HOW ARE MANITOBA'S CHILDREN DOING?

October 2012 (2nd Edition)

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The Manitoba Centre for Health Policy (MCHP) is located within the Department of Community Health Sciences, Faculty of Medicine, University of Manitoba. The mission of MCHP is to provide accurate and timely information to healthcare decision–makers, analysts and providers, so they can offer services which are effective and efficient in maintaining and improving the health of Manitobans. Our researchers rely upon the unique Population Health Research Data Repository (Repository) to describe and explain patterns of care and profiles of illness, and to explore other factors that influence health, including income, education, employment, and social status. This Repository is unique in terms of its comprehensiveness, degree of integration, and orientation around an anonymized population registry.

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We thank the University of Manitoba, Faculty of Medicine, Health Research Ethics Board for their review of this project. MCHP complies with all legislative acts and regulations governing the protection and use of sensitive information. We implement strict policies and procedures to protect the privacy and security of anonymized data used to produce this report and we keep the provincial Health Information Privacy Committee informed of all work undertaken for Manitoba Health.

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Acronyms

ACG	Adjusted Clinical Group
ADG	Aggregated Diagnosis Group
ADHD	Attention–Deficit Hyperactivity Disorder
ATC	Anatomical Therapeutic Chemical
CA	Winnipeg Community Area
CCHS	Canadian Community Health Survey
CFI	Comparative Fit Index
CFS	Child and Family Services
CFSIS	Child and Family Services Information System
CI	Confidence Interval
DPIN	Drug Program Information Network
EDI	Early Development Instrument
FASD	Fetal Alcohol Spectrum Disorder
HCM	Healthy Child Manitoba
HIV	Human Immunodeficiency Virus
IA	Income Assistance
ICD	International Classification of Disease
ICU	Intensive Care Unit
LA	Language Arts
MCHP	Manitoba Centre for Health Policy
MET	Manitoba Education Number
NFI	Bentler and Bonnet's Normed Fit Index
NNFI	Non–Normed Fit Index
PHIN	Personal Health Information Number
RHA	Regional Health Authority
Rho1	Bollen's Normed Index
RMSEA	Root Mean Square Error of Approximation
SAMIN	Social Assistance Management Information Network
SEM	Structural Equation Modeling
SES	Socioeconomic Status
STBBI	Sexually Transmitted and Blood–Borne Infection
STI	Sexually Transmitted Infection

Executive Summary

The health and development of Manitoba's children were examined in this report. It was conducted at the Manitoba Centre for Health Policy (MCHP) on behalf of Manitoba Health and at the request of the Healthy Child Committee of Cabinet. This report was meant to support and add value to the five–year Healthy Child Manitoba report, to be released in December 2012.

The main objective of this report was to provide a description of how Manitoba children are doing in the following four areas:

1. physical health and emotional health
2. safety and security
3. successful learning
4. social engagement

We used information in the Population Health Research Data Repository, a comprehensive population–based data repository developed and maintained by MCHP on behalf of the province of Manitoba. We examined key indicators in the above four areas that could be assessed over time using data from the MCHP Repository. Other objectives included examining how rates of indicators differ by age groups, income quintiles, and over time and gaining a greater understanding of factors influencing child outcomes.

Methods

The analyses in this report include virtually all children 0 to 19 years of age living in Manitoba. The information is based on where children live, not where they received services or attended school. For example, a child living in a remote area in northern Manitoba may be hospitalized in Winnipeg, but the hospitalization is attributed back to the rate for the remote area. Likewise, a child living in the Fort Garry area of Winnipeg may attend school in the Downtown area, however the educational outcomes will be attributed back to Fort Garry. Thus the results offer insight into the health, education, and social service use patterns of the child population living in the area, no matter where they receive their services.

Wherever possible, indicators were examined over a 10–year period, from 2000/01 through 2009/10. Presenting information on the indicators over several years allows us to study changes in the indicator over time. Information is also presented according to different age groups, highlighting variations in outcomes depending on developmental stage.

Indicators are presented according to geographic regions as well as socioeconomic groupings. For the geographic regions, information is reported by aggregate regions, which include a Manitoba total as well as Winnipeg, Brandon, Rural South (South Eastman, Central, and Assiniboine Regional Health Authorities (RHAs); Mid (North Eastman, Interlake, and Parkland RHAs); and the North (Burntwood, NOR–MAN, and Churchill RHAs).[1] Information at the RHA and Winnipeg Community Area level, as well as at the RHA district and Winnipeg Neighbourhood Cluster level, is available for most indicators in an online Appendix: http://umanitoba.ca/faculties/medicine/units/community_health_sciences/departmental_units/mchp/projects/mb_kids.html.

1 During the production of this report, the RHAs were amalgamated into larger regions, which do not correspond to the aggregate regions in this report. The information by RHA, districts, and Winnipeg Community Areas is provided in the online Appendix and should allow planners to determine rates of indicators for the new regions.

Information for all indicators is also displayed according to area–level income quintiles, in order to highlight the association between socioeconomic status and child health and development. These income quintiles were developed separately for urban (Winnipeg and Brandon) and rural areas (all other RHAs) by assigning average household income from the 2001 and 2006 Census to dissemination areas and ranking these from highest to lowest. Dissemination areas were then grouped into five groups or quintiles, each containing approximately 20% of the total population.

Also using these income quintiles, the degree of inequity or disparity is examined for each indicator. Lorenz curves were created to display inequities (Martens et al., 2010a). If there was complete equity in an outcome, then it would be equally distributed across income quintiles: 20% of the population would experience 20% of the outcome, 40% of the population would experience 40% of the outcome, and so on to 100%. In the Lorenz curve figures in this report, equity is represented by the dashed line running from the bottom left to top right side of the graph. Any bend away from the line of equity illustrates inequity. Gini coefficients are used to quantify the inequity displayed in the Lorenz curve. A Gini coefficient has a value between 0 and 1, with 0 indicating no inequity and 1 indicating maximum inequity.

Besides presenting indicator information by geographic and socioeconomic regions, analyses for some of the indicators go beyond cross–sectional analysis over time. Longitudinal analyses, following the same cohort of children over different stages of development, are conducted to explore why some of the outcomes occur by examining relationships between factors (such as age and sex) and the outcome. We used statistical modeling in this report to predict children's outcomes in Kindergarten (using the Early Development Instrument or EDI) and in Grade 3 (using reading and numeracy assessments).

Key Findings

Significant Changes Over Time

Of the over 35 indicators included in this report, about a third show changes in outcomes over the time period studied. Table E.1 shows the indicators where there were statistically significant changes over time. Some of these changes indicate good news stories. For example, teen pregnancy rates decreased by 10% over the 10–year study period, grade repetition decreased by 29% over the 10–year study period, and high school completion rates increased by 7% over eight years.

Some of the results summarized in Table E.1 are not as easy to interpret as these good news stories. For example, hospital utilization (episodes) decreased by 23% and physician visits decreased by 20% over the 10–year study period. Whether these decreases reflect improvements in health (and therefore less need for services), more appropriate use of services, or more difficulty accessing services over time is not clear from the data.

Table E.1: Indicators Showing Statistically Significant Changes Over Time

Indicator	Time Period	Rates/Prevalence	Change over Time
Hospital Utilization (Hospital Episodes)	2000/01 to 2009/10	44.1/1,000 to 34.1/1,000	23% decrease
Physician Visits	2000/01 to 2009/10	3.8 per child to 3.0 per child	20% decrease
ADHD	2000/01 to 2009/10	2.4% to 3.9%	66% increase
Intentional Injury Hospitalizations	2000/01-2004/05 to 2005/06-2009/10	10.0/10,000 to 8.0/10,000	20% decrease
Children in Care	2000/01-2002/03 to 2006/07-2008/09	3.7% to 4.0%	6% increase
Children in a Family Receiving Services from CFS	2000/01-2002/03 to 2006/07-2008/09	13.5% to 9.1%	33% decrease
Special Education Funding	2000/01 to 2009/10	18.7/1,000 to 38.4/1,000	106% increase
Grade Repetition	2000/01-2004/05 to 2004/05-2008/09	3.5% to 2.5%	29% decrease
Students Passing Grade 12 Math Standards Test on Time	2001/02 to 2009/10	40.0% to 45.5%	14% increase
High School Completion	2002/03 to 2009/10	76.2% to 82.1%	8% increase
Grade 7 Engagement	2007/08 to 2009/10	53.8% to 60.1%	12% increase
Teen Pregnancy	2000/01-2004/05 to 2005/06-2009/10	52.2/1,000 to 46.9/1,000	10% decrease
Youth On Income Assistance	2000/01 to 2009/10	9.7% to 8.0%	18% decrease

Differences According to Socioeconomic Status

For the majority of the indicators examined in this report, we found significant gradients across income quintiles, with children from lower income areas having poorer outcomes than children from higher income areas. The Gini coefficients and Lorenz curves associated with each indicator confirm these inequities. Table E.2 categorizes the indicators according to the degree of socioeconomic inequality associated with them. These categorizations provide decision–makers with evidence upon which to base program decisions (Martens et al., 2010a). Indicators with a low degree of inequality have risks distributed relatively equally throughout the socioeconomic groups and, therefore, require universal approaches to improving child outcomes. As the degree of socioeconomic inequality increases, there is a greater need for more targeted policies and programs alongside universal approaches. We found that for some of the indicators, the degree of inequality as measured by the Gini coefficient decreased over time (for example, youths on income assistance in rural areas), whereas for others it increased (for example, injury hospitalizations in rural areas).

Table E.2: Degree of Socioeconomic Inequality
As measured by Gini coefficients in the most recent time period and the need for targeted programs or policies

Low Degree of Inequality **Gini Coefficient < 0.060**	**Medium Degree of Inequality** **Gini Coefficient 0.060-0.200**	**High Degree of Inequality** **Gini Coefficient > 0.200**
Universal programs are needed for all indicators to ensure increasing health and well-being of the entire child population		
Universal programs and policies	**Universal and targeted programs and policies**	**Highly targeted programs and policies to supplement universal approaches**
Physician Visits (Rural)*	Hospital Utilization (Urban)	Child Mortality
Physician Visits (Urban)†	Asthma (Rural)†	Hospital Utilization (Rural)*
Asthma (Urban)	Diabetes (Rural)	Chlamydia
Children with a Mother with Mood and Anxiety Disorders (Rural)	Children with a Mother with Mood and Anxiety Disorders (Urban)*	Gonorrhea
Diabetes (Urban)	ADHD (Rural)	Suicide
Child Mood and Anxiety Disorders (Rural)	Unintentional Injury (Urban)	Injury Hospitalizations (Rural)*
Child Mood and Anxiety Disorders (Urban)*	Special Education Funding	Injury Hospitalizations (Urban)
ADHD (Urban)	Grade 3 Numeracy (Cohort Approach)	Intentional Injury Hospitalizations
Grade 3 Reading	Grade 7 Mathematics (Urban)	Unintentional Injury Hospitalizations (Rural)*
Grade 3 Reading (Cohort Approach)	Grade 7 Mathematics (Cohort Approach)	Children in Care (Rural)*
Grade 3 Numeracy	Grade 8 Reading and Writing (Cohort Approach)	Children in Care (Urban)
Grade 7 Mathematics (Rural)	Grade 12 LA Standards Test (Rural)*	Children in Families Receiving Services from CFS*
Grade 8 Reading and Writing	Grade 12 LA Standards Test (Urban)	Grade Repetition (Rural)
High School Completion (Rural)	Grade 12 Math Standards Test (Rural)*	Grade Repetition (Urban)*
Grade 7 Engagement (Rural)	Grade 12 Math Standards Test (Urban)	Teen pregnancy (Rural)
Youth on Income Assistance (Rural)†	High School Completion (Urban)	Teen pregnancy (Urban)*
	Grade 7 Engagement (Urban)†	Teen birth
	Grade 7 Engagement (Cohort Approach)	Youth on Income Assistance (Urban)

* Indicates a statistically significant increase in inequality over time in these indicators
† Indicates a statistically significant decrease in inequality over time in these indicators

Table E.3 illustrates the degree of socioeconomic inequality for rural and urban income quintile groups for each of the indicators studied. For example, there were more child deaths in the lowest income areas than expected given the percent of the population in these areas. In rural areas, 42.1% of the child mortality occurred in the 23.7% of the population that comprised R1, the lowest income group. This is clearly an indicator with a high degree of socioeconomic inequity.

Table E.3: Percent* of Outcomes in the Lowest Income Quintile for Most Recent Time Period

Indicator	Percent of outcomes that occur in the lowest income quintile (bracketed number shows the exact percent of the population in the lowest income quintile for that indicator)**	
	Rural	Urban
Physical Health		
Child Mortality	42.1% (23.7%)	46.6% (19.6%)
Hospital Utilization (Hospital Episodes)	40.0% (23.9%)	31.9% (20.2%)
Physician Visits	21.5% (23.9%)	20.8% (20.2%)
Asthma	19.5% (22.9%)	19.3% (18.5%)
Diabetes	29.3% (22.9%)	17.7% (18.5%)
Chlamydia	52.1% (22.3%)	48.0% (17.4%)
Gonorrhea	61.6% (22.3%)	59.1% (17.4%)
Emotional Health		
Attention–Deficit Hyperactivity Disorder (ADHD)	18.9% (22.9%)	20.5% (18.6%)
Children with a Mother with Mood and Anxiety Disorders	23.1% (23.5%)	24.9% (19.8%)
Child Mood and Anxiety Disorders	24.8% (22.3%)	20.9% (17.4%)
Suicide	67.4% (22.4%)	63.0% (17.3%)
Safety and Security		
Injury Hospitalizations	43.6% (23.9%)	35.8% (19.9%)
Intentional Injury Hospitalizations	58.5% (23.9%)	49.9% (19.9%)
Unintentional Injury Hospitalizations	42.0% (23.9%)	33.0% (19.9%)
Children in Care	55.8% (24.2%)	66.7% (20.2%)
Children in Families Receiving Services from CFS	43.8% (24.2%)	56.2% (20.2%)
Successful Learning		
Special Education Funding	19.5% (15.4%)	28.1% (18.4%)
Grade Repetition	30.6% (17.1%)	48.7% (20.2%)
Grade 3 Reading	14.1% (15.7%)	16.3% (19.2%)
Grade 3 Reading (Cohort Approach)†	13.5% (17.4%)	14.8% (18.1%)
Grade 3 Numeracy	13.8% (15.7%)	16.0% (19.2%)
Grade 3 Numeracy (Cohort Approach)†	13.1% (17.4%)	14.0% (18.1%)
Grade 7 Mathematics	12.7% (14.5%)	13.8% (17.6%)
Grade 7 Mathematics (Cohort Approach)†	12.2% (17.0%)	11.5% (16.1%)
Grade 8 Reading and Writing	12.2% (14.9%)	13.7% (17.0%)
Grade 8 Reading and Writing (Cohort Approach)†	12.0% (17.6%)	11.3% (15.6%)
High School Completion	11.5% (13.8%)	10.2% (15.3%)
Grade 12 Language Arts Standards Test	10.3% (21.9%)	6.8% (15.1%)
Grade 12 Mathematics Standards Test	9.2% (21.9%)	6.6% (15.1%)
Social Engagement and Responsibility		
Grade 7 Engagement	12.6% (14.5%)	13.5% (17.6%)
Grade 7 Engagement (Cohort Approach)†	12.2% (17.0%)	10.9% (16.1%)
Teen Pregnancy	45.0% (22.5%)	43.9% (17.5%)
Teen Birth	48.7% (22.5%)	51.5% (17.5%)
Youth On Income Assistance	23.4% (22.3%)	53.6% (18.1%)

* Values are adjusted for age and/or sex where applicable

** If outcomes are distributed equally amongst the five income quintiles in rural and urban Manitoba, then the percent of outcomes should equal the percent of population in income groups, i.e., around 20% of outcomes in 20% of the population

† Includes all children from a birth cohort who should have been assessed if they had progressed through the school system as expected (e.i., for grade 3 assessments, all children born in 2001; for grade 7 assessments, all children born in 1997; for grade 8 assessment, all children born in 1996)

Modeling of Successful Learning from Kindergarten to Grade 3

There was a strong association between children's developmental health at school entry (as measured by the EDI) and their outcomes for Grade 3 reading and numeracy assessments, which suggests that academic trajectories are established very early. Outcomes in Kindergarten and in Grade 3 are influenced by multiple factors, including early biological vulnerability, measured by prenatal health and health at birth. Other strong predictors of outcomes in Kindergarten and Grade 3 were the presence of an intellectual disability, mother's age at first childbirth, sex, age, involvement with Child and Family Services, family size, emotional health in Grade 3, and whether or not breastfeeding was initiated at hospital discharge. When material deprivation, measured by individual and area–level of measures of socioeconomic status, was added into the model, it was strongly related to prenatal health, health at birth, and Kindergarten and Grade 3 outcomes. In fact, its influence in the model was so strong that it eclipsed many of the other factors. This is not to say these factors are not important influences, but that many are strongly related to material deprivation. Efforts to improve socioeconomic status (or to reduce material deprivation) at every stage in development would contribute to improved school outcomes.

Although academic trajectories are established early, they are not necessarily unchanging for all children. We found that for about one quarter of Manitoba children their trajectories changed between Kindergarten and Grade 3. For example, there were children who started out having difficulties in Kindergarten, but who were performing well in Grade 3. Children in lower income areas were more likely to change trajectory pathways than children from higher income areas, and these changing trajectories may present opportunities for interventions that set more children on positive trajectories.

Conclusions

This report confirms previous research findings that children from lower socioeconomic areas carry the largest burden of illness, use more health care and social services, and have poorer educational outcomes compared to children with higher socioeconomic backgrounds. For many indicators, this inequality has remained consistent over time.

Recommendations

The following recommendations are discussed in the final chapter of this report:

- Short and long–term strategies to address health inequities. These strategies must be universal but proportionately targeted according to level of disadvantage.
- Programs and policies that improve health behaviors, coupled with policies that address the broader living conditions that contribute to poor health.
- Targeted strategies aimed at improving sexual health among teenagers.
- Mental health promotion strategies for children and youth.
- Integrated service delivery for children and youth and their families.
- Address the needs of Aboriginal children.
- Programs need to be evaluated to determine what works for children.
- Improvements in the collection of some health, social, and education data.

Chapter 1: Introduction

Background and Objectives

This report was conducted at the Manitoba Centre for Health Policy (MCHP) on behalf of **Manitoba Health**[2], and at the request of the Healthy Child Committee of Cabinet, within the government of Manitoba. The **Healthy Child Manitoba** (HCM) Act was proclaimed in December of 2007 to "guide the development, implementation and evaluation of the Healthy Child Manitoba Strategy in government and in the Manitoba community" (Government of Manitoba, 2007). The act specifies that at least once every five years, the HCM Office must present the Minister chairing the Healthy Child Committee of Cabinet with a report on the status of Manitoba's children so as to monitor child development and the effects of the HCM Strategy. The MCHP report was requested in order to support and add value to the legislated five–year HCM report. While this MCHP report will be a companion to the HCM report, it is separate and independent from it.

The objective of this report was to provide a description of how Manitoba children are doing in the following four areas:

1. physical health and emotional health
2. safety and security
3. successful learning
4. social engagement

These four areas correspond to the four cross–departmental outcome goals of HCM. Led by the Healthy Child Committee of Cabinet, HCM bridges 10 government departments to improve the well–being of Manitoba's children and youth. The HCM Office researches best practices and models and, with community partners, adapts these to Manitoba's unique situation. The HCM strategy includes a mix of universal, targeted, and clinical programs for healthy child and adolescent development, from the prenatal period to adulthood. The HCM Office then evaluates programs and services to find the most effective ways to achieve the best possible outcomes for Manitoba children, families, and communities (Government of Manitoba, 2007).

This report uses information in the **Population Health Research Data Repository (Repository)**, a comprehensive population–based data repository developed and maintained by MCHP on behalf of the province of Manitoba. Key indicators in the above four areas that could be assessed over time using MCHP Repository data were examined. To develop indicators, this report built upon previous and recent MCHP reports including the *Manitoba Child Health Atlas Update* (Brownell et al., 2008), *The **Early Development Instrument** in Manitoba* (Santos, Brownell, Ekuma, Mayer, & Soodeen, 2012), and *Health Inequities in Manitoba* (Martens et al., 2010a).

2 Terms in **bold** typeface are defined in the Glossary at the end of this report.

Structure of This Report

Study Population

The health and development of Manitoba's children are examined in this report. For the purposes of this report, "children" are defined as those 0 to 19 years of age. For most indicators, results are not only reported for all ages together (i.e., 0 to 19 years) but by the following age groups: 0 to 5 years, 6 to 12 years, and 13 to 19 years. For some indicators where 18– and 19–year–olds may be treated as adults (e.g., hospitals), analyses are also reported for 13– to 17–year–olds; this information can be found in the online Appendix at http://umanitoba.ca/faculties/medicine/units/community_health_sciences/departmental_units/mchp/projects/mb_kids.html.

Timeframe of Report

In this report, wherever possible, indicators are presented over a 10–year period, from 2000/01 through 2009/10. Presenting information on the indicators over several years allows us to examine changes in the indicator over time. For indicators that are commonly occurring, such as physician visits, values for each year in the 10–year period are reported. For indicators that are less frequent, such as child deaths, multiple years of data are combined to report on the outcomes.

Presentation of Indicators

In this report, indicators are presented according to geographic regions as well as socioeconomic groupings. For the geographic regions, information is reported by aggregate regions, which include a Manitoba total as well as Winnipeg, Brandon, **Rural South** (South Eastman, Central, and Assiniboine **Regional Health Authorities (RHAs)**), **Mid** (North Eastman, Interlake, and Parkland RHAs) and the **North** (Burntwood, NOR–MAN, and Churchill RHAs).[3] Information at the RHA and **Winnipeg Community Area (CA)** level, as well as at the RHA district and Winnipeg Neighbourhood Cluster level, is available for most indicators in the online Appendix.

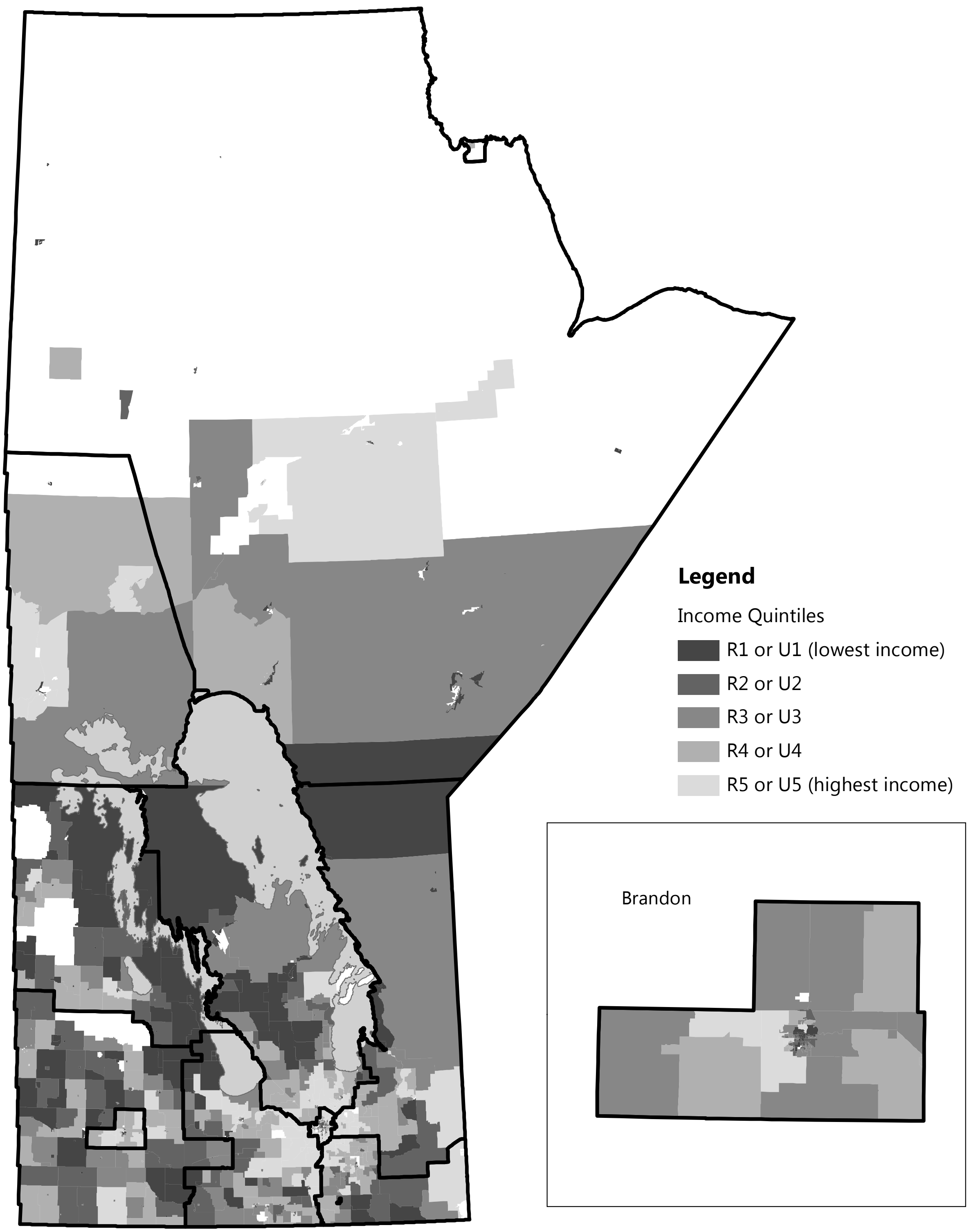
In order to highlight the association between socioeconomic status (SES) and child health and development, information for all indicators is also displayed according to area–level **income quintiles.** These income quintiles were developed separately for urban (Winnipeg and Brandon) and rural (all other RHAs) areas by assigning average household income from the 2001 and 2006 **Census** to **dissemination areas (DAs)** and ranking these from highest to lowest. Dissemination areas were then grouped into five groups or quintiles, each containing approximately 20% of the total population. In rural areas, R1 includes children living in the lowest income quintile areas, whereas R5 represents the highest income quintile neighbourhoods. Children residing in institutions such as psychiatric facilities or prisons, or who are **wards of the Public Trustee**, are not assigned to an income quintile and are grouped into the category "**Income Unknown**"[4]. For a small proportion of children who are wards of **Child and Family Services (CFS)**, the postal code associated with them is actually a Child and Family Services office, so these are also categorized as Income Unknown. Additionally, children living in areas reporting no income in the Census and areas with populations less than 250 persons are also grouped in this category. Maps of rural and urban quintile assignment by dissemination area for Manitoba, Brandon, and Winnipeg can be found in Figures 1.1 and 1.2.

3 During the production of this report, the RHAs were amalgamated into larger regions, which do not correspond to the aggregate regions in this report. The information by RHA and RHA districts provided in the online appendix should allow planners to determine rates of indicators for the new regions.

4 In 2000, 0.7% of all Manitoba children 0 to 19 years of age were categorized as "income unknown". In 2009, this value was 1.7%.

Updated November 1, 2012

Figure 1.1: Distribution of Rural and Urban Income Quintiles in Manitoba
2006 Census Dissemination Areas

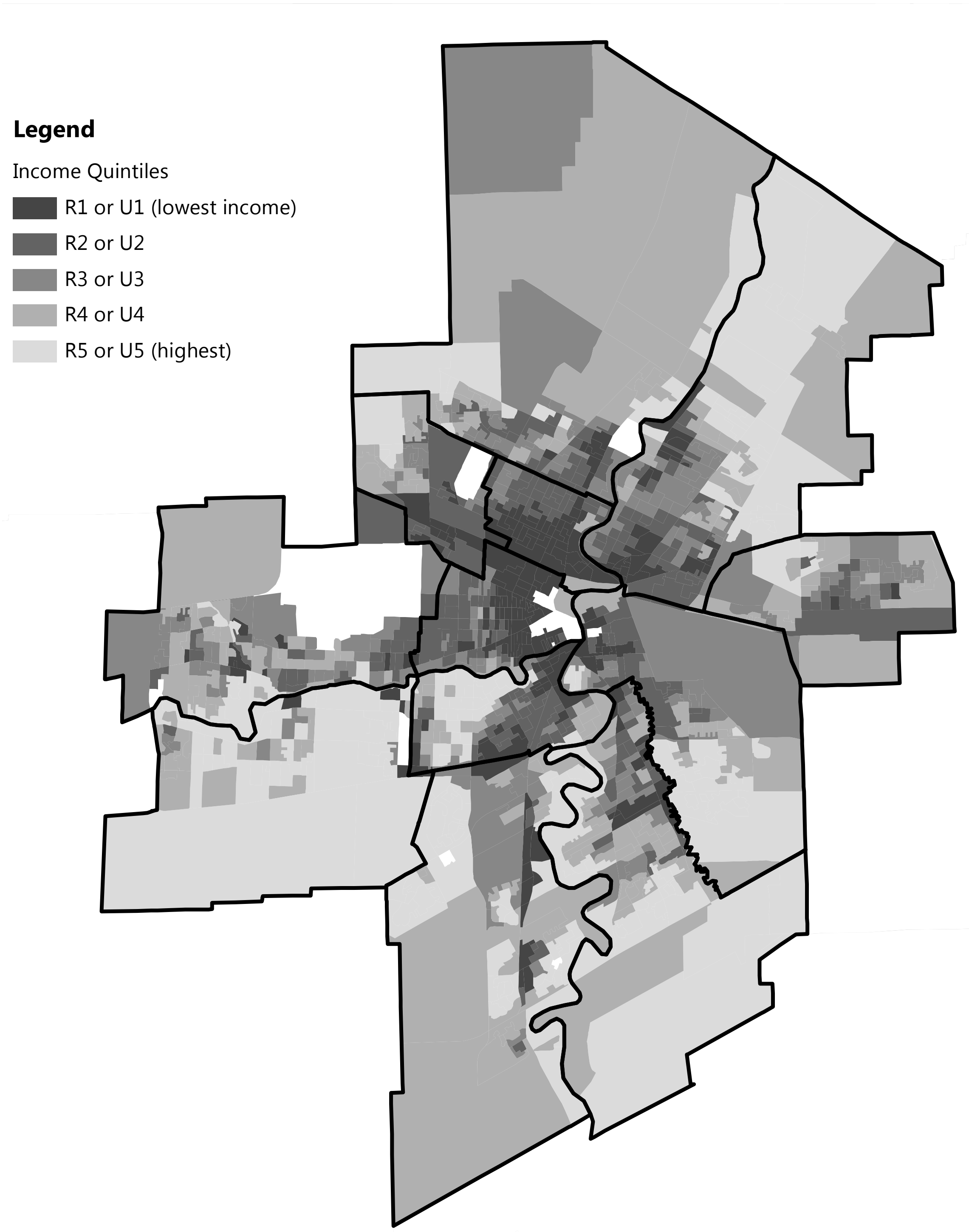


Charles Burchill, Manitoba Centre for Health Policy. January 2009
Based on 20% Population groups of Average Household Income by Census Dissemenination Areas. Census of Canada 2006.

Note: White areas in map indicate Census areas which are nc enumerated (such as parks), are suppressed due to small numbers, or have not been reported for other reasons.

Updated November 1, 2012

Figure 1.2: Distribution of Urban Income Quintiles in Winnipeg
2006 Census Dissemination Areas



Charles Burchill, Manitoba Centre for Health Policy. January 2009
Based on 20% Population groups of Average Household Income by Census Dissemenination Areas. Census of Canada 2006.

Note: White areas in map indicate Census areas which are not enumerated (such as parks), are suppressed due to small numbers, or have not been reported for other reasons.

Also using income quintiles, the degree of inequity or disparity is examined for each indicator. Health inequity is unfair and avoidable or remediable differences in health among social groups (Bonnefoy, Morgan, Kelly, Butt, & Bergman, 2007). To display inequities, **Lorenz curves** are used (Martens et al., 2010a). If there was complete equity in an outcome, then it would be equally distributed across income quintiles: 20% of the population would experience 20% of the outcome, 40% of the population would experience 40% of the outcome, and so on to 100%. In the Lorenz curve figures in this report, equity is represented by the dashed line running from the bottom left to top right side of the graph. Any bend away from the line of equity illustrates inequity. **Gini coefficients** (described below under "Methods Used in This Report") are used to quantify the inequity displayed in the Lorenz curve.

Besides presenting indicator information by geographic and socioeconomic regions, analyses for some of the indicators go beyond cross–sectional analysis over time. Longitudinal analyses, following the same cohort of children over different stages of development, are used to explore why some of the outcomes occur by examining relationships between factors (such as age, sex, mother's age at birth of first child) and the outcome. The health indicators presented in this report have a significant impact on the functioning and well–being of children who experience them. Fortunately, many of the conditions are relatively rare and do not affect the majority of children in Manitoba. Thus this longitudinal analysis focuses on education indicators, as the majority of Manitoba children are assessed on their performance in school. This analysis is critical for understanding the relative importance of factors that contribute to childhood well–being. It highlights the crucial role socioeconomic status plays in children's outcomes and confirms the importance of our focus throughout the report on the association between socioeconomic status and the indicators and on quantifying inequities.

Methods Used in This Report

Population–Based Approach

The analyses in this report include virtually all children 0 to 19 years of age living in Manitoba. Furthermore, the information is based on where children live, not where they received services or attended school. For example, a child living in a remote area in northern Manitoba may be hospitalized in Winnipeg, but the hospitalization is attributed back to the **rate** for the remote area. Thus the results offer insight into the complete health and health care use patterns of the child population living in the area, no matter where they receive their care. Likewise, for education outcomes, information is presented on where children live as opposed to where they attend school, so as to focus on the important relationship between socioeconomic conditions and educational outcomes.

Datasets Used in this Report

The information presented in this report comes from the Population Health Research Data Repository, which is housed at MCHP. Most of the data in the Repository are derived from administrative claims data, that is, data obtained in order to administer health and social services. The data in the Repository are "anonymized" meaning that prior to being sent to MCHP, all identifying information, such as name and street address, is removed and the **personal health information number (PHIN)** and **Manitoba Education (MET)** number are scrambled so that the real numbers cannot be identified. Thus the Repository only contains this anonymized information, which is linkable across files and over time.

The following database files from the Repository were used for the analyses in this report:

- **Hospital Discharge Abstracts** (records of hospitalizations)
- **Medical Claims** (records of **ambulatory visits** to physicians)
- **Manitoba Health Insurance Registry** (records for the time a person is registered as a resident of Manitoba, as well as their age, sex, and area of residence)
- **Vital Statistics** (records of deaths and causes of death)
- **Pharmaceutical Claims** (records of medications prescribed from the **Drug Program Information Network (DPIN)**)
- Public use Census files (for area–level socioeconomic information for years 2001 and 2006)
- **Income Assistance (IA)** receipt (an individual level measure of low socioeconomic status from the **Social Assistance Management Information Network (SAMIN)**)
- **Child Welfare Involvement** (information on **children in care** and families receiving services from the **Child and Family Services Information System (CFSIS)**)
- School enrolment, assessment, and high school marks data from Manitoba Education
- **Cadham Provincial Laboratory database** (for information on laboratory test results)
- **Early Development Instrument (EDI)** (a measure of development at Kindergarten)
- **Families First Screen** (measure of biological, social, and family risk factors for families with newborns)
- Manitoba FASD Centre database (records of children assessed at the FASD Centre)
- **Canadian Community Health Survey (CCHS)** (for individual–level information on education level)

Depending on the source of data, information is generated for **fiscal years**, calendar years, or school years. Fiscal years run from April 1 to March 31 of the following year and are represented, for example, as 2000/01. Most healthcare use data are reported in fiscal years. Mortality data are reported in calendar years. Education indicators are reported by school years (**academic years**), which run from September 1 to June 30 of the following year, and are also represented, for example, as 2000/01.

How rates were generated

To compare and estimate rates in this report, the count of events for each indicator was modeled using a statistical technique called a **generalized linear model (GLM)**, which is suitable for non–normally distributed data such as counts (e.g., number of physician visits). Various distributions were used for different indicators depending on which provided the best fit of the data, including **Poisson distribution** (for very rare events, such as death) and **negative binomial distribution** for relatively rare but highly variable events, such as children in care. Most models included the covariates of age and sex to "adjust" for differences in underlying regional, or income quintile, age and sex distributions.

In order to obtain regional and income quintile rates for the analyses, relative risks were estimated for each region or income quintile. To estimate relative risks or rates rather than counts of events, the log of the population count was included in the model as an offset. Estimated rates were calculated for each group (region or income quintile) by multiplying the Manitoba crude reference rate by the appropriate relative risk estimate (Martens et al., 2010a).

Adjusted Rates, Crude Rates, and Statistical Testing of Rates

Most of the indicators in this report are given as age– and sex–**adjusted rates** through the statistical modeling described above. This rate adjustment allows for a fair comparison among areas or income quintiles that have different age and sex distributions. Adjusted rates show what the rate would be if each area's population had the same age and sex composition as the overall Manitoba population for that time period. For indicators where models could not be fitted, adjusted rates could not be computed, so crude (unadjusted) rates are reported instead. All graphs indicate whether adjusted or crude rates are displayed.

Updated February 18, 2015

Statistical testing indicates how much confidence to put in the results. If a difference is "statistically significant", then the difference is large enough that we are confident it is not just due to chance or random fluctuation. The notation "p<0.05" indicates the degree of confidence placed in the statistical difference. It means that the probability of finding a difference as large as was found by chance alone is less than 5%, and we are 95% sure that the difference is real. Likewise, the notation "p<0.01" indicates that we are 99% sure that the difference is real.

Lorenz Curves and Gini Coefficients

Lorenz curves and Gini coefficients are used in this report to indicate inequities in the indicators. A Gini coefficient has a value between 0 and 1; zero indicates no inequity and 1 indicates maximum inequity. The Gini coefficient represents the fraction of the area between the Lorenz curve and the line of equity (described previously). **Confidence intervals (CI)** of the Gini coefficients were derived using **bootstrapping** techniques.[5]

The mathematical approach developed by Martens et al. (2010), was used to adjust the Lorenz curves and Gini coefficients for differences in age and sex structures of the income quintiles. In each Lorenz curve graph, the percentage of the entire population that is within each income quintile group (R1 through R5 for the rural areas, U1 through U5 for the urban areas) is given along the horizontal axis. These values are cumulative, so for example, if the income quintiles in the rural areas all contain exactly 20% of the population, the value for R1 on the horizontal axis would be 20%, for R2 it would be 40%, for R3 it would be 60% and so on. Because some indicators only include some members of the population (e.g., females for **teen pregnancies**) and may be restricted to certain ages of the population (e.g., for teen pregnancy – only 15– to 19–year–olds were included for the Lorenz curves), the income quintiles do not usually contain exactly 20% of the population. Statistical tests for significant differences in Gini coefficients for the rural and urban income quintiles in the first and last time period[6] and for statically significant differences between Gini coefficients for rural and urban income quintiles in the last time period[7] are available in Appendix 1 at the end of this report.

Following Martens et al., (2010), we used the following cut–offs for categorizing Gini coefficients according to degree of inequity: < 0.060, low degree of inequity; 0.060–0.200, moderate degree of inequity; and > 0.200, high degree of inequity.

5 The 95% lower and upper confidence limits for the Gini coefficient were obtained from the 2.5 percentile and 97.5 percentile of 200 bootstrapped Gini coefficients.

6 When testing if the Rural/Urban Gini coefficient in the first time period was statistically different from the Rural/Urban Gini coefficient in the most recent time period, the difference of 200 bootstrapped Rural/Urban Gini in the first time period and 200 bootstrapped Rural/Urban Gini in the most recent time period were calculated. If the 2.5 percentile and the 97.5 percentile of these Gini differences did not contain zero, then the conclusion was that the Rural/Urban Gini coefficient in the first time period was statistically different from the Rural/Urban Gini coefficient in the most recent time period.

7 When testing if the Rural Gini in the most recent time period was statistically different from the Urban Gini in the most recent time period, the difference of 200 bootstrapped Rural Ginis in the most recent time period and 200 bootstrapped Urban Gini in the most recent time period were calculated. If the 2.5 percentile and the 97.5 percentile of these Gini differences did not contain zero, then the conclusion was that the Rural Gini in the most recent time period was statistically different from the Urban Gini in the most recent time period.

Notation in the graphs

In order to simplify the graphs, symbols are used to signify statistical differences. The following notation is used in the graphs:

- an "f" beside an aggregate region's name indicates that the rate for that region was statistically significantly different than the Manitoba average in the first time period[8]
- an "l" beside an aggregate region's name indicates that the rate for that region was statistically significantly different than the Manitoba average in the last time period[9]
- a "t" beside an aggregate region's name or beside an income quintile indicates a statistically significant change over time for that region or income quintile[10]
- an "*" below a year on an income quintile graph indicates a statistically significant SES gradient (a trend across income quintiles) for that time period[11]
- an "s" indicates **suppression** of results to ensure confidentiality[12]

All comparisons are made to the Manitoba average (the reference group).

Difference Between Prevalence and Rate

Prevalence refers to the percentage of the population that has a certain condition at a given point in time (point prevalence) or over a given period of time (period prevalence). It is calculated using a numerator of people with a given condition over a denominator of the entire population, which gives the portion of the population that has the condition during a given time period. For example, for **diabetes**, we calculate the prevalence over a three–year time period, which would include people who had diabetes before the time period began and those newly diagnosed during the time period. In prevalence, a person contributes only once to the percentage.

A rate refers to the number of occurrences of an event over a given time period. It is calculated by using the number of events in the numerator over a denominator of the entire population. In a rate, a child can contribute more than one event over the time period—for example, one child could be hospitalized more than once during the year.

Modeling of Successful Learning from Kindergarten to Grade 3

We used **structural equation modeling (SEM)** in this report to predict children's outcomes in Kindergarten (using the Early Development Instrument or EDI) and in Grade 3 (using reading and numeracy assessments). In using SEM, we modeled the children's average EDI scores for each of the five EDI domains (Chapter 5, Modeling of Successful Learning from Kindergarten to Grade 3 for Children at Risk for list of domains) and their average reading and numeracy scores (Chapter 5, Grade 3/4 Assessments for description of Grade 3 reading and numeracy assessments). The EDI and Grade 3 assessment scores were modeled as continuous variables in the SEMs.

SEM is a statistical technique used to test a theory. SEM specifies a model that represents predictions of that theory among constructs measured with indicators (Kline, 2010). Based on a theory relating the constructs of "prenatal health", "health at birth", and "material deprivation" through early childhood to both EDI and Grade 3 outcomes, we specified models of predictor variables measured at birth and through early childhood.[13]

8 A **contrast statement** was written to test for a statistical difference in the GLM.
9 See footnote above.
10 See footnote above.
11 An **estimate statement** treating time as a continuous variable was included in the GLM.
12 Rates, prevalence, and percentages were suppressed where the counts upon which these were based represented one to five events. This practice avoids breaches of confidentiality and is similar to the way in which Statistics Canada reports data.
13 We used the child's fourth birthday for EDI outcomes and the child's eighth birthday for Grade 3 outcomes.

In SEM, it is important to assess how well our conceptual models match up with the observed data, which is referred to as "goodness of fit." The following indices were used in judging the goodness of fit of our SEMs (Hatcher, 1994): **Bentler's Comparative Fit Index (CFI)**; **Bentler and Bonnet's Normed Fit Index (NFI)**; Bentler and Bonnet's **Non–Normed Fit Index (NNFI)**, and **Bollen's Normed Index (Rho1)**. For each of these indices, all our models had values above 0.9, indicating a good fit (Hatcher, 1994). Also considered in assessing the goodness of fit of our models is the **Root Mean Square Error of Approximation (RMSEA)** (Hatcher, 1994); all values in our models were less than 0.06 indicating a good fit.

We also used multinomial **logistic regression** to model developmental pathways from Kindergarten to Grade 3. Separate logistic regressions were also done for each of four developmental pathways.

All data management, programming, and analyses were performed using SAS® version 9.2.

What's in This Report?

The following provides a list of chapters and indicators within those chapters.

- Chapter 2: Demographics
- Chapter 3: Physical and Emotional Health
  - Child Mortality
  - Causes of Child Mortality
  - Hospital Utilization
  - Causes of Hospitalization
  - Physician Visits
  - Asthma
  - Diabetes
  - Sexually Transmitted Infections
    - Chlamydia
    - Gonorrhea
    - Syphilis
    - Hepatitis B
    - HIV
  - Children Living with a Mother with Mood and/or Anxiety Disorders
  - Child Mood and/or Anxiety Disorders
  - Attention–Deficit Hyperactivity Disorder
  - FASD
  - Suicide
- Chapter 4: Safety and Security
  - Injury Hospitalization
  - Causes of Injury Hospitalization
  - Intentional Versus Unintentional Injury Hospitalization
  - Children in Care
  - Children in a Family Receiving Services from Child and Family Services
- Chapter 5: Successful Learning
  - Special Education Funding
  - Grade Repetition
  - Grade 3/4 Assessments

Grade 3 Assessment in Reading
Grade 3 Assessment in Numeracy
Grade 7 Assessment in Mathematics
Grade 8 Assessment in Reading and Writing
Grade 12 Standards Tests
Grade 12 Language Arts Standards Test
Grade 12 Mathematics Standards Test
High School Completion
Modeling of Successful Learning from Kindergarten to Grade 3
Relationship between Language and Cognitive Development in Kindergarten and Grade 3 Reading
Relationship between Language and Cognitive Development in Kindergarten and Grade 3 Numeracy
SEMs with Other EDI Domains
Modeling of Successful Learning from Kindergarten to Grade 3 for Children at Risk
EDI to Grade 3 Pathways
Reading
Numeracy
Chapter 6: Social Engagement and Responsibility
Grade 7 Assessment of Student Engagement
Teen Pregnancy
Teen Births
Youths on Income Assistance

Information not provided in this report, such as indicators at the RHA, District, Winnipeg CA, and Winnipeg neighbourhood level and additional graphs and tables as indicated in this report, can be found in Excel spreadsheets in the online Appendix.

What's Not in This Report

Some key indicators (e.g., infant mortality, two–year immunization rates, dental extractions for preschool children) have been left out of this report because they are explored in other recently released or upcoming MCHP reports. These reports include:

Perinatal Services and Outcomes in Manitoba (Heaman et al., 2012)
Manitoba Immunization Study (Hilderman et al., 2011)
Health Inequities in Manitoba (Martens et al., 2010a)

Chapter 2: Demographics

In this chapter, information is provided about the age and sex composition of aggregate regions and income quintiles for 2000 and 2009. Information is provided in two different formats: summary tables and figures breaking down the area populations into three large age groups (0 to 19, 20 to 64, 65+ years) and figures showing **population pyramids** for each aggregate region and income quintile, breaking the population down by sex and by five–year age groupings.

Tables 2.1 to 2.4 and Figures 2.1 and 2.2 show the summary information on aggregate regions by the three large age groups for 2000 and 2009. From this information it is easy to see the proportion of each region's population that children 0 to 19 years of age comprise. The Manitoba population grew by over 6% between 2000 and 2009; however this growth did not occur in the child population, which remained relatively stable between 2000 and 2009. All of the aggregate regions showed decreases over the study period in the proportion of their population made up of children. The North has the highest proportion of the total population made up of children at 39.5% in 2009; Winnipeg has the lowest proportion of the population comprising children at 23.6% in 2009. Summary tables and graphs for each RHA can be found in the online Appendix.

Table 2.1: Demographic Summary by Region: Number of People in Each Region by Age Group, 2000

Region	Age Groups (Years)		
	0-19	20-64	65+
Brandon	13,061	27,476	6,643
Winnipeg	164,643	393,662	89,021
Rural South	68,726	121,146	32,905
Mid	45,408	89,269	23,506
North	28,842	38,774	3,528
Manitoba	322,564	671,951	157,166

Table 2.2: Demographic Summary by Region: Proportion of Region Population in Each Age Group, 2000

Region	Age Groups (years)		
	0-19	20-64	65+
Brandon	27.68%	58.24%	14.08%
Winnipeg	25.43%	60.81%	13.75%
Rural South	30.85%	54.38%	14.77%
Mid	28.71%	56.43%	14.86%
North	40.54%	54.50%	4.96%
Manitoba	28.01%	58.35%	13.65%

Table 2.3: Demographic Summary by Region: Number of People in Each Region by Age Group, 2009

Region	Age Groups (Years)		
	0-19	20-64	65+
Brandon	12,908	31,896	7,212
Winnipeg	162,276	428,745	95,982
Rural South	72,217	135,801	34,592
Mid	42,510	93,036	26,188
North	29,020	40,154	4,227
Manitoba	322,447	731,289	169,374

Table 2.4: Demographic Summary by Region: Proportion of Region Population in Each Age Group, 2009

Region	Age Groups (Years)		
	0-19	20-64	65+
Brandon	24.82%	61.32%	13.87%
Winnipeg	23.62%	62.41%	13.97%
Rural South	29.77%	55.98%	14.26%
Mid	26.28%	57.52%	16.19%
North	39.54%	54.71%	5.76%
Manitoba	26.36%	59.79%	13.85%

Tables 2.5 to 2.8 and Figures 2.3 and 2.4 show the summary information for income quintiles. As with the aggregate regions, all income quintiles showed a decrease between 2000 and 2009 in the proportion of the population comprising 0– to 19–year–olds, with the exception of R2 (second lowest rural income quintile) where the proportion of the population comprising children remained the same. Among the rural income areas, R1 (lowest) had the highest proportion of the population that were children at 36.4% in 2009. In urban areas, the income quintile with the highest proportion of the population made up of children was U5 (highest income) at 25.2% in 2009.

Figure 2.1: Summary of Region Demographics, 2000
Proportion of region population in each age group

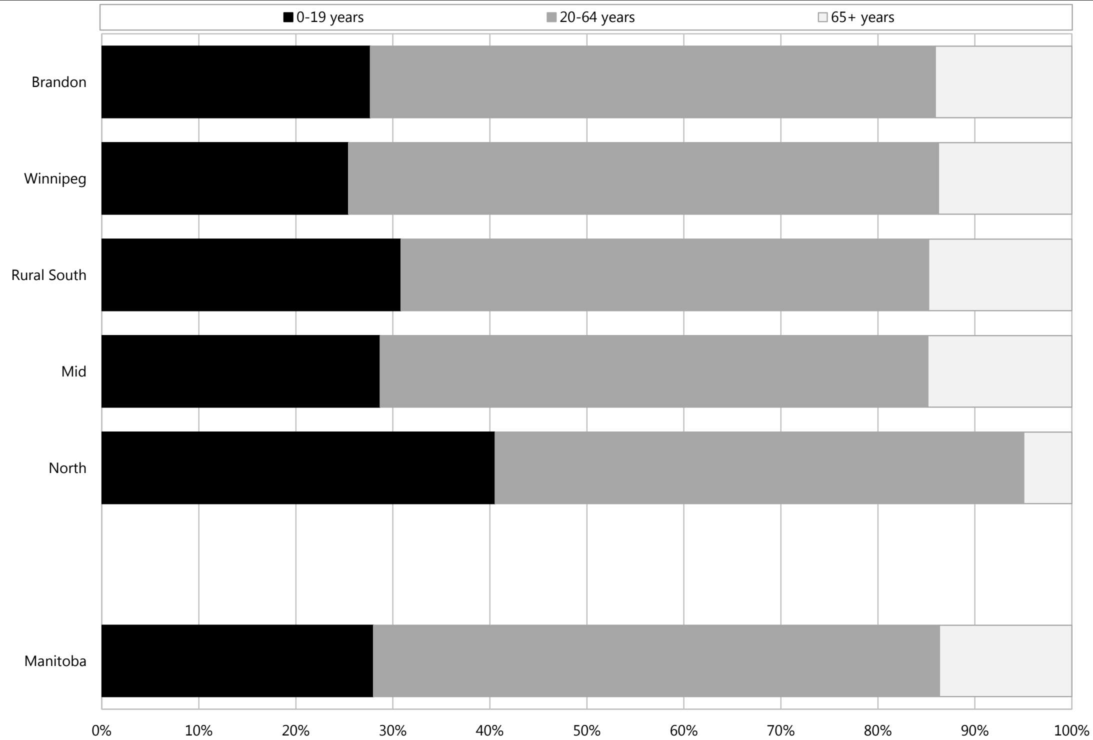


Figure 2.2: Summary of Region Demographics, 2009
Proportion of region population in each age group

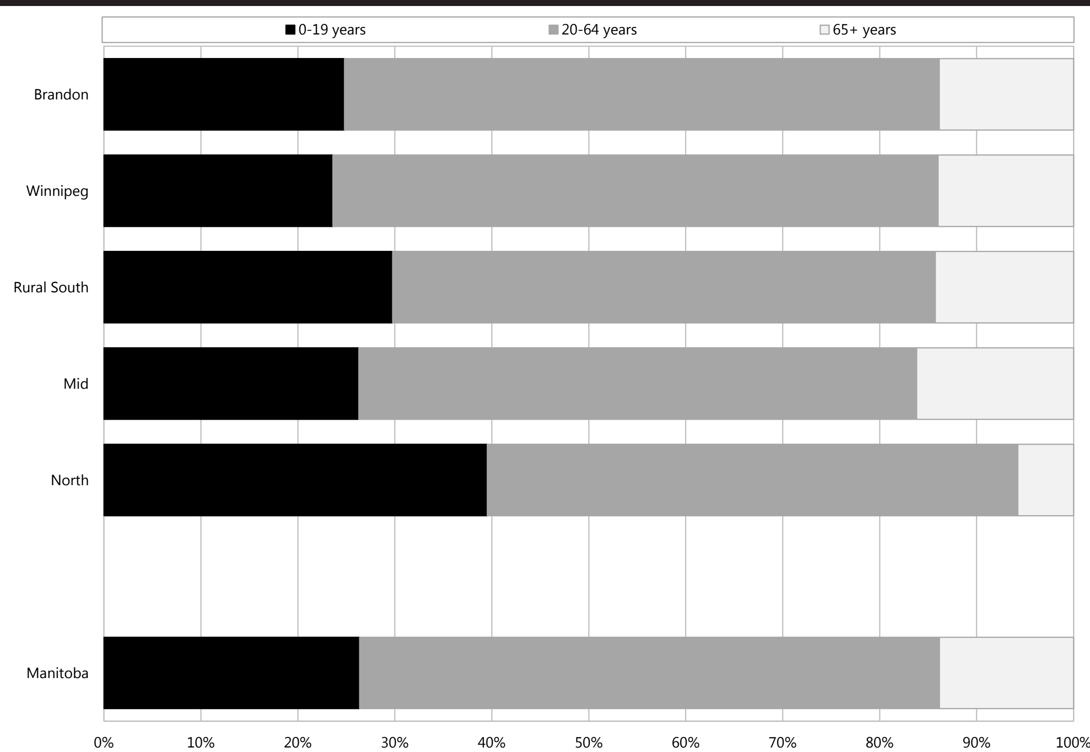


Table 2.5: Demographic Summary: Number of People in Each Income Quintile by Age Group, 2000

Income Quintile	Age Groups (Years)		
	0-19	20-64	65+
Income Unknown	2,114	2,442	5,426
Rural 1 (R1) – Lowest Income	33,913	45,214	9,936
R2	26,381	47,561	15,036
R3	25,866	48,588	14,496
R4	27,588	50,218	11,764
R5 – Highest Income	29,069	57,263	8,119
Urban 1 (U1) – Lowest Income	33,398	80,122	23,149
U2	33,640	84,205	20,677
U3	34,073	84,263	20,169
U4	37,630	86,136	14,747
U5 – Highest Income	38,892	85,939	13,647

Table 2.6: Demographic Summary: Proportion of Income Quintile Population in Each Age Group, 2000

Income Quintile	Age Groups (Years)		
	0-19	20-64	65+
Income Unknown	21.18%	24.46%	54.36%
Rural 1 (R1) – Lowest Income	38.08%	50.77%	11.16%
R2	29.65%	53.45%	16.90%
R3	29.08%	54.62%	16.30%
R4	30.80%	56.07%	13.13%
R5 – Highest Income	30.78%	60.63%	8.60%
Urban 1 (U1) – Lowest Income	24.44%	58.62%	16.94%
U2	24.29%	60.79%	14.93%
U3	24.60%	60.84%	14.56%
U4	27.17%	62.19%	10.65%
U5 – Highest Income	28.09%	62.06%	9.86%

Table 2.7: Demographic Summary: Number of People in Each Income Quintile by Age Group, 2009

Income Quintile	Age Groups (years)		
	0-19	20-64	65+
Income Unknown	5,417	5,989	5,847
Rural 1 (R1) – Lowest Income	34,140	48,436	11,103
R2	27,832	50,793	14,773
R3	26,499	52,439	14,824
R4	25,693	54,505	13,570
R5 – Highest Income	28,564	60,906	9,762
Urban 1 (U1) – Lowest Income	35,151	89,801	21,902
U2	33,274	92,198	19,483
U3	33,083	91,179	21,455
U4	35,568	92,686	18,504
U5 – Highest Income	37,226	92,357	18,151

Table 2.8: Demographic Summary: Proportion of Income Quintile Population in Each Age Group, 2009

Income Quintile	Age Groups (Years)		
	0-19	20-64	65+
Income Unknown	31.40%	34.71%	33.89%
Rural 1 (R1) – Lowest Income	36.44%	51.70%	11.85%
R2	29.80%	54.38%	15.82%
R3	28.26%	55.93%	15.81%
R4	27.40%	58.13%	14.47%
R5 – Highest Income	28.79%	61.38%	9.84%
Urban 1 (U1) – Lowest Income	23.94%	61.15%	14.91%
U2	22.95%	63.60%	13.44%
U3	22.70%	62.57%	14.72%
U4	24.24%	63.16%	12.61%
U5 – Highest Income	25.20%	62.52%	12.29%

Figure 2.3: Summary of Income Quintile Demographics, 2000
Proportion of income quintile population in each age group

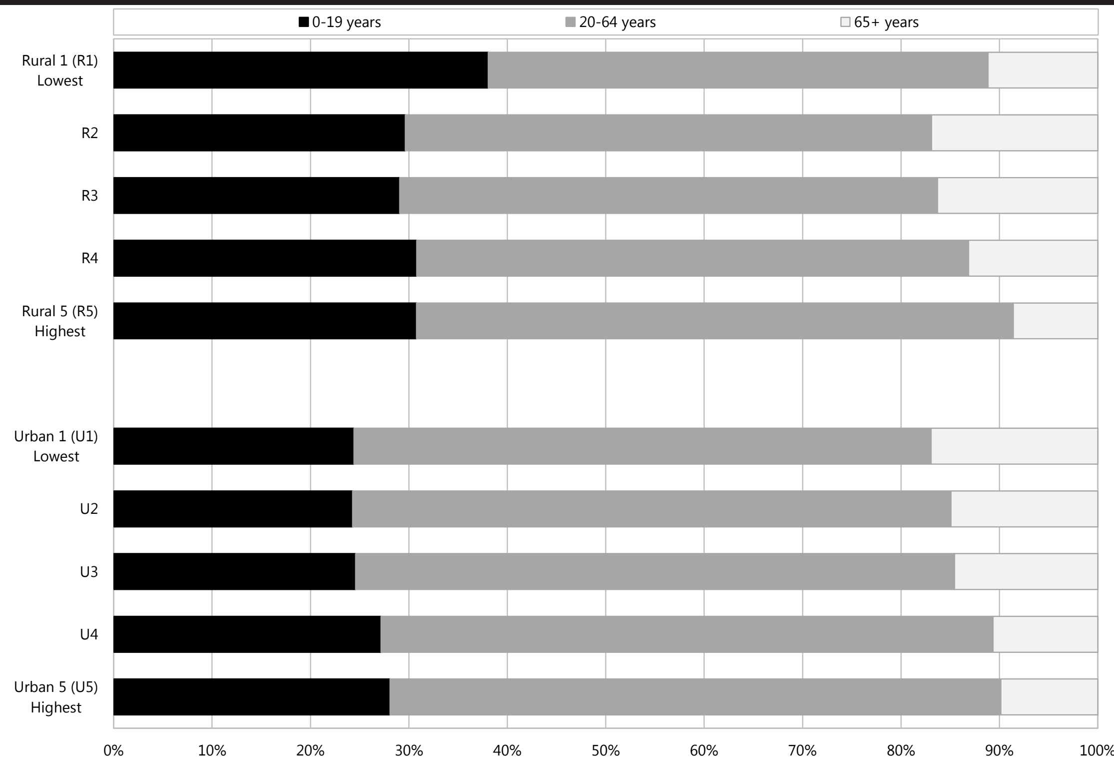
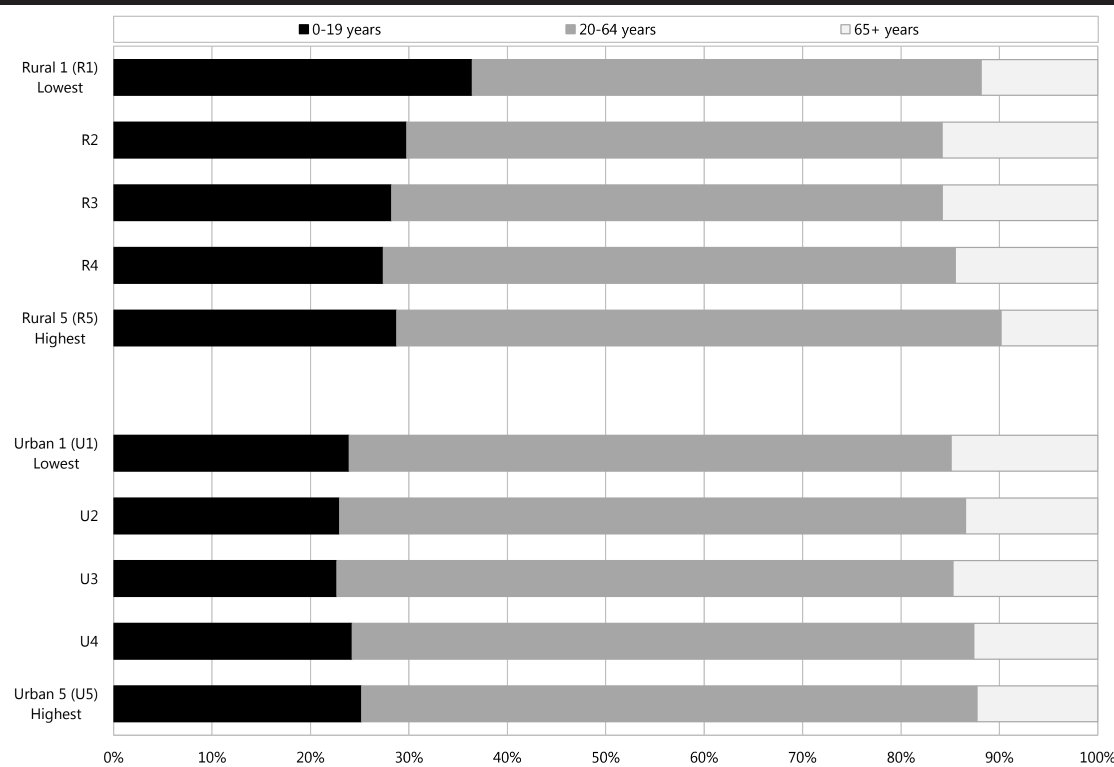


Figure 2.4: Summary of Income Quintile Demographics, 2009
Proportion of income quintile population in each age group



The remaining graphs in this chapter show population pyramids, which show the age and sex composition of the population within five–year age groups, with information for males shown on the left side of the figure and for females shown on the right side. There are two types of population pyramid shown for each area:

1. The first pyramid shows each area (aggregate region or income quintile) compared to the Manitoba population on December 31, 2009. Adding across all age groups and both sexes, the bars for each add up to 100%.
2. The second pyramid shows each area at the beginning (December 31, 2000) and end (December 31, 2009) of the study period, in order to highlight any changes in population structure over time. Adding across age groups and sexes, the bars add up to the total population for the area in each time period.

Looking across the different pyramids for aggregate regions and income quintiles, it is evident that areas vary widely in terms of demographic profiles. Areas with younger populations have triangular shapes, reflecting the presence of many young residents and fewer elderly; whereas areas with older populations have more rectangular shapes. The North has the youngest population, whereas the other aggregate regions have older populations. For the population under 20 years of age, the North has the highest percent of children and Brandon and Winnipeg have the lowest percent. These differences have implications for health outcomes and health and social service use, which is why most indicators in this report have been "adjusted" for age and sex. This adjustment allows results to be validly compared across areas, which ensures that any differences shown are not the result of differences in the age and sex distributions of the area populations. Population pyramids by each RHA can be found in the online Appendix.

Figure 2.5: Age Profile of Manitoba by Sex, 2000 and 2009
Population 2000: 1,151,681 | Population 2009: 1,223,110

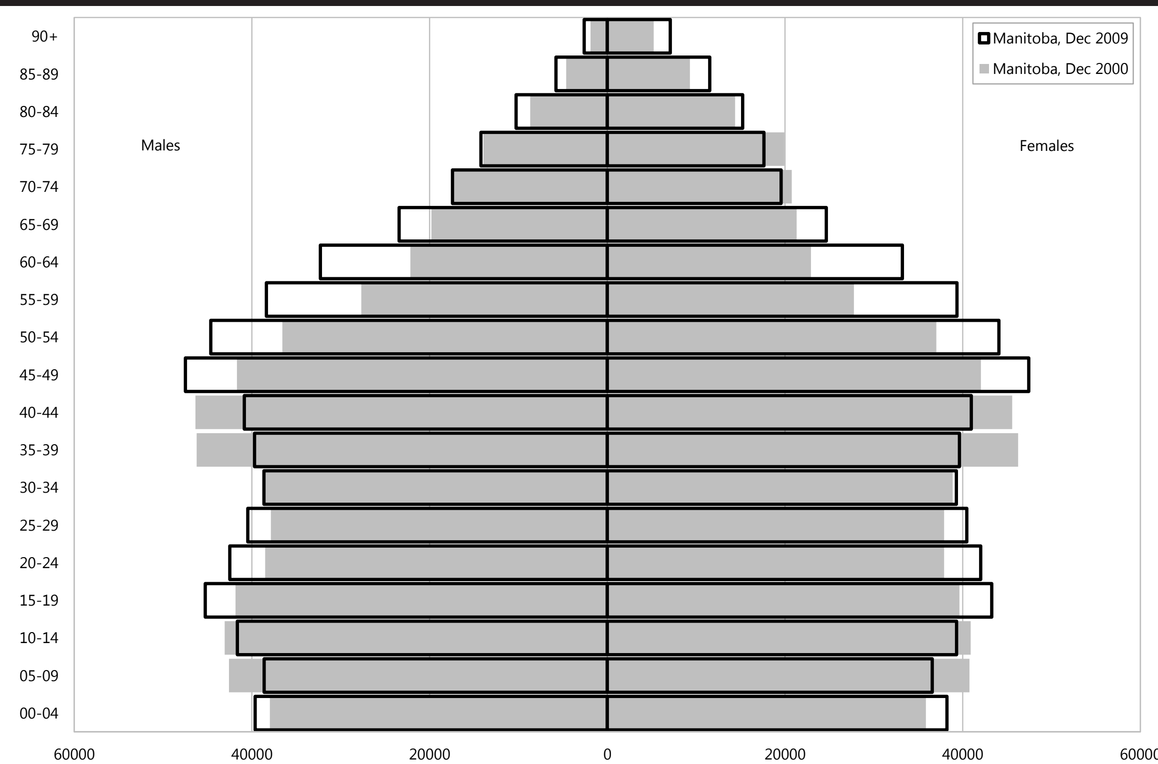


Figure 2.6: Age Profile of Winnipeg Aggregate Region and Manitoba by Sex, 2009

Winnipeg population 2009: 687,003 | Manitoba population 2009: 1,223,110

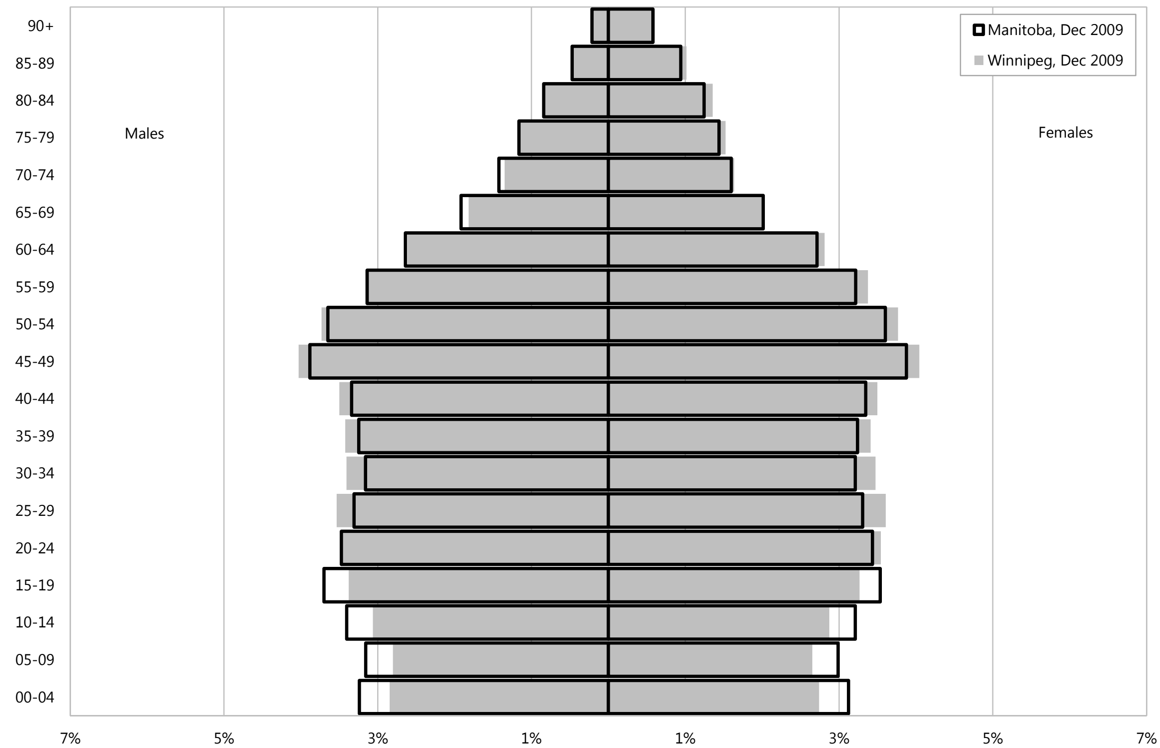


Figure 2.7: Age Profile of Winnipeg Aggregate Region by Sex, 2000 and 2009

Population 2000: 647,326 | Population 2009: 687,003

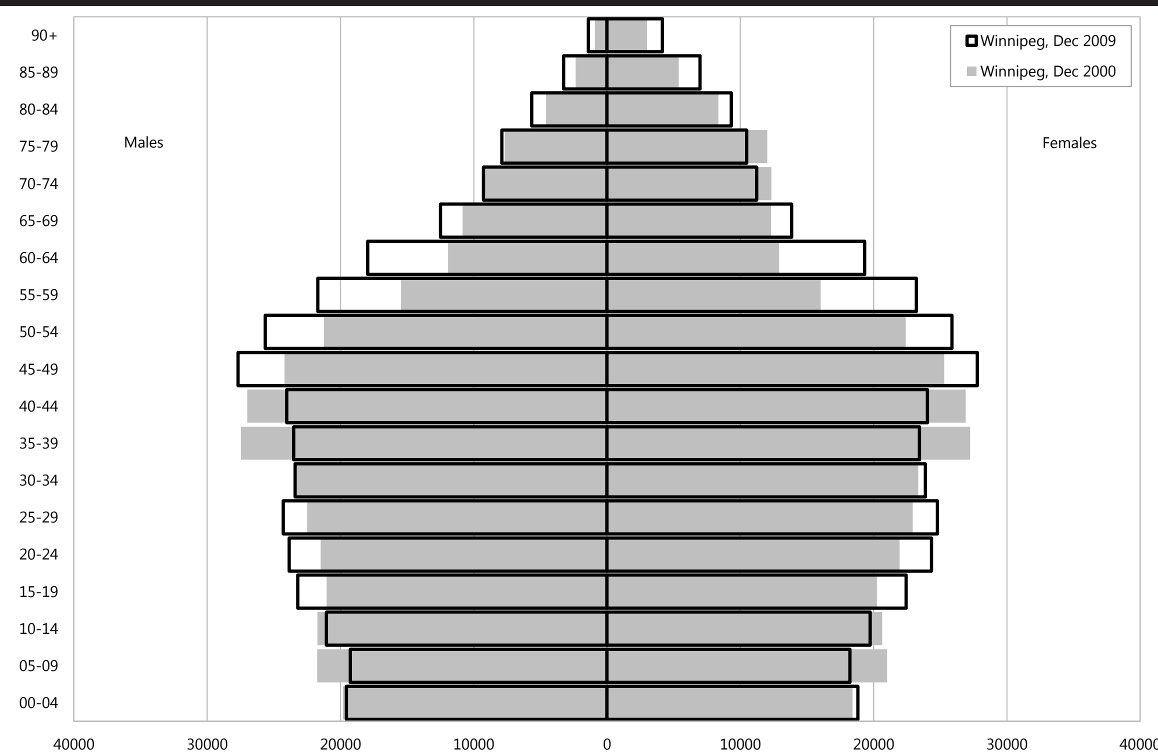


Figure 2.8: Age Profile of Brandon Aggregate Region and Manitoba by Sex, 2009
Brandon population 2009: 52,016 | Manitoba population 2009: 1,223,110

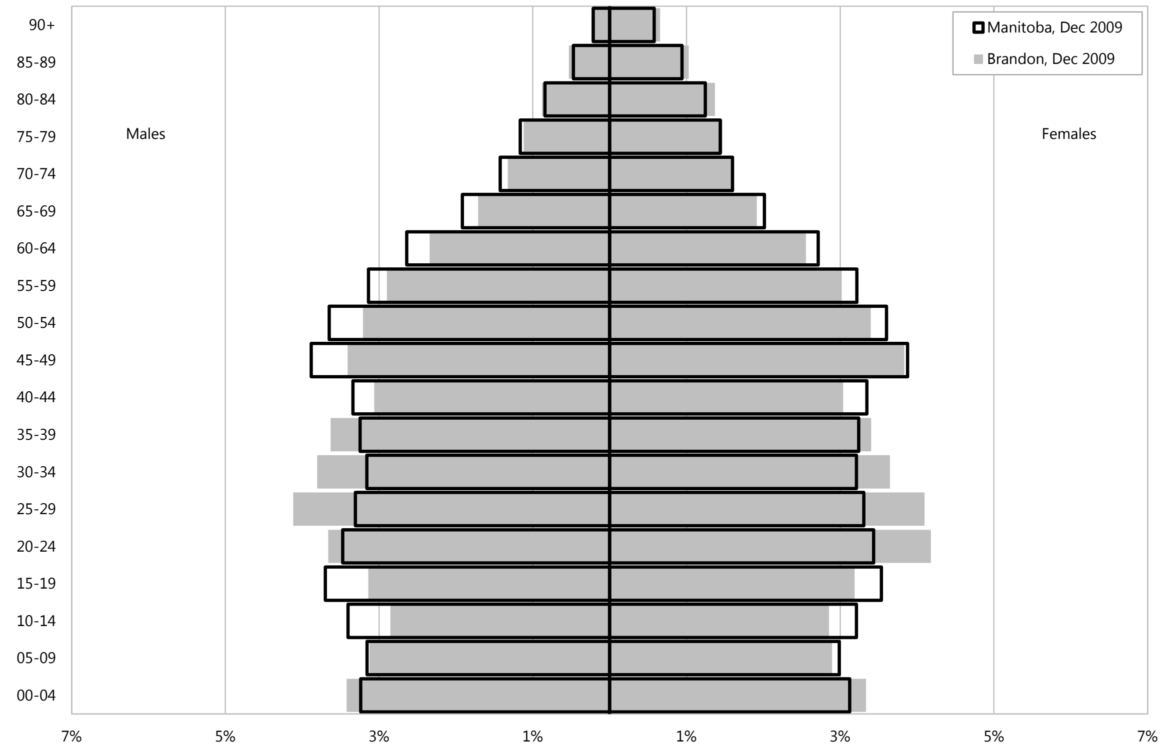


Figure 2.9: Age Profile of Brandon Aggregate Region by Sex, 2000 and 2009
Population 2000: 47,180 | Population 2009: 52,016

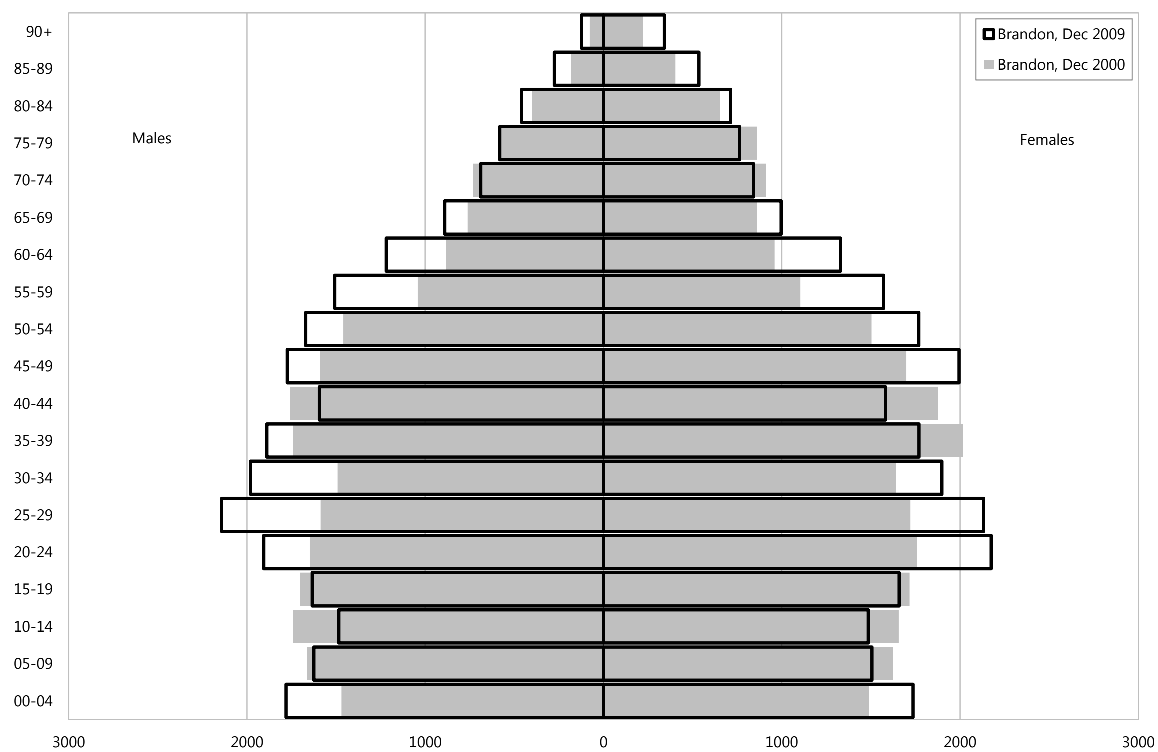


Figure 2.10: Age Profile of the Rural South Aggregate Region and Manitoba by Sex, 2009
Rural South population 2009: 242,610 | Manitoba population 2009: 1,223,110

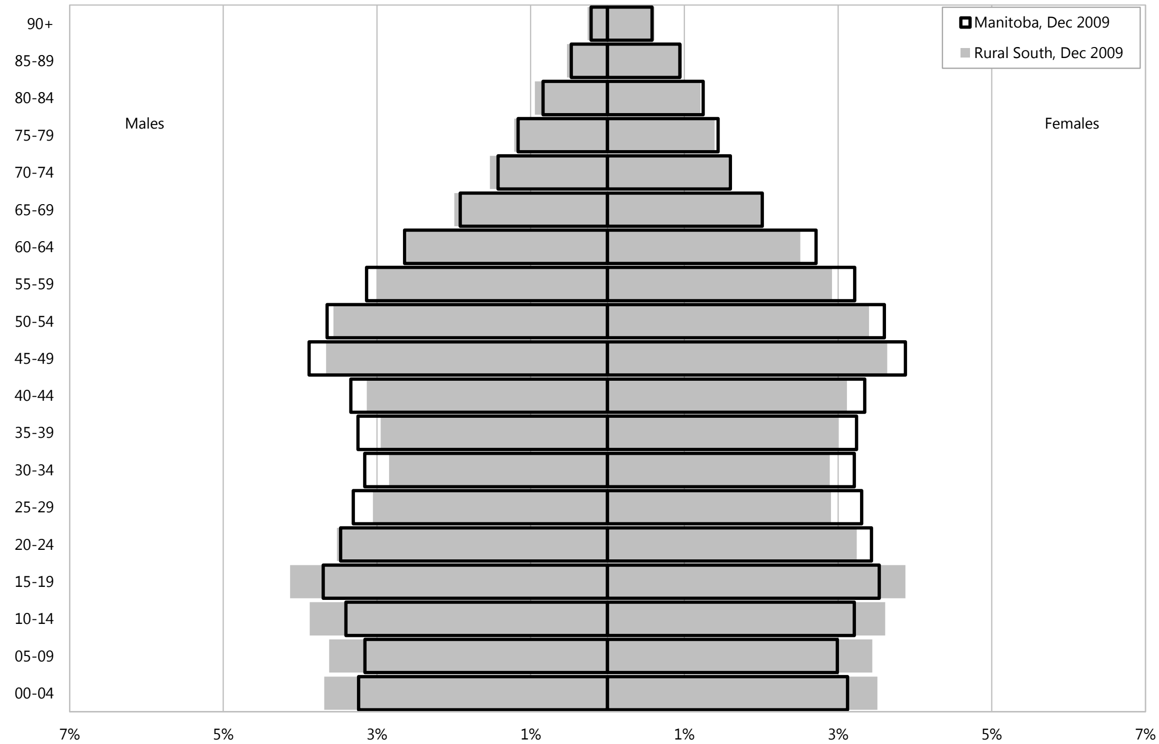


Figure 2.11: Age Profile of the Rural South Aggregate Region by Sex, 2000 and 2009
Population 2000: 222,777 | Population 2009: 242,610

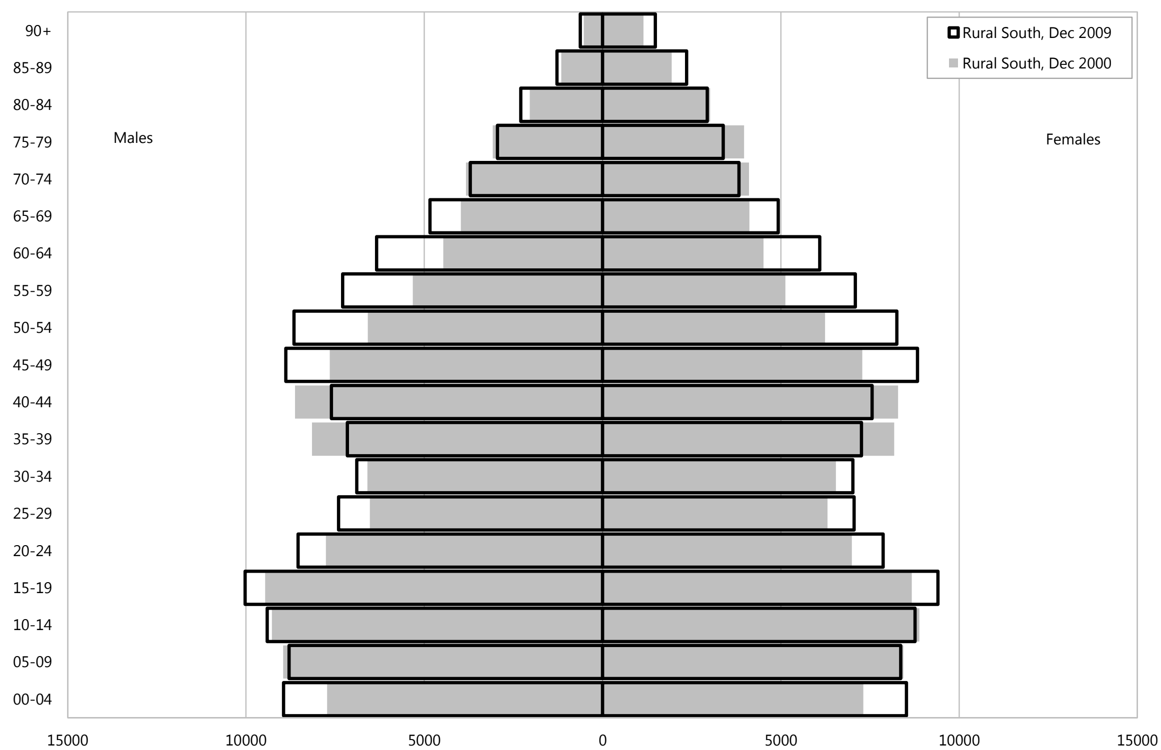


Figure 2.12: Age Profile of the Mid Aggregate Region and Manitoba by Sex, 2009
Mid population 2009: 161,734 | Manitoba population 2009: 1,223,110

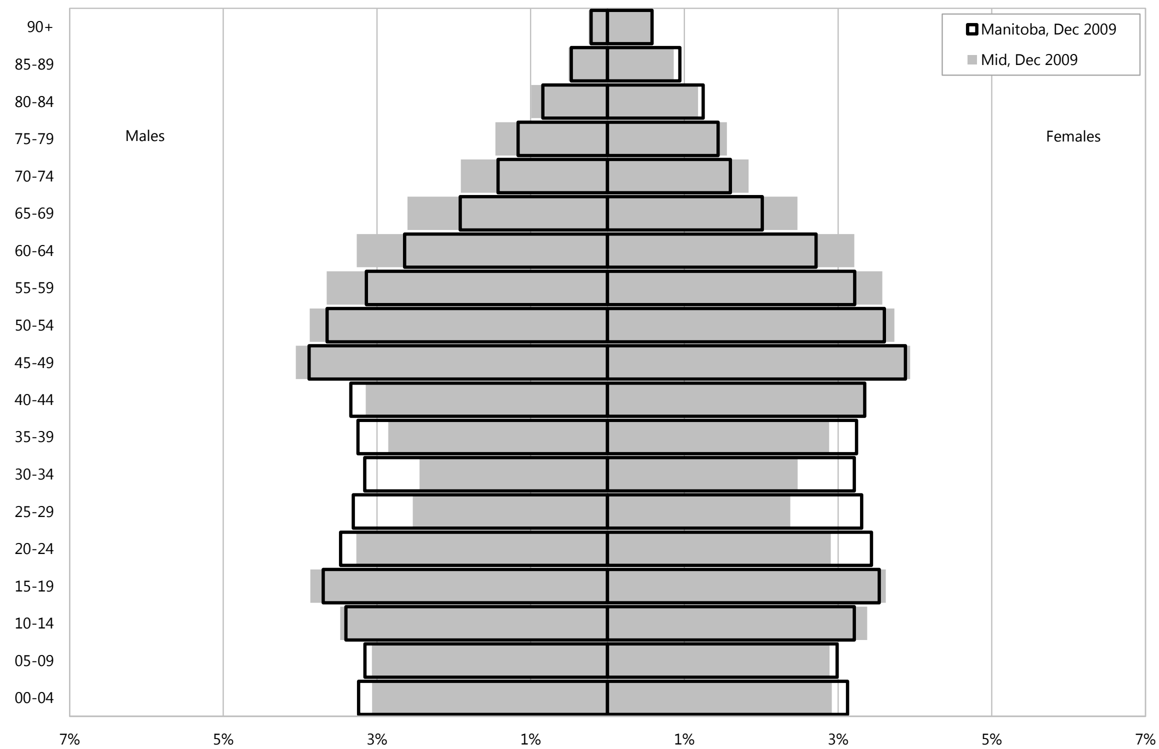


Figure 2.13: Age Profile of the Mid Aggregate Region by Sex, 2000 and 2009
Population 2000: 158,183 | Population 2009: 161,734

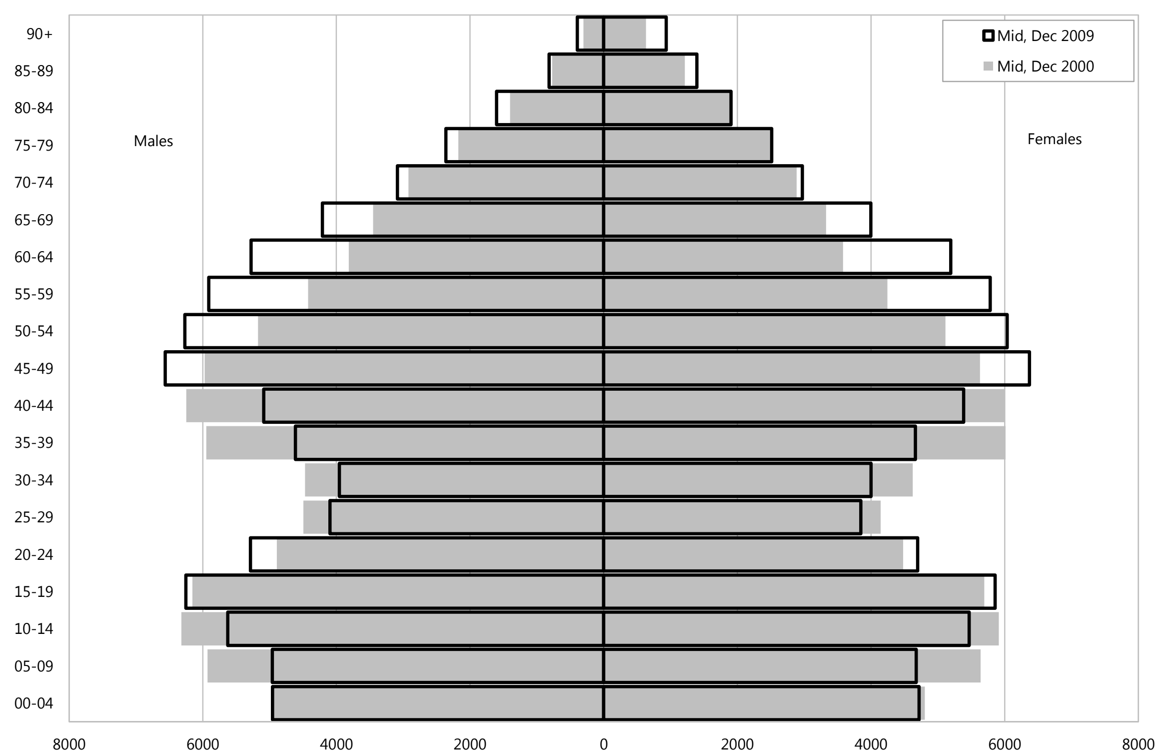


Figure 2.14: Age Profile of the North Aggregate Region and Manitoba by Sex, 2009
North population 2009: 73,401 | Manitoba population 2009: 1,223,110

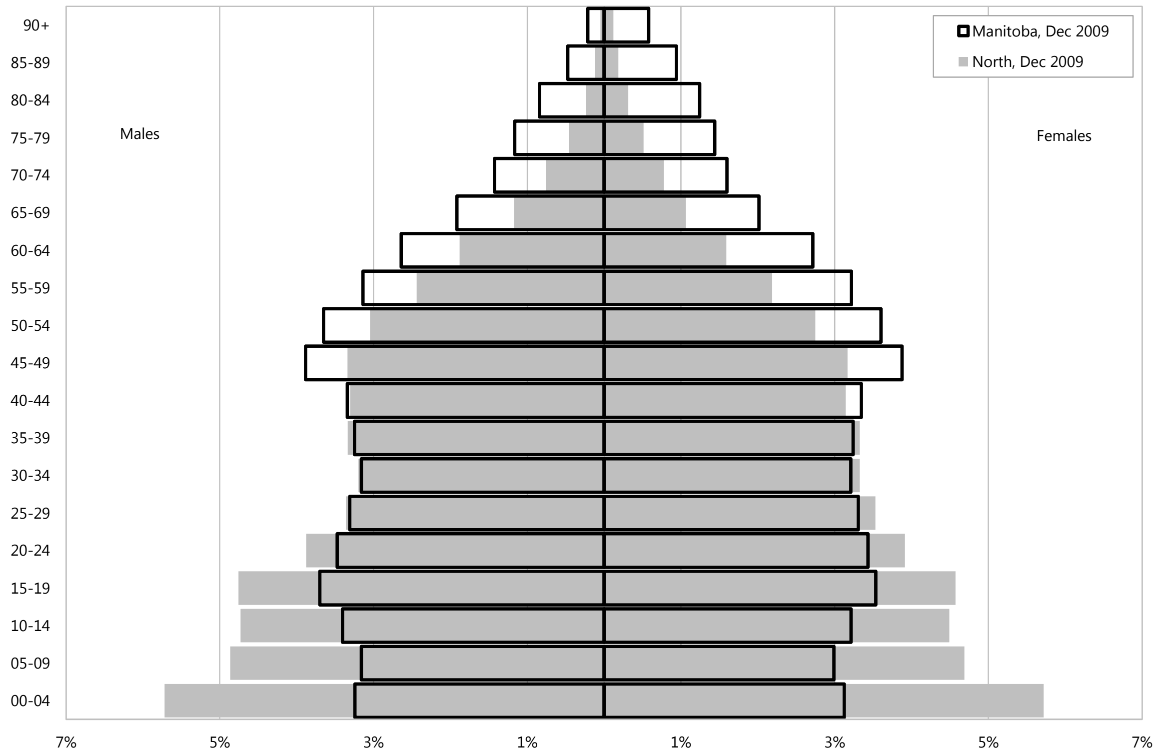


Figure 2.15: Age Profile of the North Aggregate Region by Sex, 2000 and 2009
Population 2000: 71,144 Population 2009: 73,401

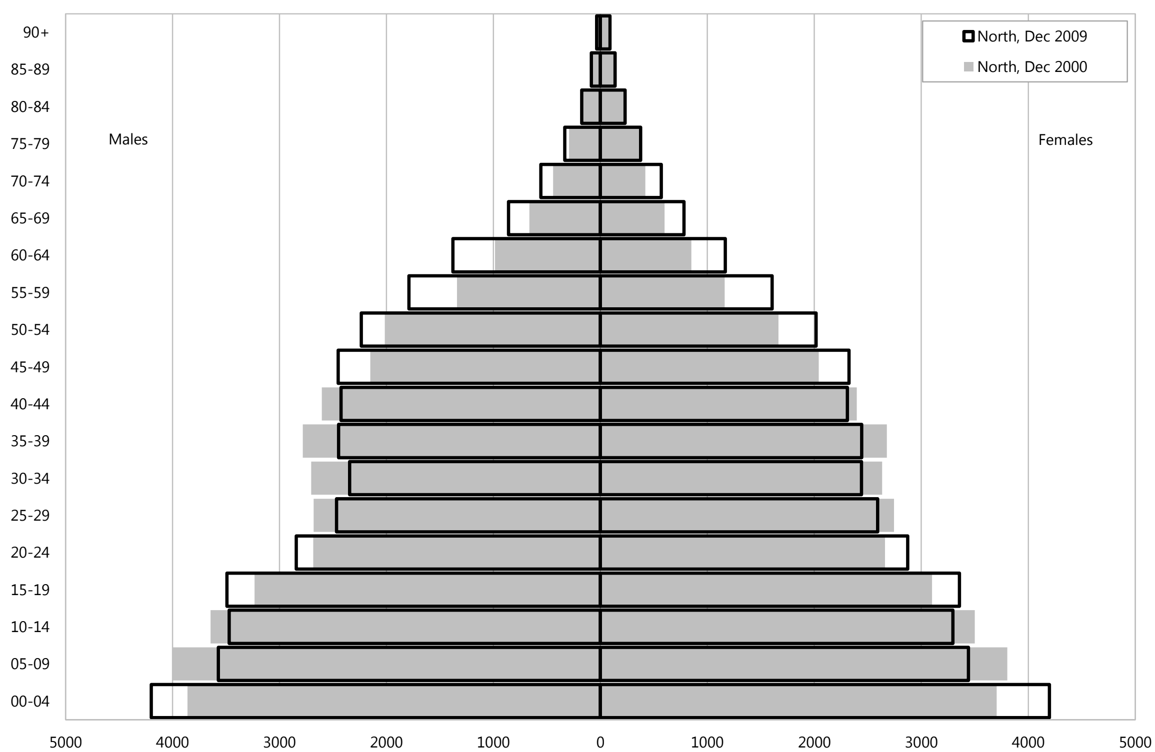


Figure 2.16: Age Profile of Income Quintile Rural 1 (R1) and Manitoba by Sex, 2009
Rural 1 population 2009: 93,679 | Manitoba population 2009: 1,223,110

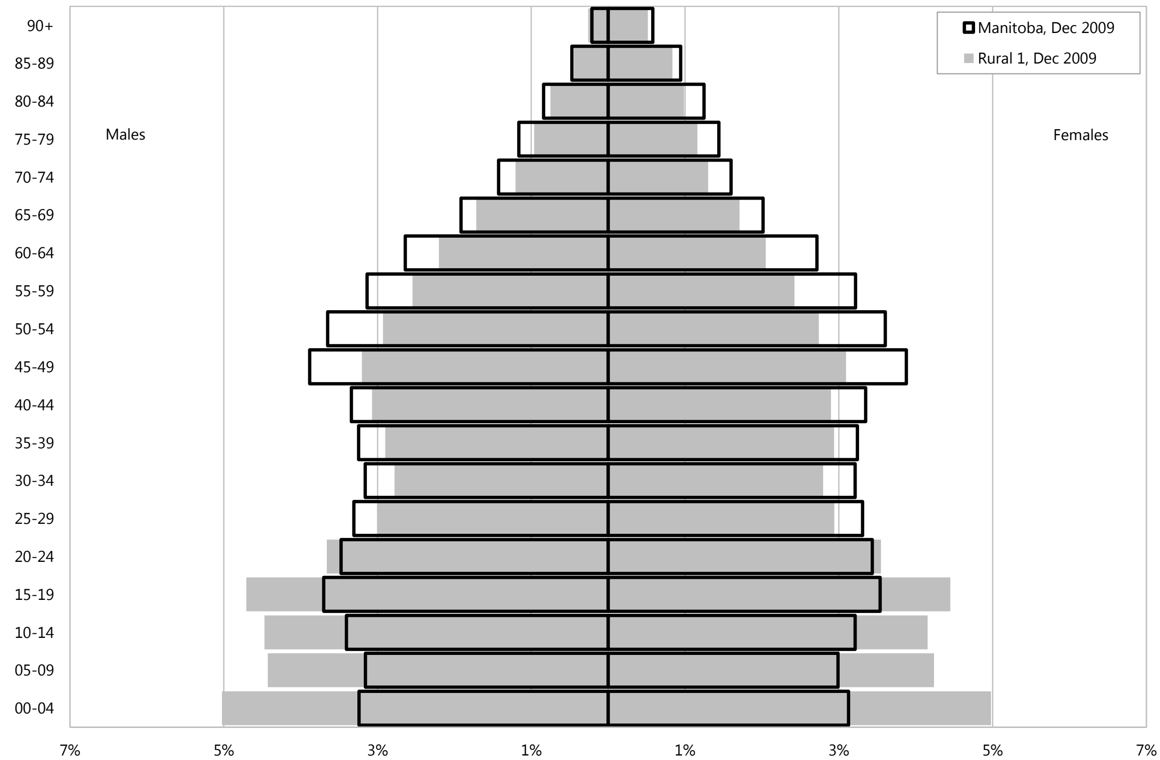


Figure 2.17: Age Profile of Income Quintile Rural 1 (R1) by Sex, 2000 and 2009
Population 2000: 89,063 Population 2009: 93,679

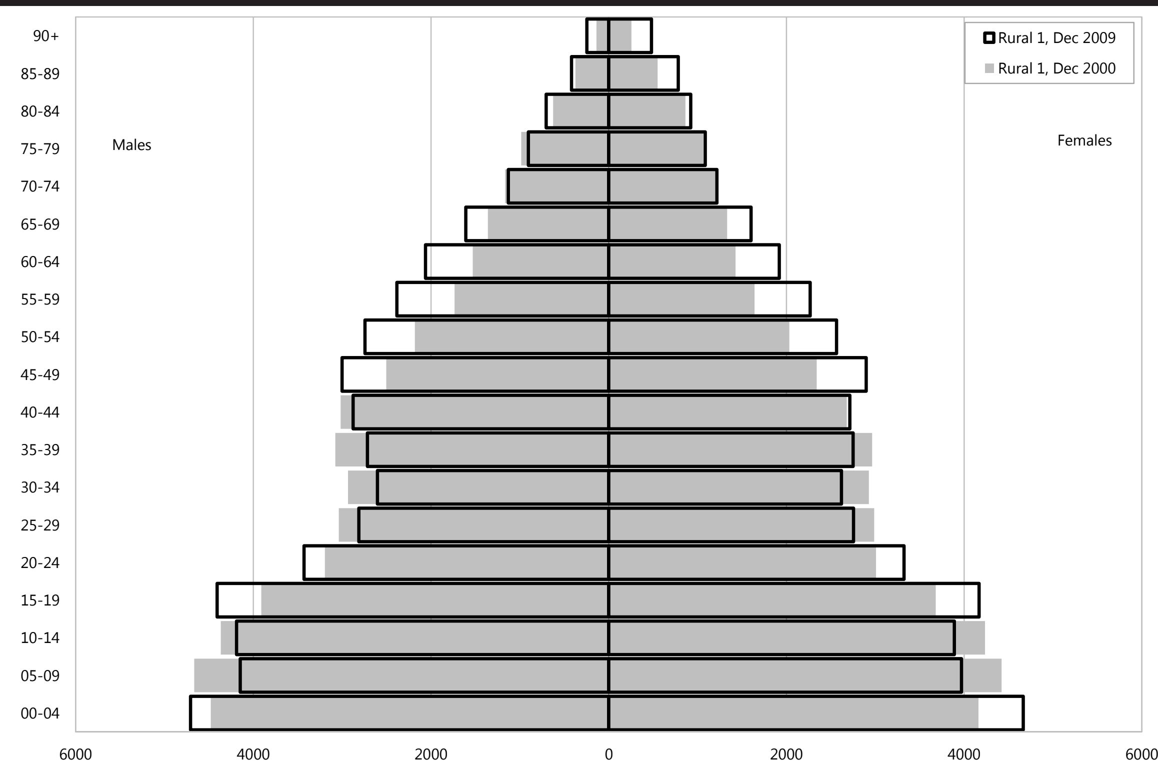


Figure 2.18: Age Profile of Income Quintile Rural 2 (R2) and Manitoba by Sex, 2009
Rural 2 population 2009: 93,398 | Manitoba population 2009: 1,223,110

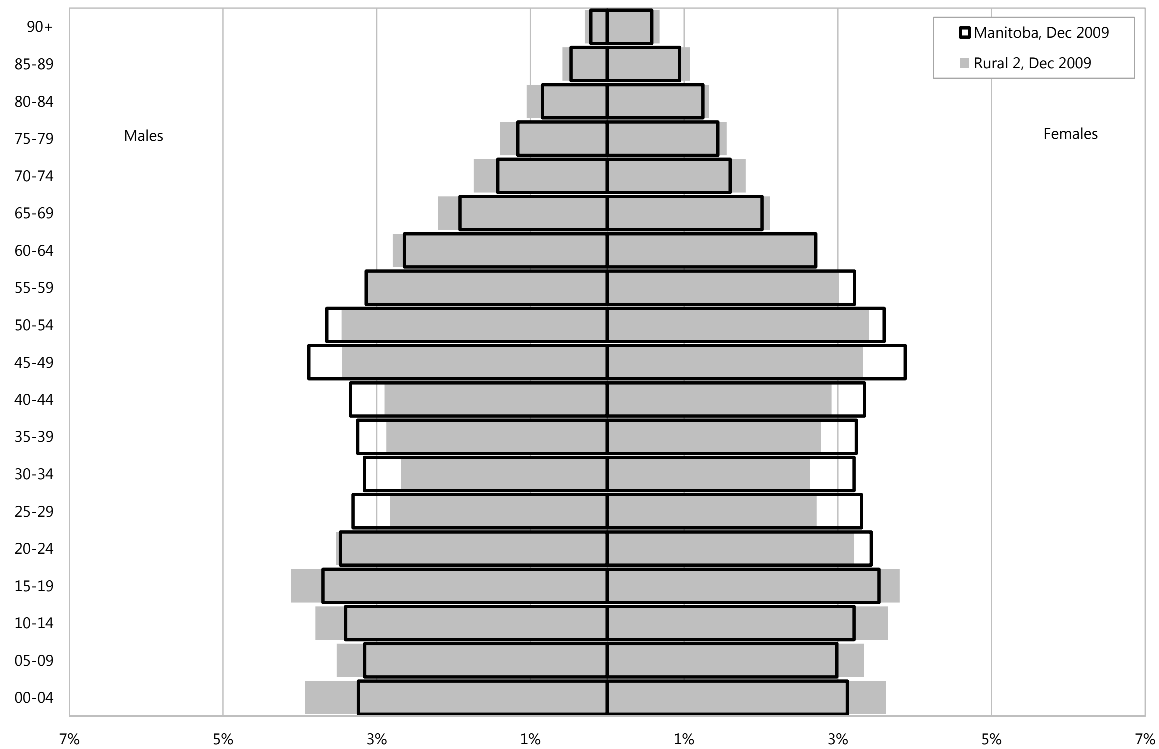


Figure 2.19: Age Profile of Income Quintile Rural 2 (R2) by Sex, 2000 and 2009
Population 2000: 88,978 | Population 2009: 93,398

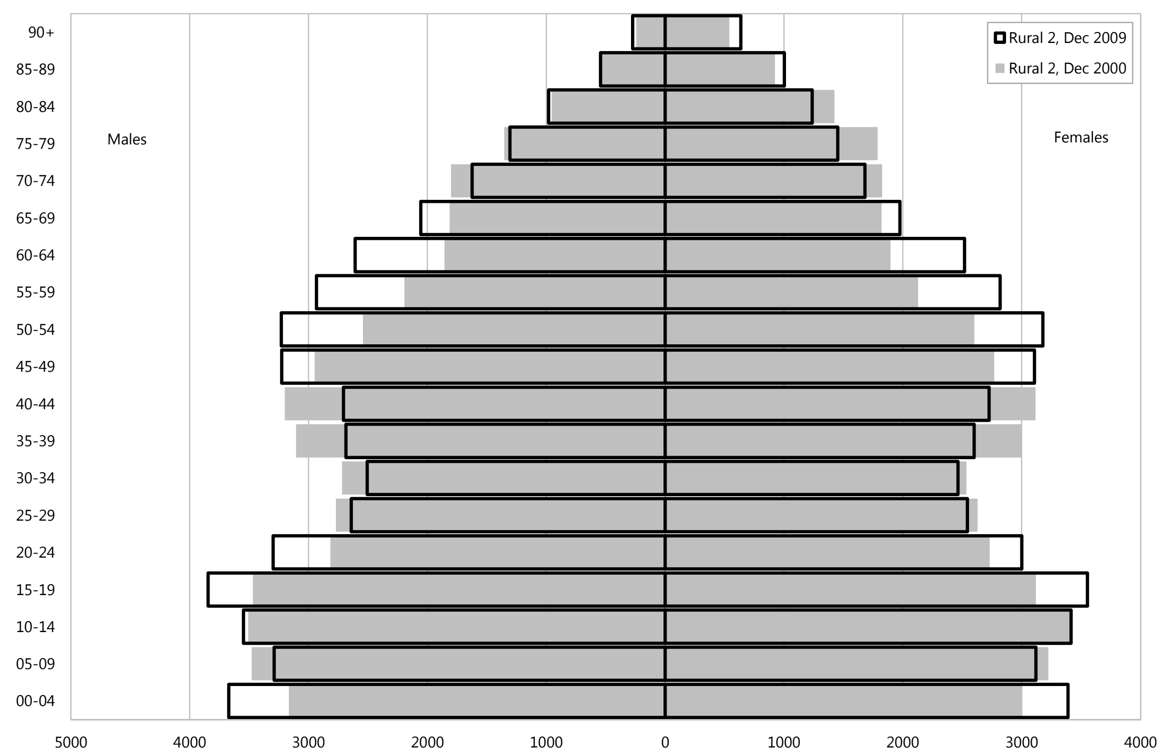


Figure 2.20: Age Profile of Income Quintile Rural 3 (R3) and Manitoba by Sex, 2009
Rural 3 population 2009: 93,762 | Manitoba population 2009: 1,223,110

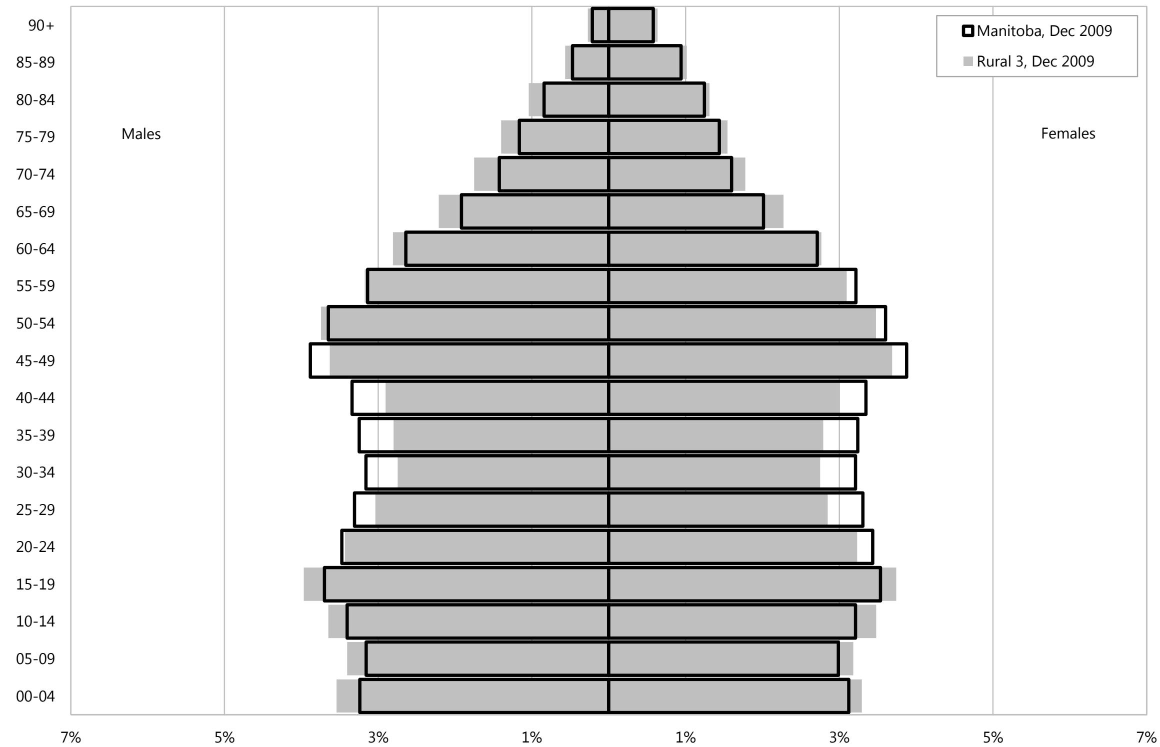


Figure 2.21: Age Profile of Income Quintile Rural 3 (R3) by Sex, 2000 and 2009
Population 2000: 88,950 | Population 2009: 93,762

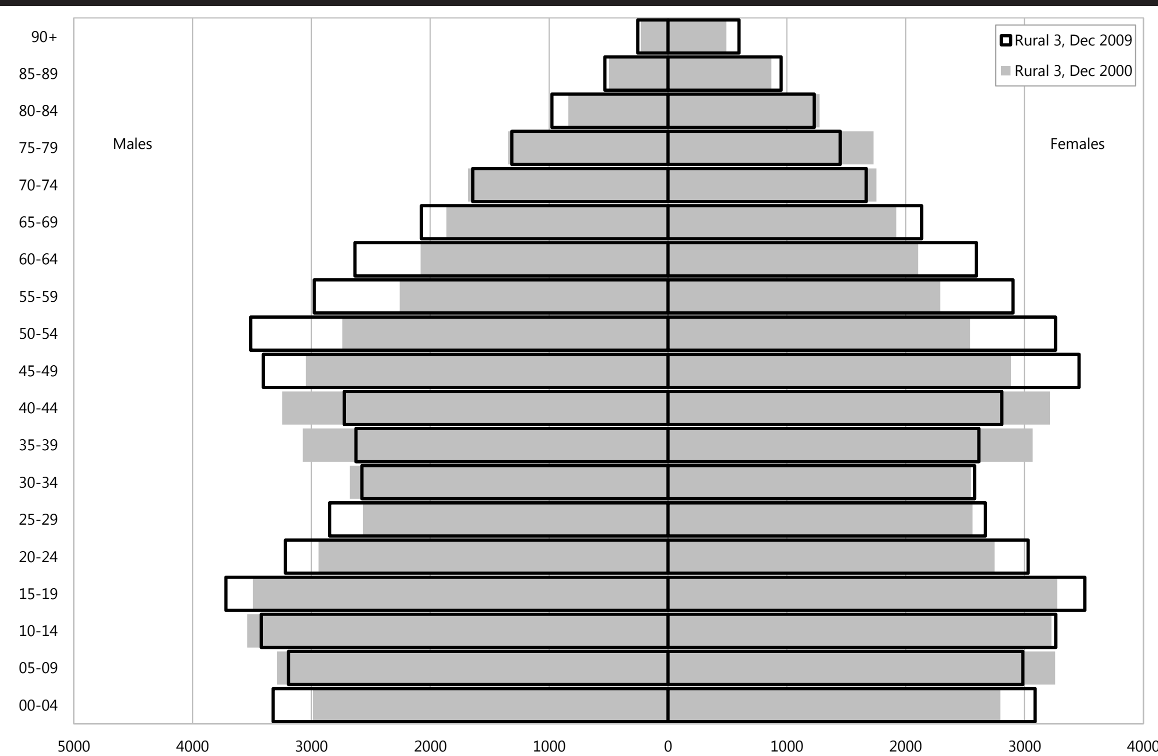


Figure 2.22: Age Profile of Income Quintile Rural 4 (R4) and Manitoba by Sex, 2009
Rural 4 population 2009: 93,768 | Manitoba population 2009: 1,223,110

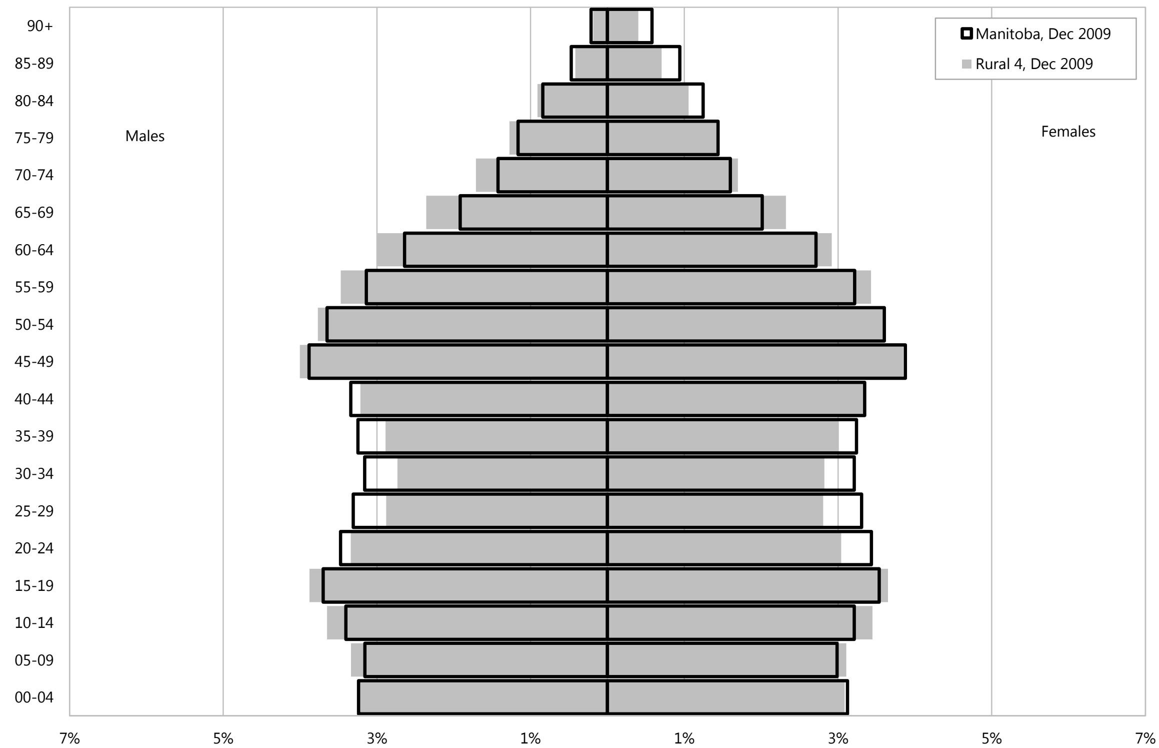


Figure 2.23: Age Profile of Income Quintile Rural 4 (R4) by Sex, 2000 and 2009
Population 2000: 89,570 | Population 2009: 93,768

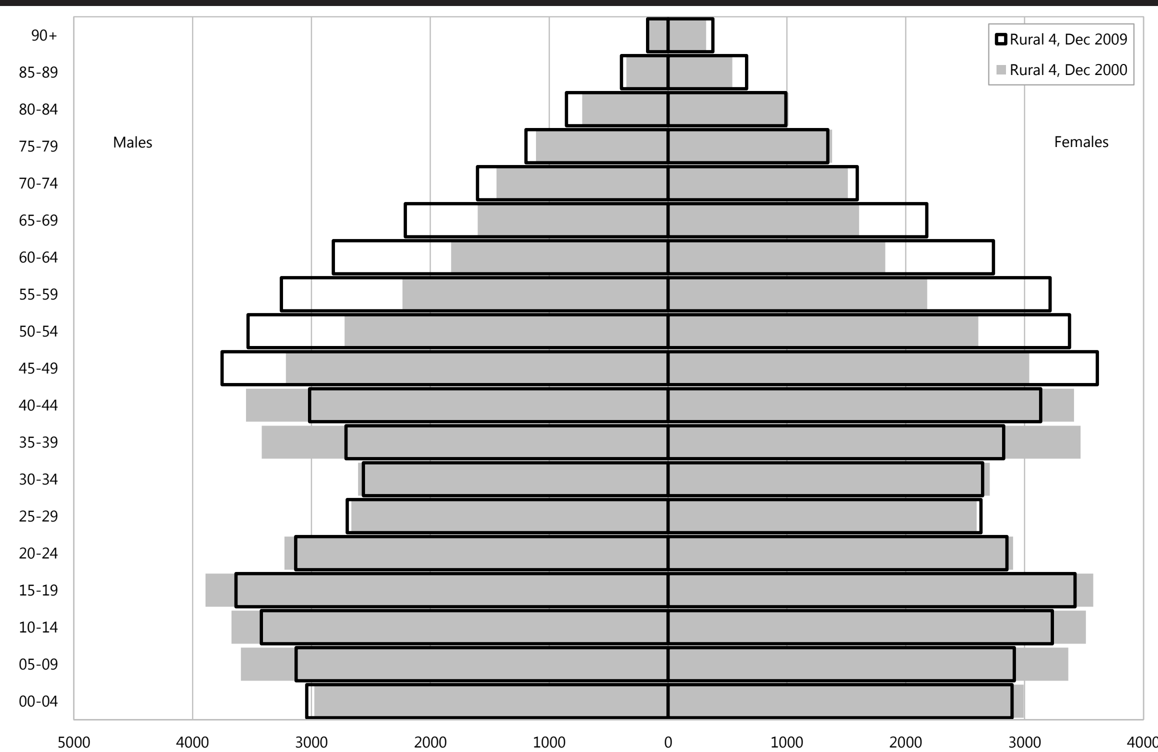


Figure 2.24: Age Profile of Income Quintile Rural 5 (R5) and Manitoba by Sex, 2009

Rural 5 population 2009: 99,232 | Manitoba population 2009: 1,223,110

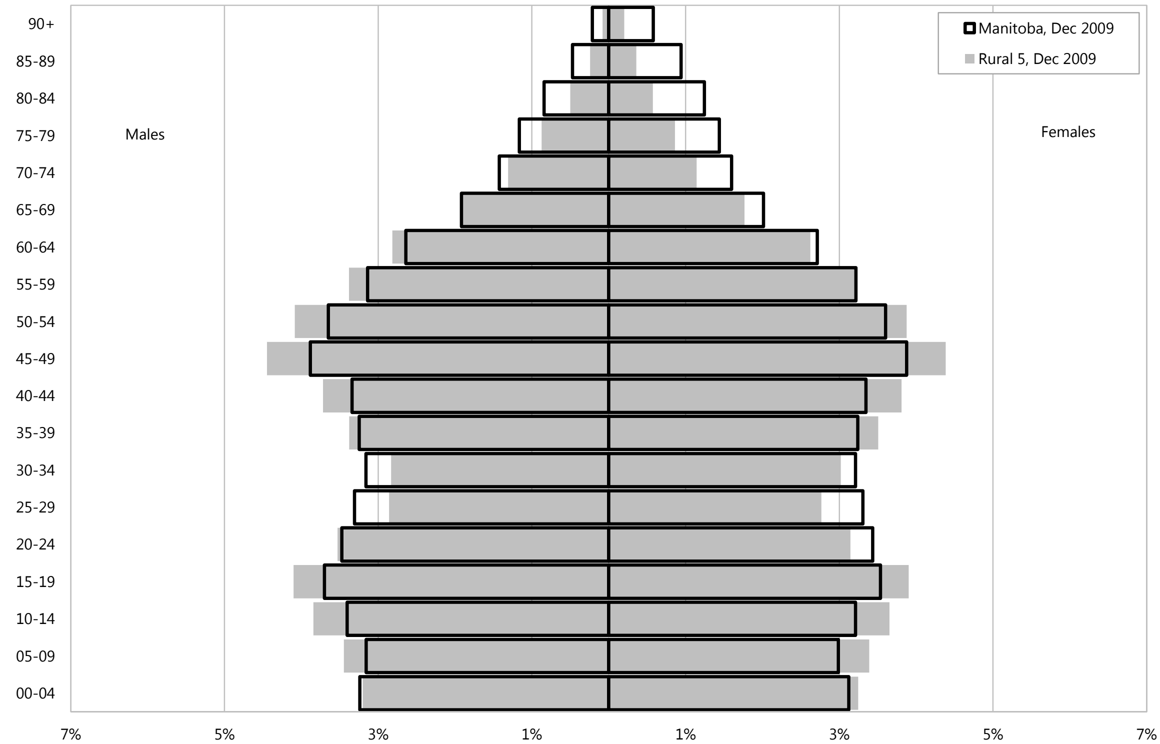


Figure 2.25: Age Profile of Income Quintile Rural 5 (R5) by Sex, 2000 and 2009

Population 2000: 94,451 | Population 2009: 99,232

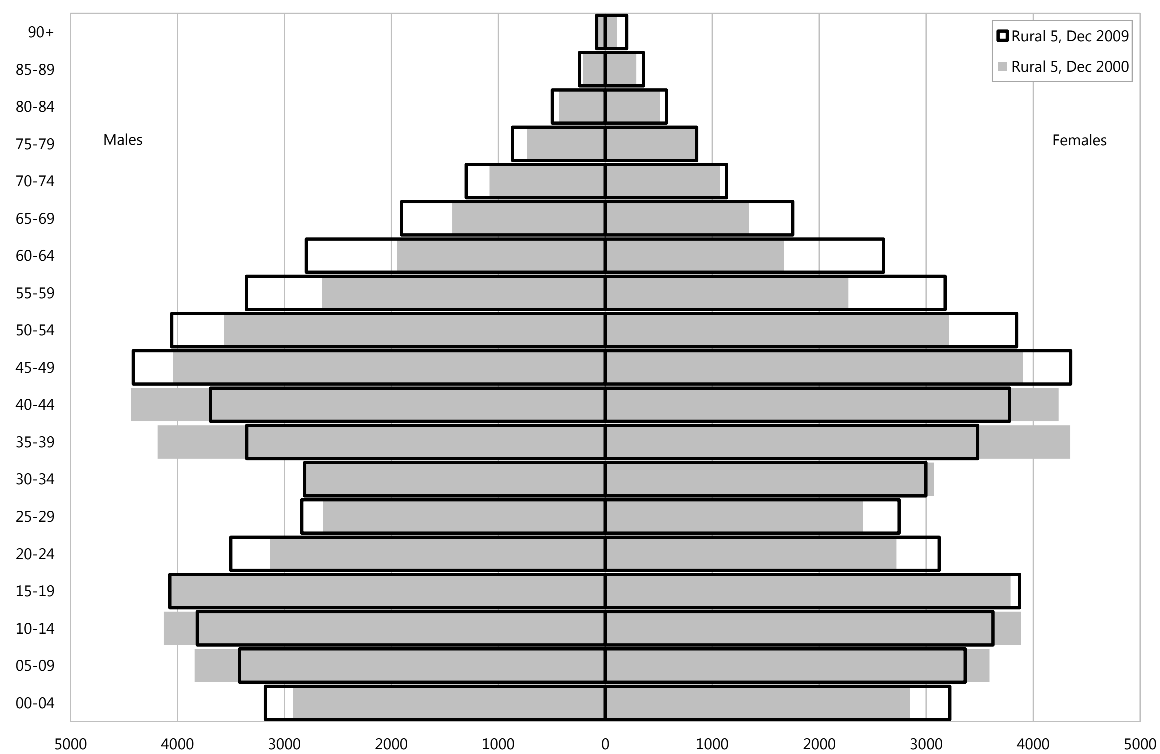


Figure 2.26: Age Profile of Income Quintile Urban 1 (U1) and Manitoba by Sex, 2009
Urban 1 population 2009: 146,854 | Manitoba population 2009: 1,223,110

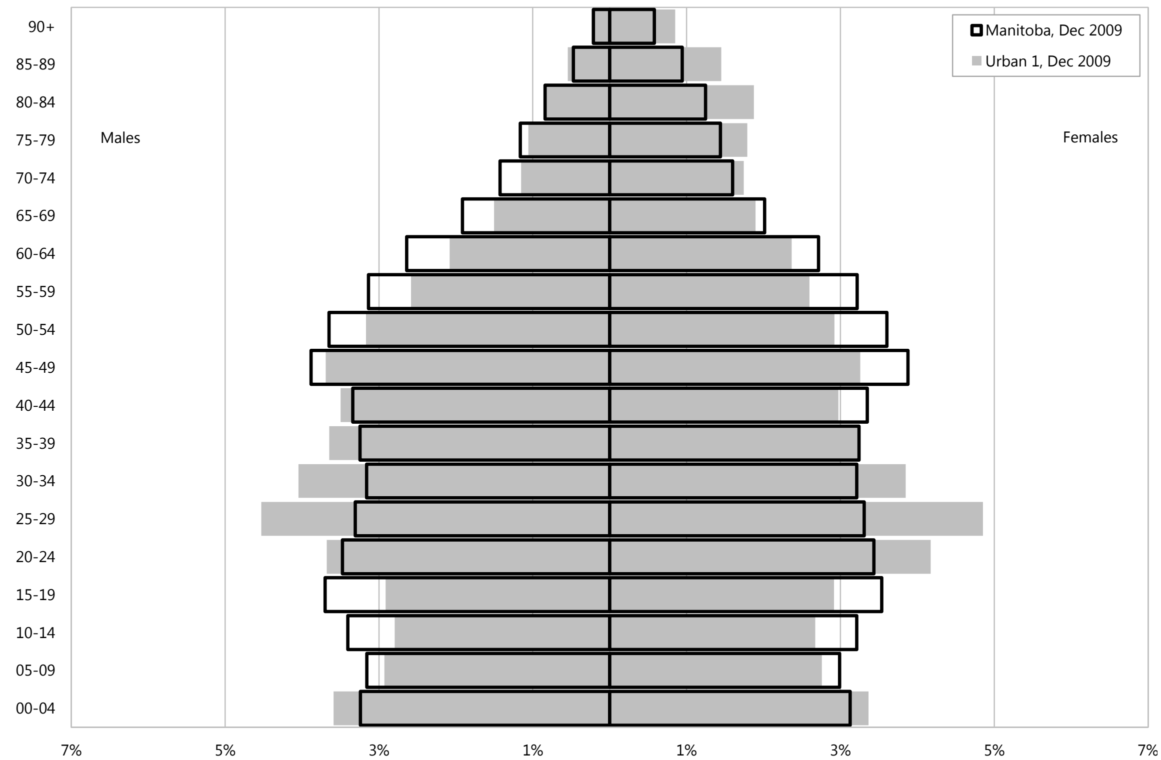


Figure 2.27: Age Profile of Income Quintile Urban 1 (U1) by Sex, 2000 and 2009
Population 2000: 136,669 | Population 2009: 146,854

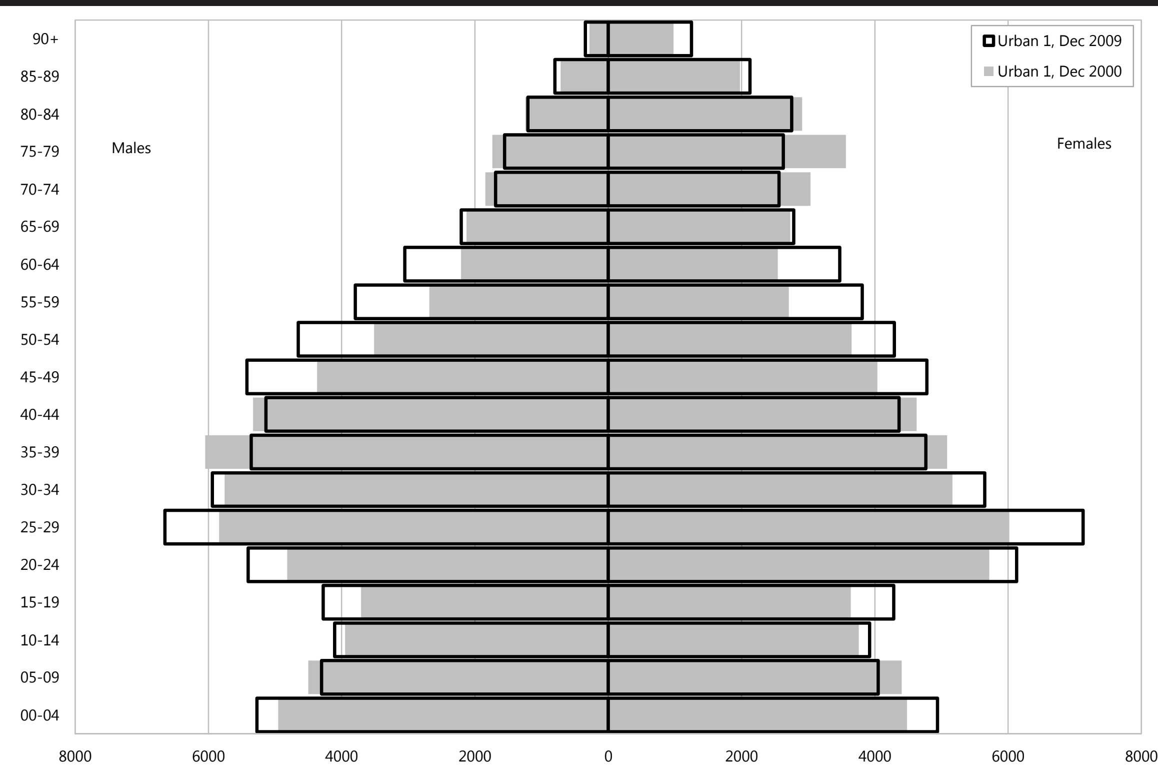


Figure 2.28: Age Profile of Income Quintile Urban 2 (U2) and Manitoba by Sex, 2009
Urban 2 population 2009: 144,955 | Manitoba population 2009: 1,223,110

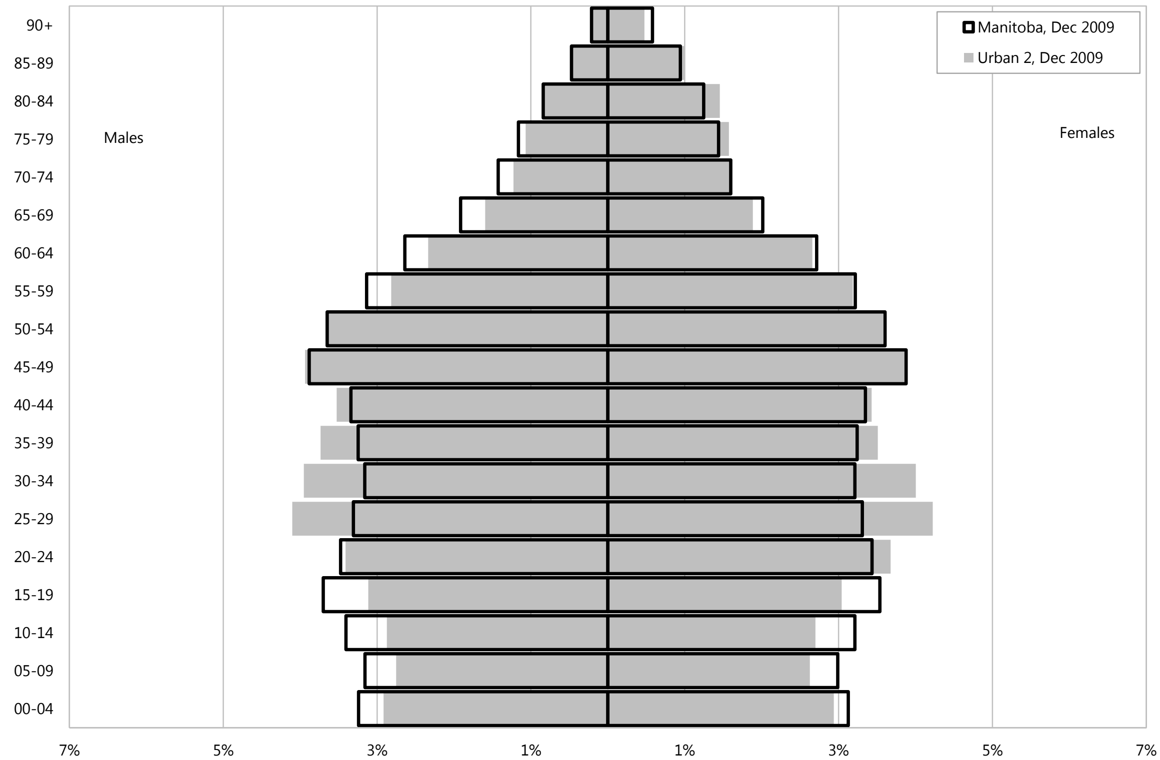


Figure 2.29: Age Profile of Income Quintile Urban 2 (U2) by Sex, 2000 and 2009
Population 2000: 138,522 | Population 2009: 144,955

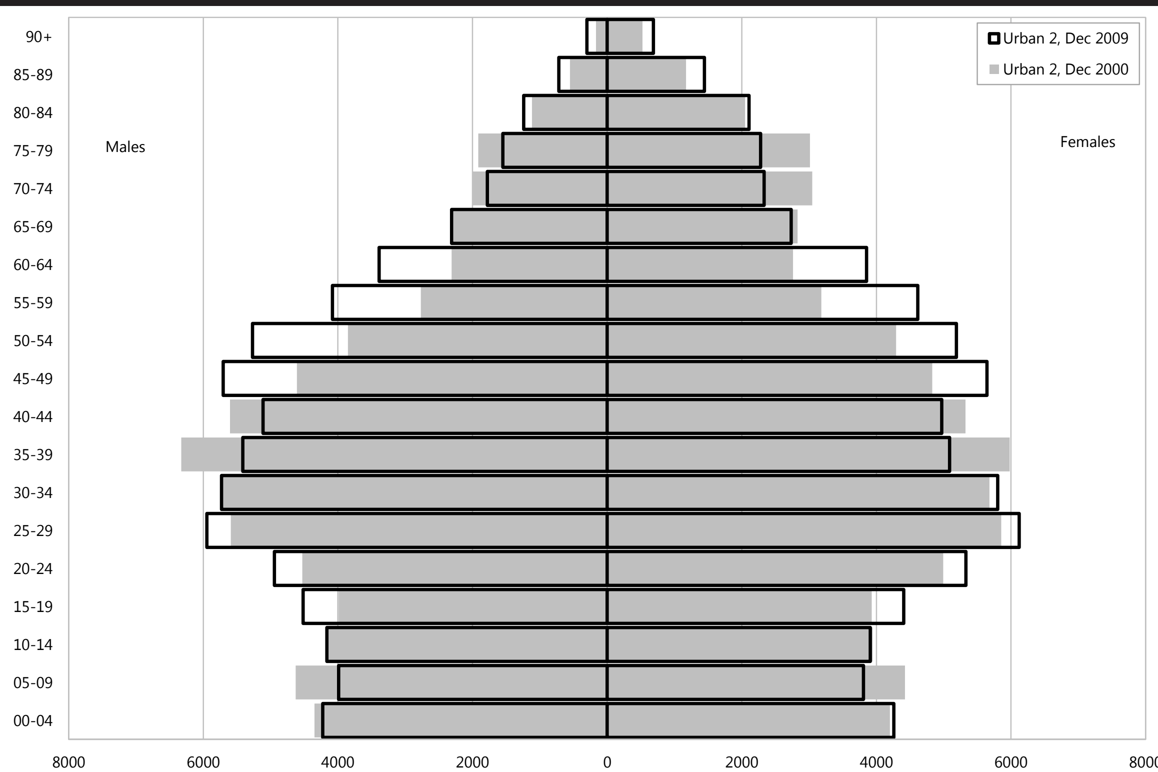


Figure 2.30: Age Profile of Income Quintile Urban 3 (U3) and Manitoba by Sex, 2009

Urban 3 population 2009: 145,717 | Manitoba population 2009: 1,223,110

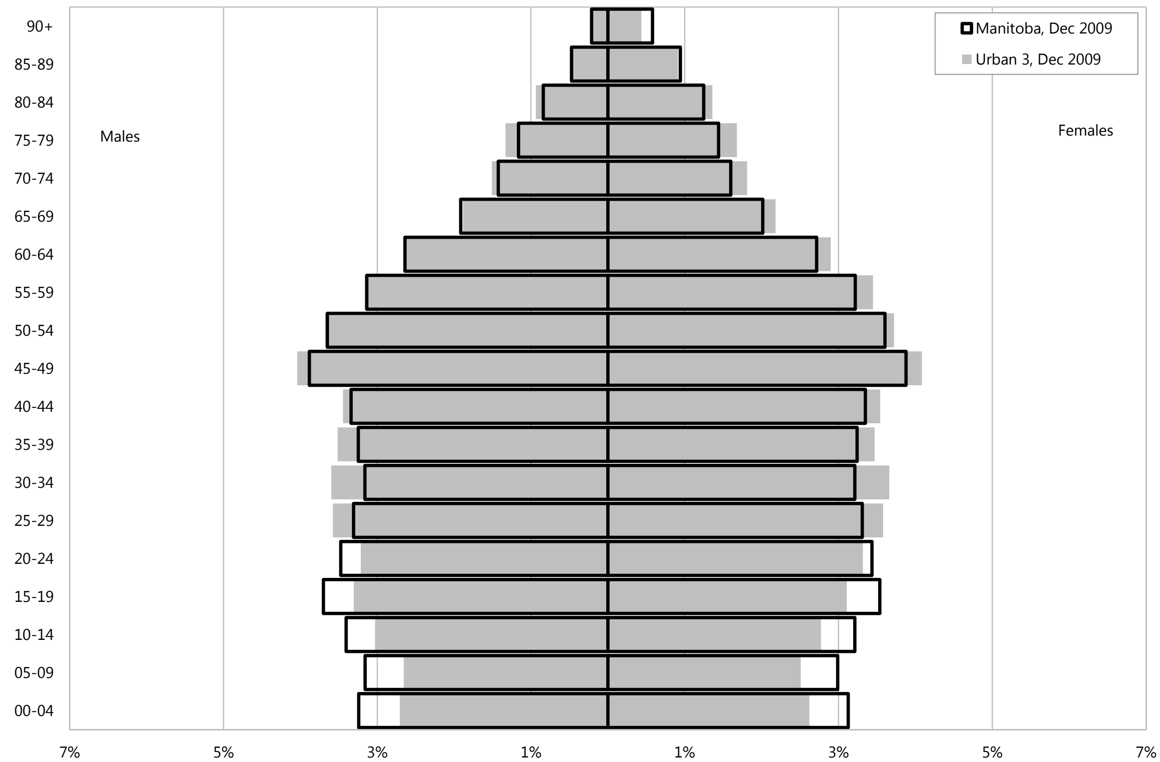


Figure 2.31: Age Profile of Income Quintile Urban 3 (U3) by Sex, 2000 and 2009

Population 2000: 138,505 | Population 2009: 145,717

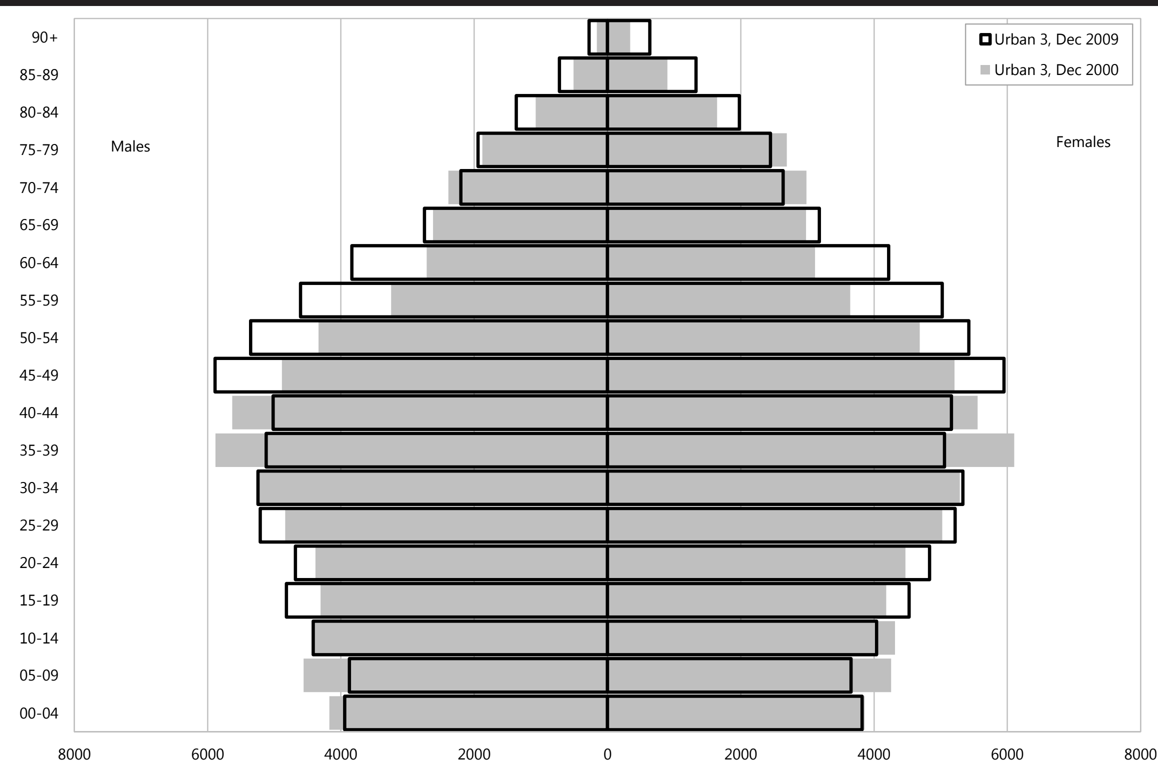


Figure 2.32: Age Profile of Income Quintile Urban 4 (U4) and Manitoba by Sex, 2009
Urban 4 population 2009: 146,758 | Manitoba population 2009: 1,223,110

Figure 2.33: Age Profile of Income Quintile Urban 4 (U4) by Sex, 2000 and 2009
Population 2000: 138,513 | Population 2009: 146,758

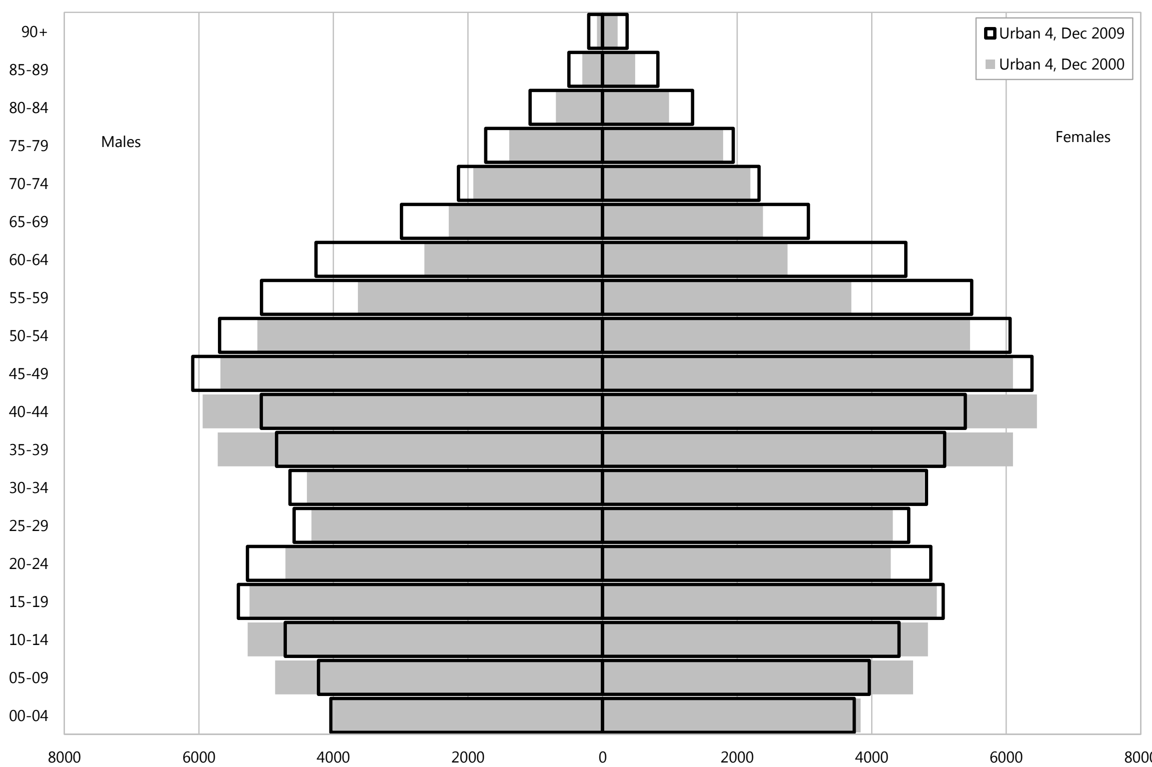


Figure 2.34: Age Profile of Income Quintile Urban 5 (U5) and Manitoba by Sex, 2009
Urban 5 population 2009: 147,734 | Manitoba population 2009: 1,223,110

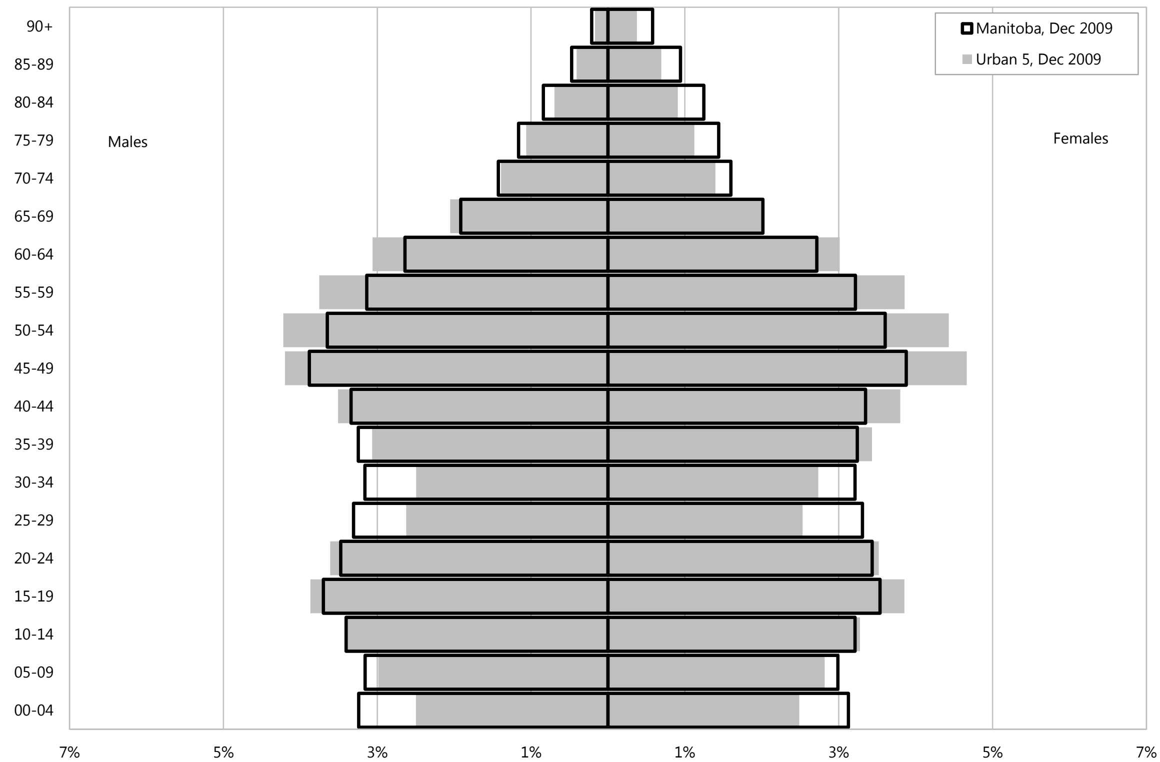
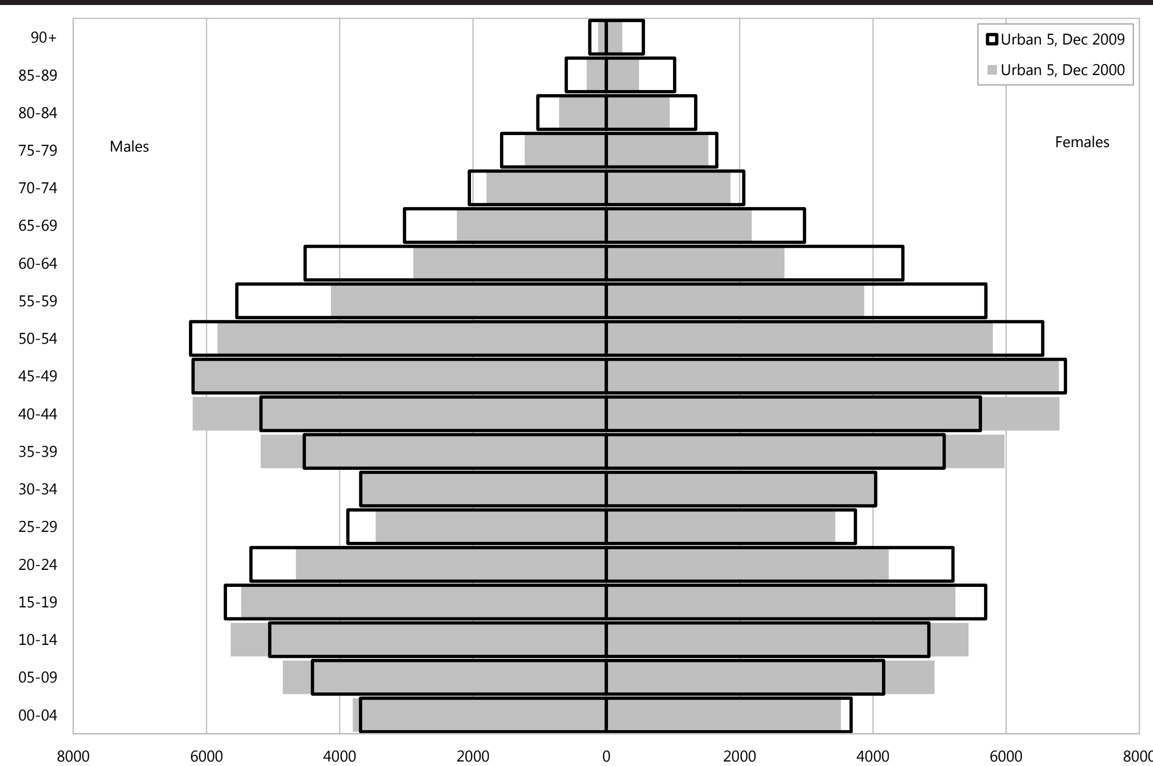


Figure 2.35: Age Profile of Income Quintile Urban 5 (U5) by Sex, 2000 and 2009
Population 2000: 138,478 Population 2009: 147,734



Chapter 3: Physical and Emotional Health

Child Mortality

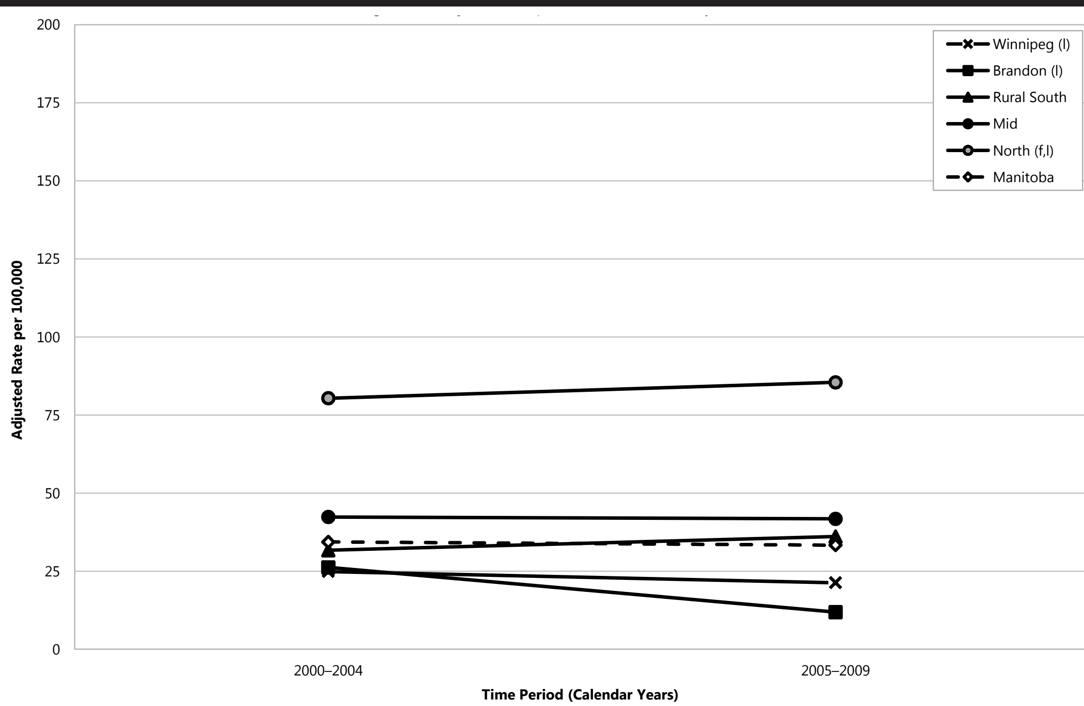
Child mortality is reported in the Vital Statistics dataset. This indicator of health includes the rate of deaths per 100,000 children aged 1 to19 years. In this report, child mortality rates were calculated as the total number of deaths aged 1 to 19 years divided by the total population of the same age in that time period. Child death is a rare event, therefore child mortality rates are presented by aggregate regions and are calculated over five–year time periods (Brownell et al., 2001). Infant mortality rates are generally examined separately and can be found in Heaman et al. (2012).

Regional Trends Over Time

Figure 3.1 shows the child mortality rates for Manitobans 1 to 19 years of age in two time periods (2000–2004 and 2005–2009) for aggregate regions of Manitoba. The provincial rate of child mortality went from 34.3/100,000 to 33.3/100,000, a change that was not statistically significant. The North had the highest rates of child mortality in both time periods, going from 80.4/100,000 to 85.5/100,000, a change that was not statistically significant. The other aggregate regions were not statistically different from the Manitoba average in the first time period; but in the second time period, both Brandon (11.9/100,000) and Winnipeg (21.3/100,000) had significantly lower rates than the provincial average.

The section entitled "Causes of Child Mortality" provides information on the primary causes.

Figure 3.1: Child Mortality Rates by Aggregate Region, 2000–2004 to 2005–2009
Age– & sex–adjusted rates per 100,000 children 1–19 years

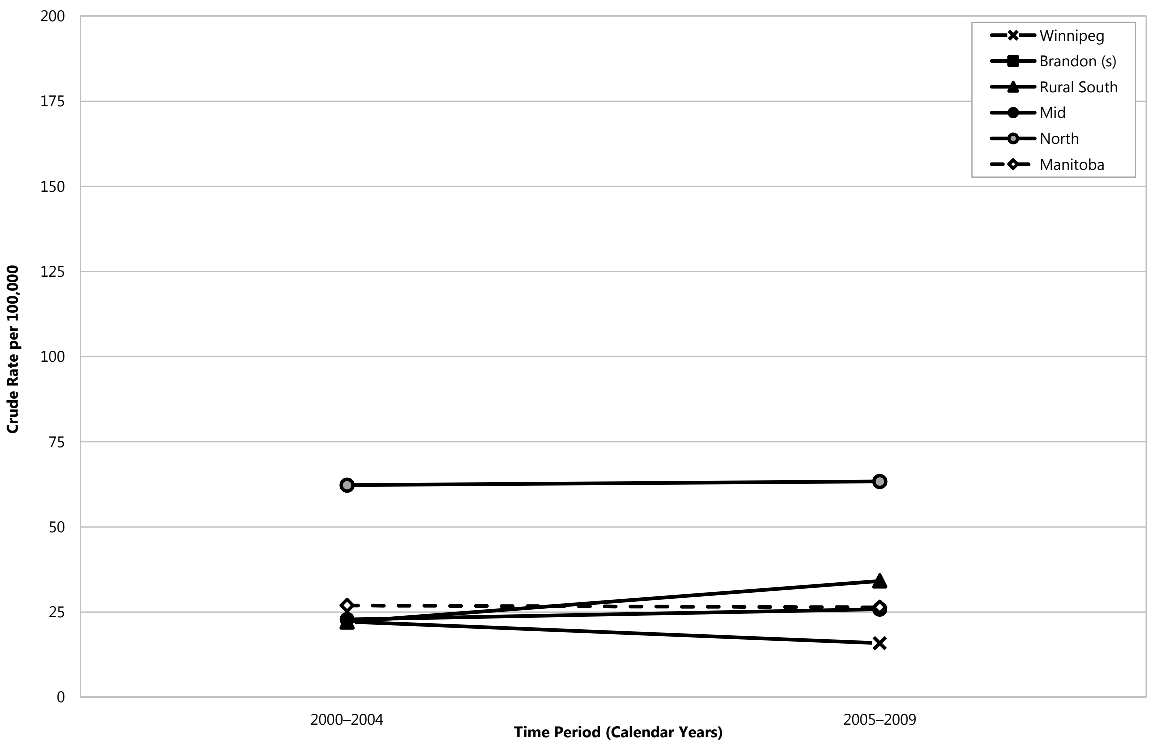


f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Trends by Age Group

Figures 3.2 to 3.4 show mortality rates for three age categories over the time period. Because of relatively small numbers of deaths, only crude rates were calculated. The highest mortality rates are found for teenagers, followed by children 1 to 5 years, and then the 6 to 12 year group. The provincial mortality rate for children 1 to 5 years was 26.9/100,000 in the first time period and 26.4/100,000 in the second time period. The highest rates were found in the North (62.3/100,000 and 63.3/100,000 for the first and last time periods). In both time periods, the rate for Brandon is suppressed due to small numbers.

Figure 3.2: Child Mortality Rates by Aggregate Region and 1 to 5 Age Group, 2000–2004 to 2005–2009
Crude rates per 100,000 children



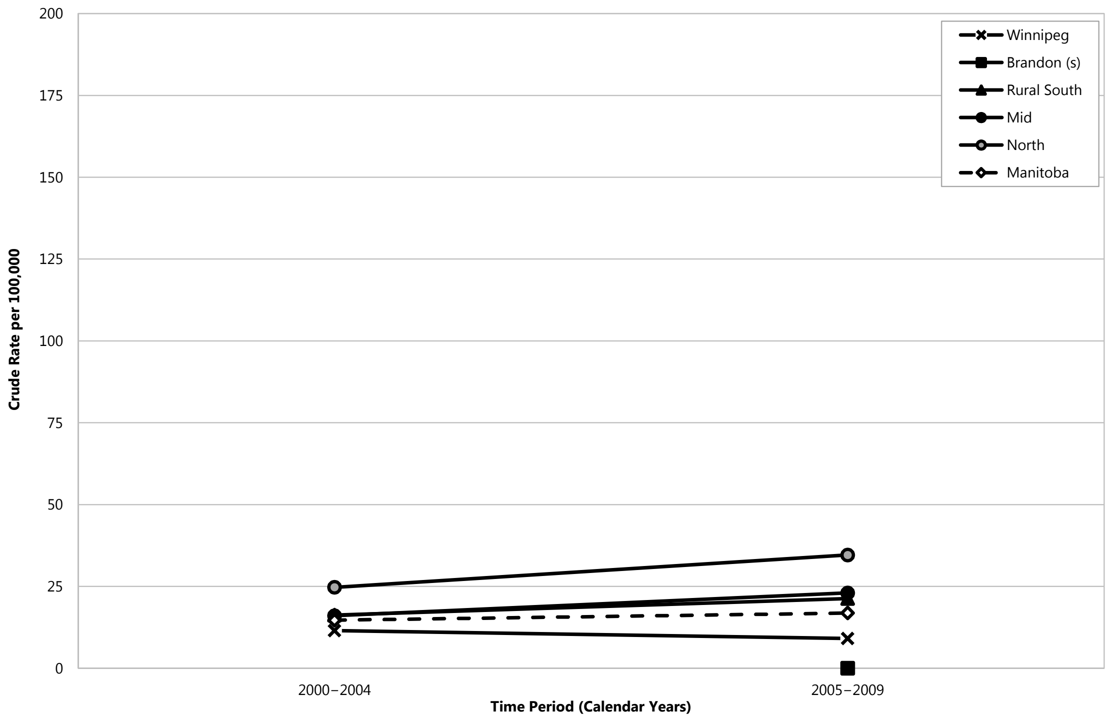
t indicates statistically significant difference between the first and last time periods for that region at $p<0.05$
s indicates data suppressed due to small numbers

For the 6 to 12 year group, the Manitoba mortality rate was 14.6/100,000 in time 1 and 16.9/100,000 in time 2. The rates were highest in the North at 24.7/100,000 in time 1 and 34.6/100,000 in time 2. In Brandon, the rate is suppressed in the first time period due to very small numbers and in the second time period, there were no deaths in this age group.

For the 13– to 19–year–old group, the Manitoba mortality rate was 58.6/100,000 in time 1 and 53.5/100,000 in time 2. As with the other two age groups, the highest mortality rates for 13– to 19–year–olds were found in the North at 151.1/100,000 in time 1 and 146.3/100,000 in time 2. Brandon's teen mortality rate is suppressed in the second time period due to small numbers.

Figure 3.3: Child Mortality Rates by Aggregate Region and 6 to 12 Age Group, 2000–2004 to 2005–2009

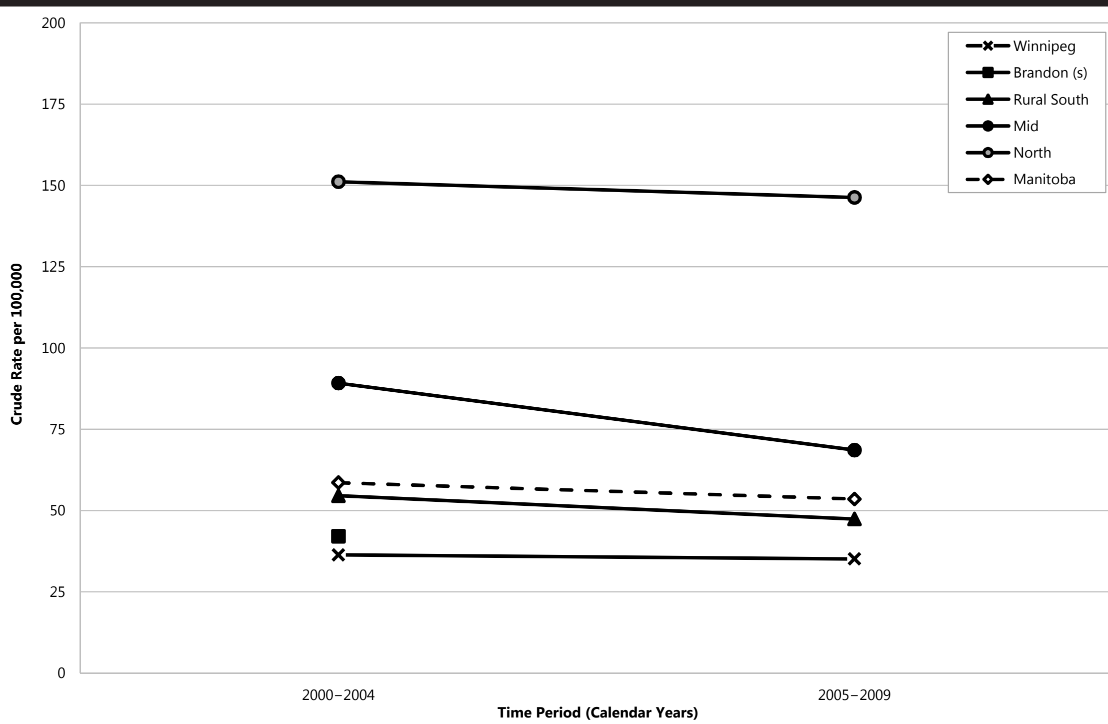
Crude rates per 100,000 children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05
s indicates data suppressed due to small numbers

Figure 3.4: Child Mortality Rates by Aggregate Region and 13 to 19 Age Group, 2000–2004 to 2005–2009

Crude rates per 100,000 children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05
s indicates data suppressed due to small numbers

Trends by Socioeconomic Status

Figure 3.5 shows child mortality rates by rural income quintiles for 2000–2004 and 2005–2009. In both time periods, there is a significant SES gradient in mortality rates, with rates increasing as income quintile decreases. For example, in time 2, the child mortality rate was 83.1/100,000 in R1 and 26.5/100,000 in R5. None of the income quintiles showed significant changes in mortality rates over time.

Figure 3.6 shows child mortality rates by urban income quintiles. As was found in the rural areas, there is a significant gradient across urban income quintiles in both time periods; rates get higher with each decrease in income quintile. For example, in time 2, the mortality rate was 49.3/100,000 in U1 and 11.4/100,000 in U5. None of the income quintiles showed significant changes in mortality rates over time.

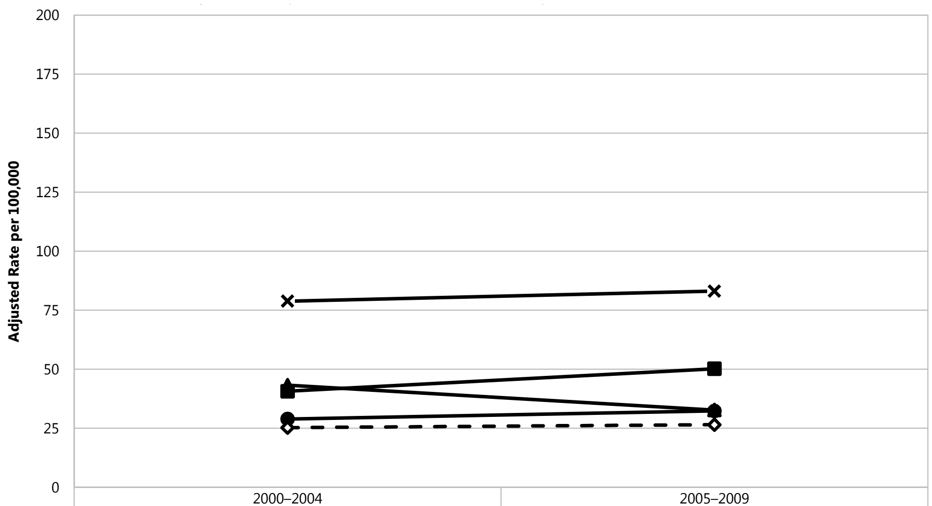
Changes in Inequity Over Time

Figures 3.7 and 3.8 show the inequities in child mortality rates in the two time periods, for rural areas. In both time periods, the lowest income quintile (R1) had higher mortality rates than expected given the proportion of the population. In time 1, 41.5% of the child deaths were found in the 23.6% of the population in R1. The Gini coefficient was 0.229, indicating high disparity across rural income quintiles. In time 2, 42.1% of the child deaths were found in the 23.7% of the population in R1. The Gini coefficient was 0.241, also indicating a high degree of disparity. The change in the Gini coefficient over the study period in the rural areas was not statistically significant, indicating no change in disparity over time.

Figures 3.9 and 3.10 show that there are also substantial inequities in child mortality rates in both time periods for urban areas. In time 1, 39.3% of child deaths were found in the 19.0% of the population in the lowest income quintile group (U1), with a Gini coefficient of 0.272, indicating a high degree of disparity. In time 2, 46.6% of the child deaths occurred in the 19.6% of the population in the lowest income quintile group, with a Gini coefficient of 0.314, indicating high disparity. The change in the Gini coefficient over time in the urban areas was not statistically significant, indicating no change in inequity over time. A comparison of the Gini coefficients in the last time period indicated that the disparity was similar in urban and rural income areas.

Figure 3.5: Child Mortality Rates by Rural Income Quintile, 2000–2004 to 2005–2009

Age– & sex–adjusted rates per 100,000 children 1–19 years



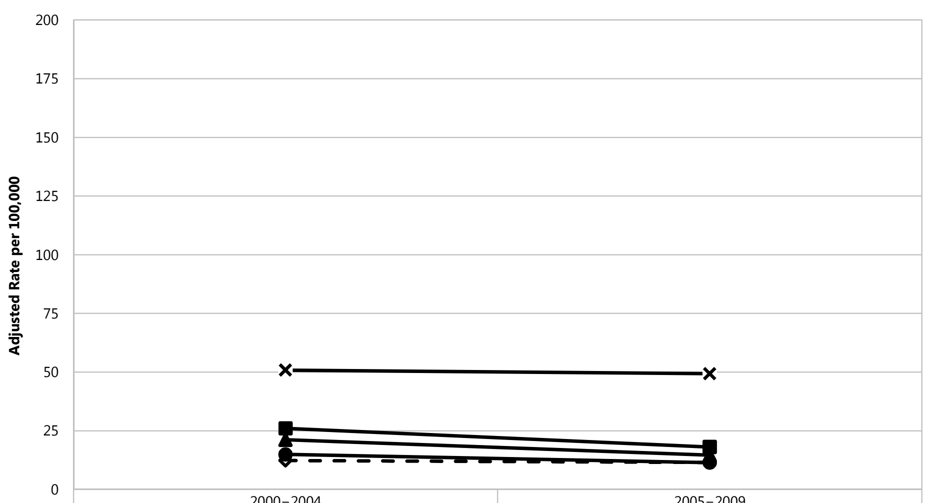
	2000–2004	2005–2009
Income Unknown (t)	126.69	182.61
R1 – Lowest Income	78.80	83.07
R2	40.65	50.17
R3	43.20	32.66
R4	28.88	32.33
R5 – Highest Income	25.23	26.47
Linear trend across R1–R5	*	*

Time Period (Calendar Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 3.6: Child Mortality Rates by Urban Income Quintile, 2000–2004 to 2005–2009

Age– & sex–adjusted rates per 100,000 children 1–19 years



	2000–2004	2005–2009
Income Unknown (t)	126.69	182.61
U1 – Lowest Income	50.84	49.34
U2	26.05	18.11
U3	21.18	14.61
U4	12.33	11.50
U5 – Highest Income	14.95	11.43
Linear trend across U1–U5	*	*

Time Period (Calendar Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 3.7: Lorenz Curve for Mortality in Rural Areas, 2000–2004
Adjusted by age & sex for children 1–19 years

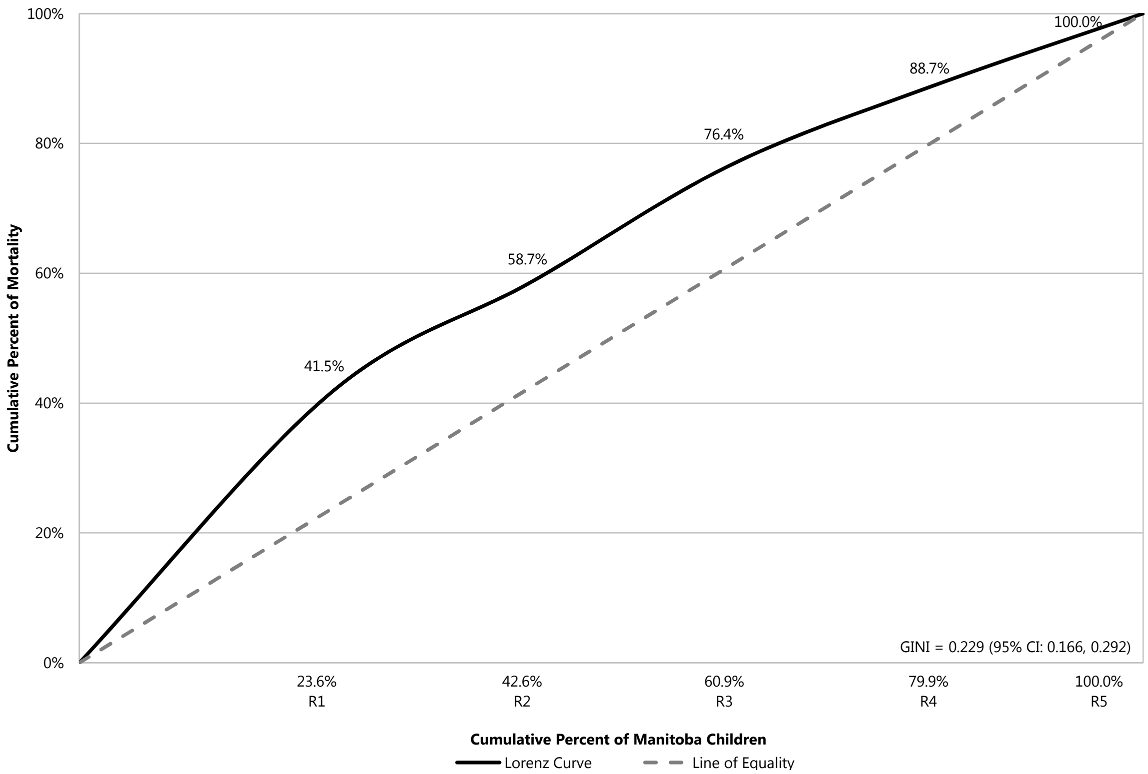


Figure 3.8: Lorenz Curve for Mortality in Rural Areas, 2005–2009
Adjusted by age & sex for children 1–19 years

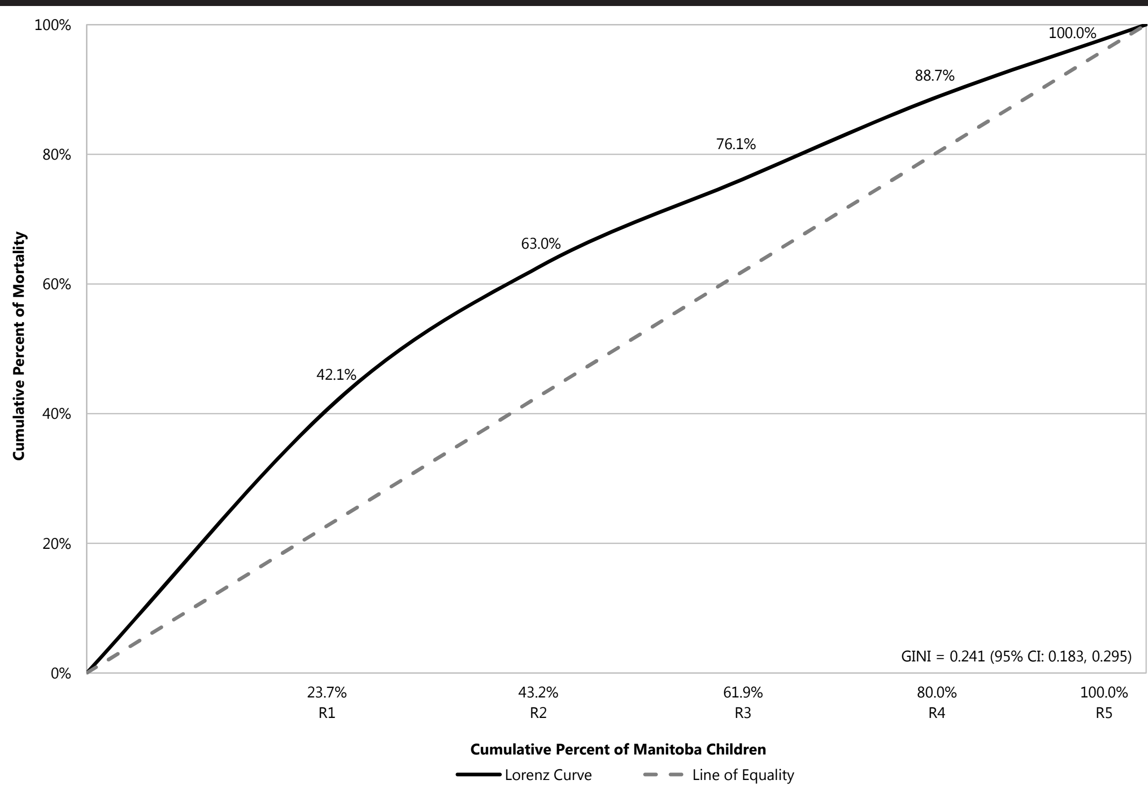


Figure 3.9: Lorenz Curve for Mortality in Urban Areas, 2000–2004
Adjusted by age & sex for children 1–19 years

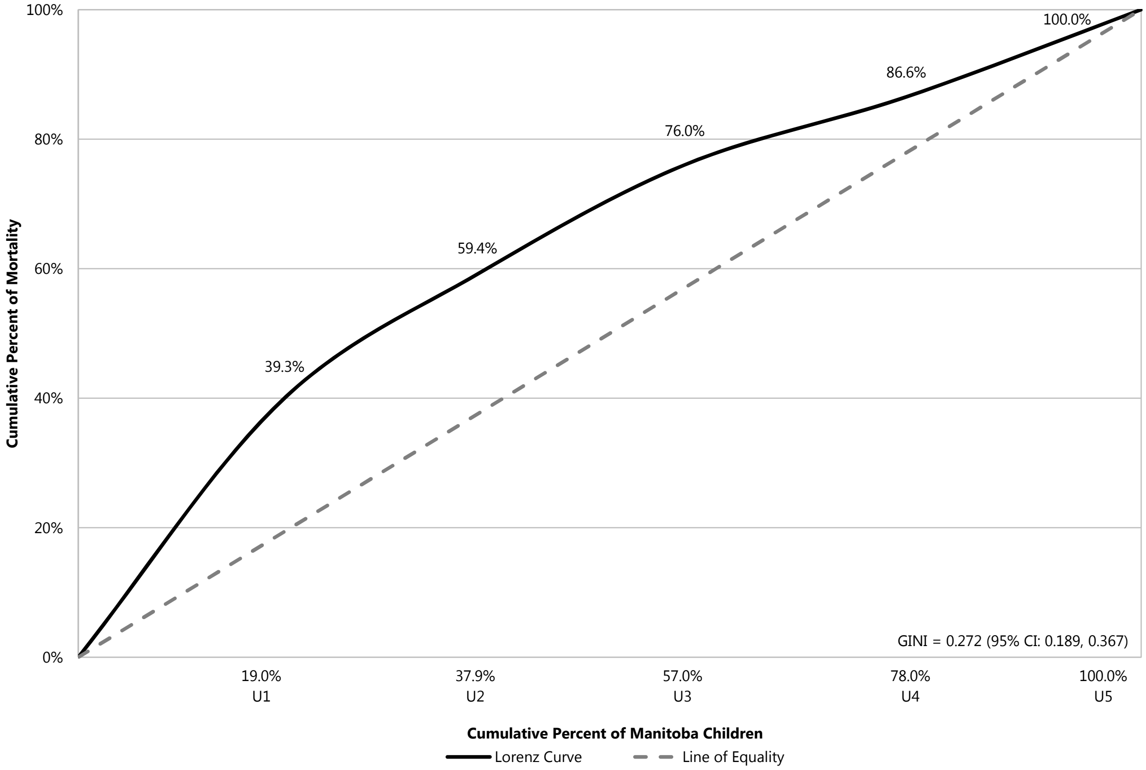
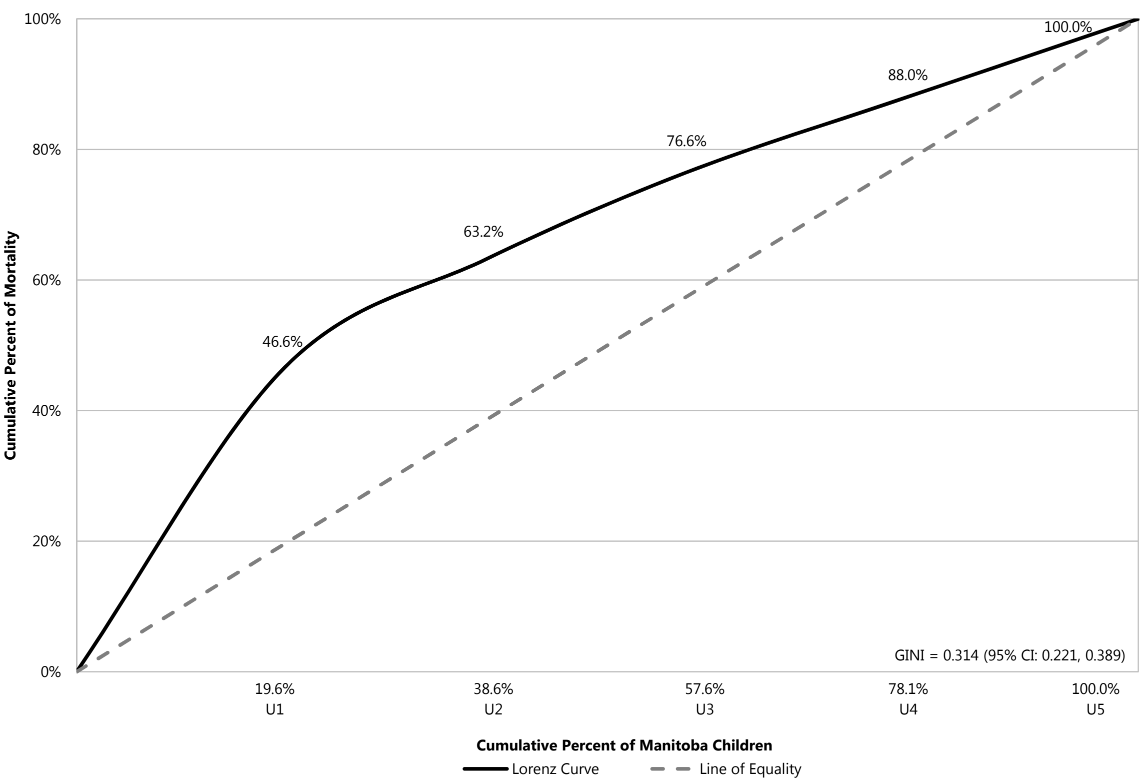


Figure 3.10: Lorenz Curve for Mortality in Urban Areas, 2005–2009
Adjusted by age & sex for children 1–19 years



What do these results mean?

Mortality is utilized as a crude indicator of population health. Our results confirm previous findings that Manitoba's child mortality rate is amongst the highest in Canada. For example, Statistics Canada (2012a) reports that for 2009, the mortality rate for all Canadian children 1 to 4 years of age was 0.1/1000, whereas Manitoba's rate was 0.2/1000. Among the other provinces and territories, only PEI (0.4/1000) and Nunavut (1.1) had higher rates. For children 5 to 9 years, the Canadian rate was 0.1/1000 whereas the Manitoba rate was 0.2/1000, with only Yukon (0.5/1000) and Nunavut (0.9) having higher rates. For children 10 to 14 years, the Canadian rate was 0.1/1000 whereas the Manitoba rate was 0.2/1000, with only NWT (0.6/1000) and Nunavut (0.9/1000) having higher rates. For children 15 to 19 years, the Canadian mortality rate was 0.4/1000, whereas the Manitoba rate was 0.8/1000, the highest in the country, tied with NWT and Saskatchewan. Manitoba's child mortality rates are not increasing but nor are they decreasing.

There is a high degree of inequity in Manitoba's child mortality rates. Children from Northern regions and those living in the lowest rural and urban income areas experience the highest rates of deaths. As will be seen in the next section, injuries are the leading cause of death for children in each of our three age groups; strategies aimed at reducing child mortality need to address injuries, particularly intentional injuries (suicide, homicide) and motor vehicle collisions. Programs to reduce alcohol consumption among teens could lead to reductions in these injuries.

Causes of Child Mortality

Vital Statistics records a "cause of death" for each death in the province, and these deaths can be categorized according to **International Classification of Diseases (ICD) chapters**.[14] Information on the **causes of child mortality** may provide a focus for policy strategies in the prevention of child death.

Because smaller percentages tend to fluctuate greatly over time (due to smaller numbers) the focus of this section is on the top five causes of death. Figures 3.11 and 3.12 show the crude percent of different causes of death for children 1 to 19 years in each of the two time periods. The top 5 causes of mortality for Manitoba children 1–19 years were slightly different in the two time periods. For both time periods, the top 3 causes were the same and accounted for a similar proportion of deaths: Injuries (comprising 60.6% of deaths in time 1 and 61.0% in time 2), Other[15] (comprising 8.7% of deaths in time 1 and 8.4% in time 2), and Neoplasms (comprising 7.0% of deaths in both time periods).

14 ICD–10–CA diagnostic codes have been used for mortality data in Manitoba since January 1, 2000.

15 The category "Other" includes a large number of ICD codes for causes of child mortality that are coded infrequently and do not fall in any of the nine categories shown in Figures 3.11 or 3.12.

Figure 3.11: Causes of Mortality, 2000–2004
Crude percent of children 1–19 years

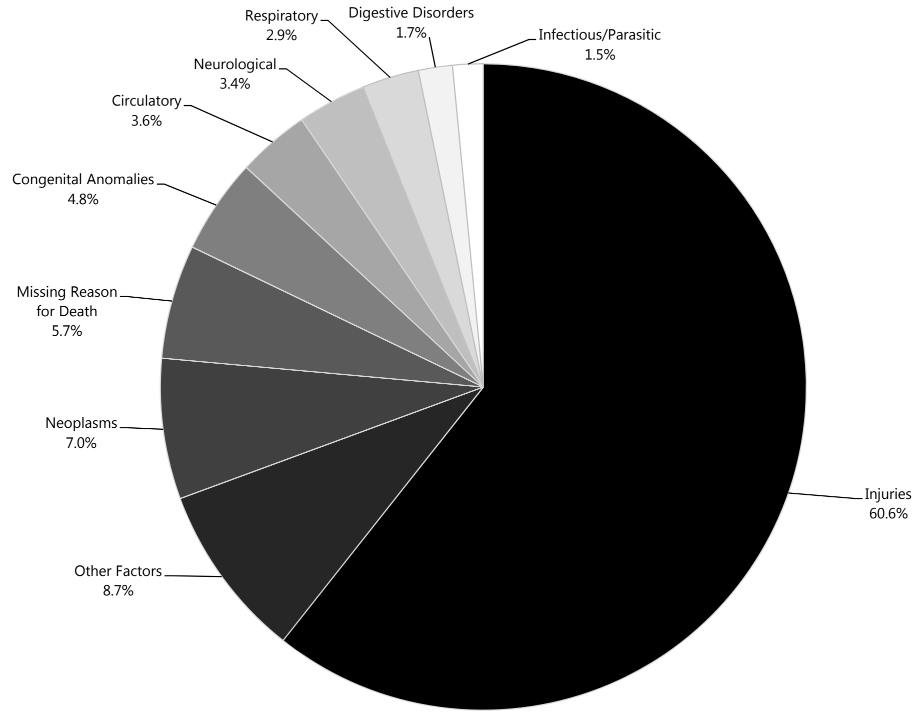


Figure 3.12: Causes of Mortality, 2005–2009
Crude percent of children 1–19 years

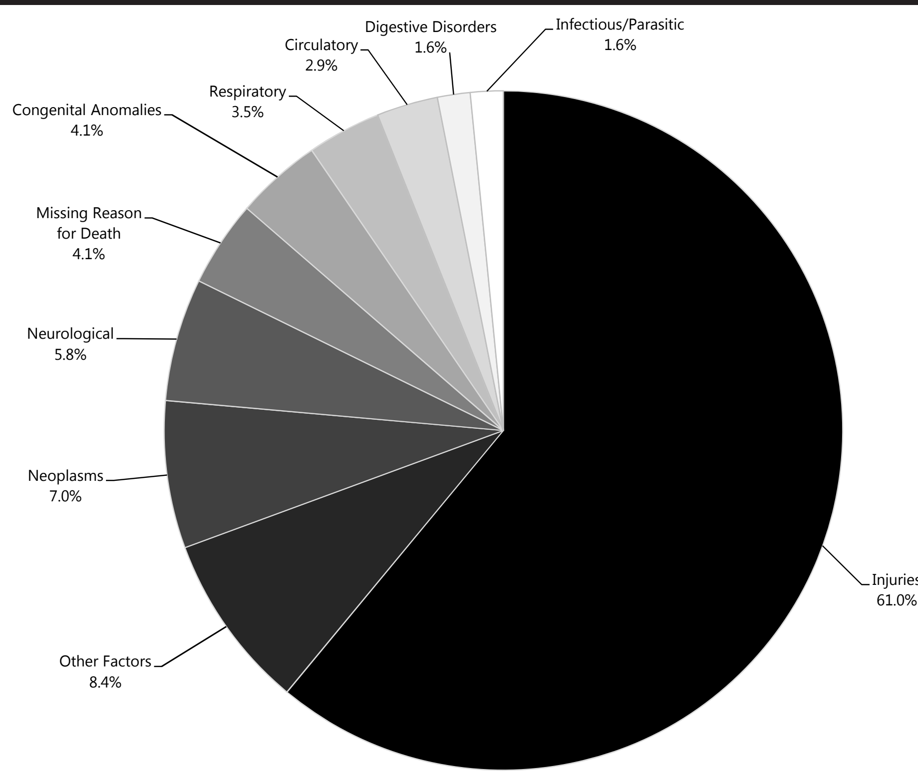
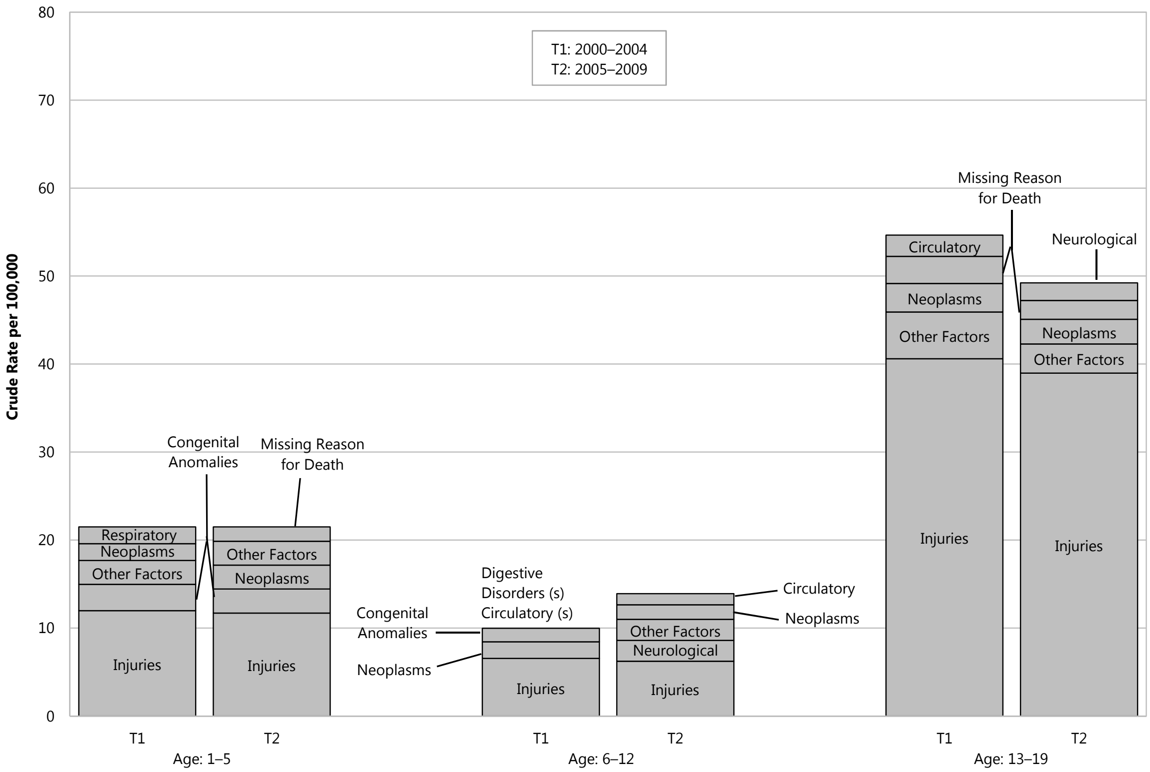


Figure 3.13 shows the top 5 causes of death broken down into three age categories: 1 to 5, 6 to12 and 13 to 19 years. Injury is the leading cause of death for children in each of these three age groups, accounting for about 70% of the deaths in the 13 to 19 age group. Detailed information about causes of child mortality by region is not provided because the number of deaths in many regions are too small to be displayed.

Figure 3.13: Top 5 Causes of Child Mortality by Age Group, 2000–2004 and 2005–2009
Crude rate per 100,000 children 1–5, 6–12, and 13–19 years



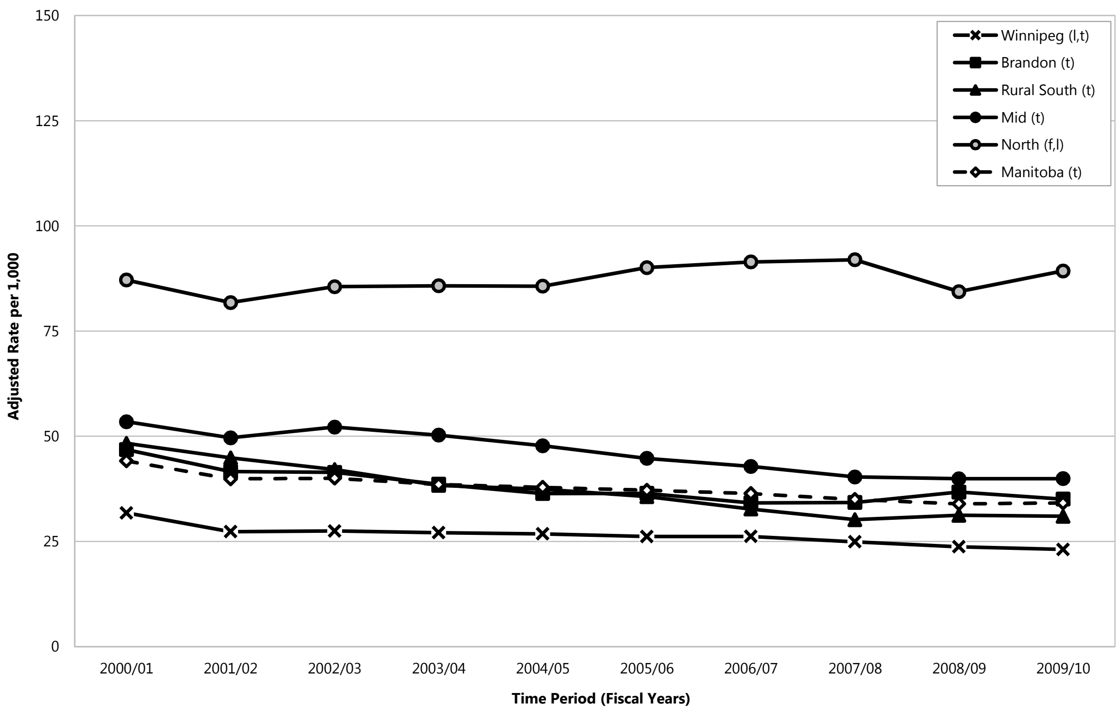
Hospital Utilization

Hospital utilization was measured by looking at **hospital episode** rates. If a child was hospitalized in one hospital and then transferred to a different hospital, it was counted as a single episode. A hospital episode is attributed to the region of the child's residence, regardless of where the hospitalization took place. In this section, all hospitalizations for any reason are included with the exception of birth hospitalizations, which are excluded because nearly all children are born in hospital. As seen in the next section on **Causes of Hospitalization**, Pregnancy and Childbirth Related hospitalizations in teenaged girls are one of the top reasons for hospitalization (comprising almost 16% of all hospitalizations for Manitoba children in 2009/10). For this reason, we also re–ran all analyses described here but excluding pregnancy and childbirth related hospitalizations. The patterns were very similar to the patterns described here for all hospitalizations. The results with pregnancy and childbirth–related hospitalizations removed can be found in Appendix 2 of the report.

Regional Trends Over Time

Figure 3.14 shows the hospitalizations over time for aggregate regions of Manitoba. The provincial rate of hospitalizations decreased significantly over the 10–year time period, going from 44.1/1000 in 2000/01 to 34.1/1000 in 2009/10. Winnipeg had significantly lower rates than the Manitoba average in the final time period and decreased significantly over time, from 31.8/1000 in 2000/01 to 23.1/1000 in 2009/10. Hospitalization rates in the North were significantly higher than the Manitoba average in the first and the last time periods: in 2000/01 the rate was 87.1/1000 and in 2009/10 the rate was 89.2/1000, a change that was not statistically significant. All other aggregate regions showed statistically significant decreases in hospitalizations from 2000/01 to 2009/10: Mid dropped from 53.4/1000 to 39.9/1000, Rural South went from 48.3/1000 to 31.0/1000, and Brandon decreased from 46.8/1000 to 35.0/1000.

Figure 3.14: Hospital Episode Rates by Aggregate Region, 2000/01–2009/10
Age– & sex–adjusted rates per 1,000 children 0–19 years



f indicates region's rate was statistically different from Manitoba average in first time period at $p<0.01$
l indicates region's rate was statistically different from Manitoba average in last time period at $p<0.01$
t indicates change over time was statistically significant for that region at $p<0.05$

The section entitled "Causes of Hospitalization" provides details regarding the primary causes.

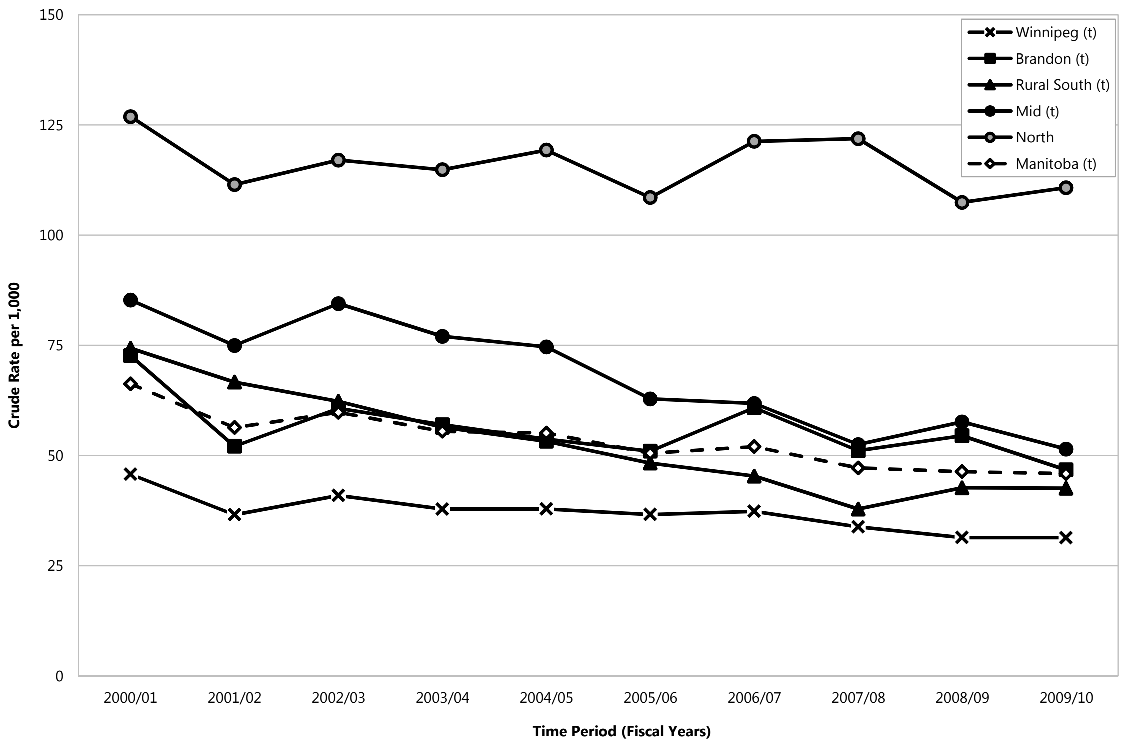
Trends by Age Group

Figures 3.15 to 3.17 show the hospitalizations for each of the three age categories. The youngest age group, 0 to 5 years, had the highest rates of hospitalizations, followed by the 13 to 19 age group, with the lowest hospitalization rates found for the 6 to12 year group. The regional patterns were similar across age groups with Winnipeg having the lowest hospitalization rates and the highest rates found in the North. For the 0 to 5 age group, the Manitoba rate decreased from 66.3/1000 to 45.9/1000 over the 10–year period, a statistically significant decrease. Statistically significant decreases over time were found for all aggregate regions except the North: Mid went from 85.3/1000 to 51.4/1000, rural South went from 74.3/1000 to 42.6/1000, Brandon went from 72.7/1000 to 46.7/1000, and Winnipeg went from 45.7/1000 to 31.4/1000.

For the 6 to12 age group, the Manitoba rate decreased significantly from 21.3/1000 to 15.7/1000, and significant decreases over time were also found for the following aggregate regions: Mid 24.8/1000 to 18.1/1000, Rural South 26.1/1000 to 14.8/1000, and Winnipeg 14.9/1000 to 10.4/1000.

For the 13 to 19 age group, the Manitoba rate decreased significantly from 50.2/1000 to 46.4/1000 over the study period. All of the aggregate regions, with the exception of Mid, also showed significant changes in hospitalizations over time; however in the North, this change was an increase in hospitalizations, from 112.8/1000 to 141.6/1000[16], as opposed to the decrease observed in all other regions.

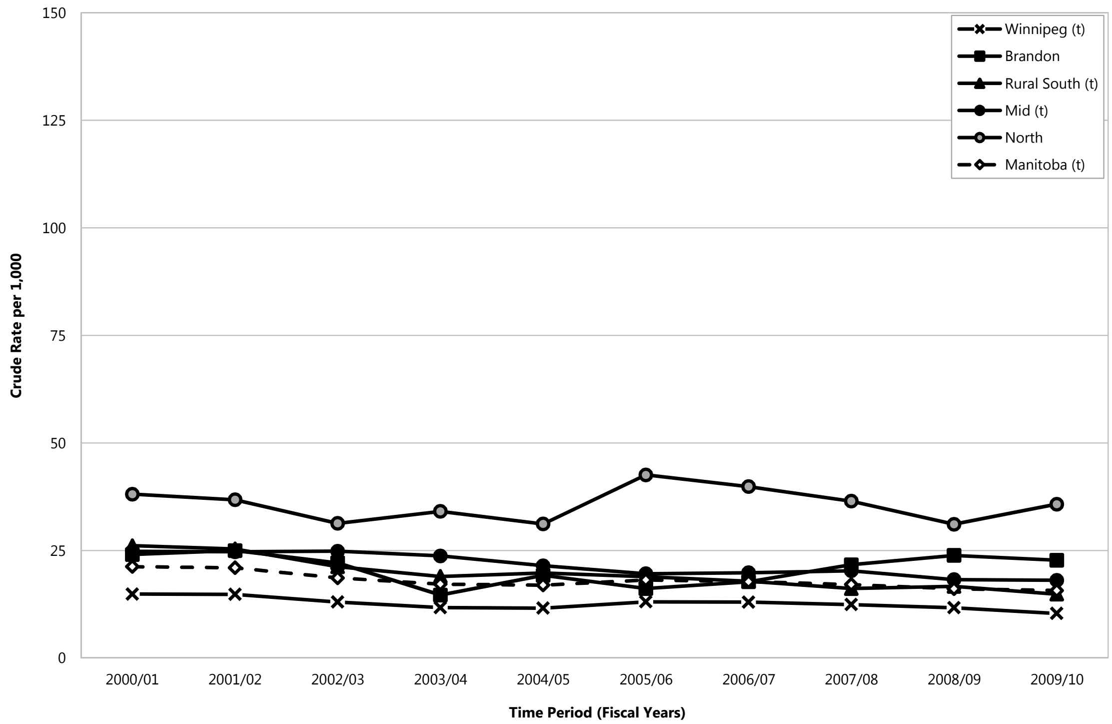
Figure 3.15: Hospital Episode Rates by Aggregate Region and 0 to 5 Age Group, 2000/01–2009/10
Crude rates per 1,000 children



t indicates change over time was statistically significant for that region at p<0.05

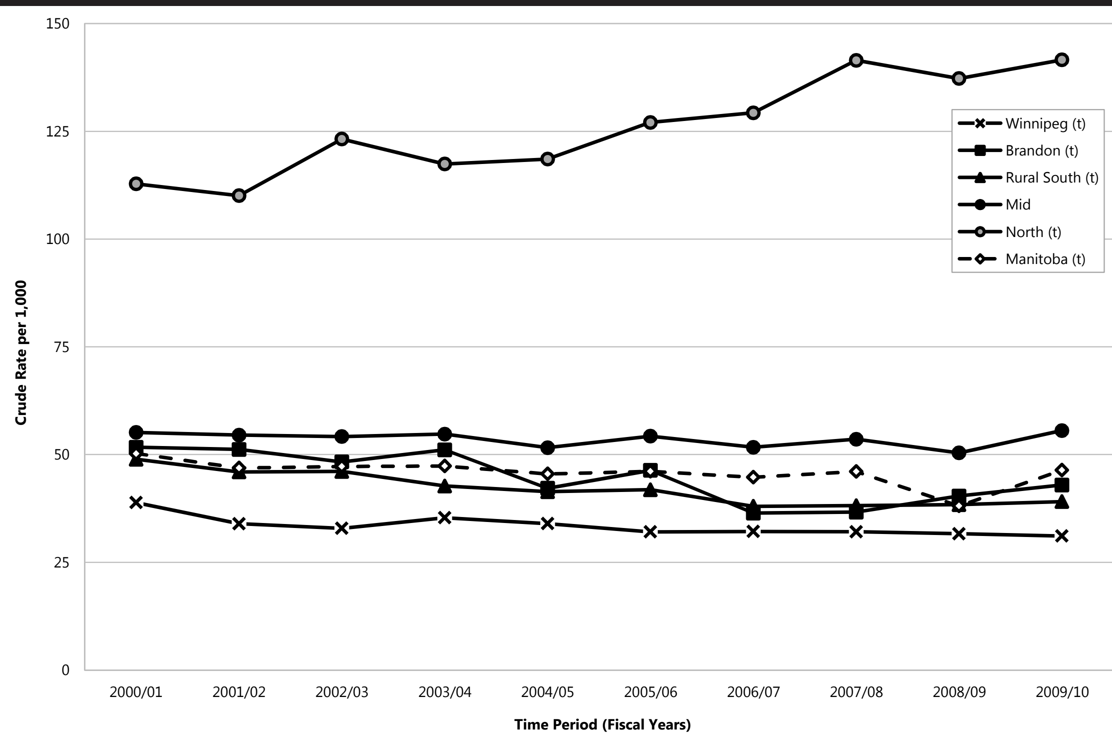
16 The section "Causes of Hospitalization" below provides details regarding causes of hospitalization for all Manitoba. Details by region can be found in the Online Appendix, which shows that the increased hospitalizations in the North for the 13 to 19 age groups were driven by the categories "Complications of Pregnancy, Childbirth and Pueriperium". It includes normal delivery and went from 47.0/1000 (422 cases) in time 1 to 54.9/1000 (526 cases) in time 10 and "Symptoms, Signs, and Ill-Defined Conditions" which increased from 4.0/1000 to 18.3/1000 (36 cases to 175 cases). The code that increased the most for the latter category was R458, which is "other signs and symptoms involving emotional state" and includes suicide ideation and some conditions that would previously have been categorized under "Mental Conditions".

Figure 3.16: Hospital Episode Rates by Aggregate Region and 6 to 12 Age Group, 2000/01–2009/10
Crude rates per 1,000 children



t indicates change over time was statistically significant for that region at p<0.05

Figure 3.17: Hospital Episode Rates by Aggregate Region and 13 to 19 Age Group, 2000/01–2009/10
Crude rates per 1,000 children



t indicates change over time was statistically significant for that region at p<0.05

Trends by Socioeconomic Status

Figure 3.18 shows hospitalization rates by rural income quintiles over the 10–year study period. There are statistically significant SES gradients in hospitalization rates in each of the years examined, with higher rates of hospitalization found for residents of areas with lower SES and lower rates of hospitalization found for residents of areas with the higher SES. For example, in 2009/10, the hospitalization rate in R1 was 75.9/1000 compared to 23.4/1000 in R5. As was found with the regional results, hospitalizations decreased over time for all rural income groups. However, these decreases were only statistically significant for: R3, which went from 53.9/1000 to 33.9/1000; R4, which went from 46.4/1000 to 28.9/1000; and R5 (highest), which went from 32.0/1000 to 23.4/1000 over the study period.

Figure 3.19 shows hospitalization rates by urban income quintiles. The rates in the urban areas are lower than those found in the rural areas; however, there are still statistically significant SES gaps in hospitalization rates for children living in urban areas, with the highest rates of hospitalization found for children in U1, the area with the lowest SES, and the lowest rates of hospitalization found in U5, the area with the highest SES. For example, in 2009/10, the hospitalization rate in U1 was 37.9/1000 compared to 15.9/1000 in U5. Hospitalization rates decreased significantly over time for all urban income groups except U2: U1 (lowest) went from 51.0/1000 to 37.9/1000, U3 went from 30.4/1000 to 20.7/1000, U4 went from 25.2/1000 to 17.8/1000, and U5 (highest) went from 22.0/1000 to 15.9/1000.

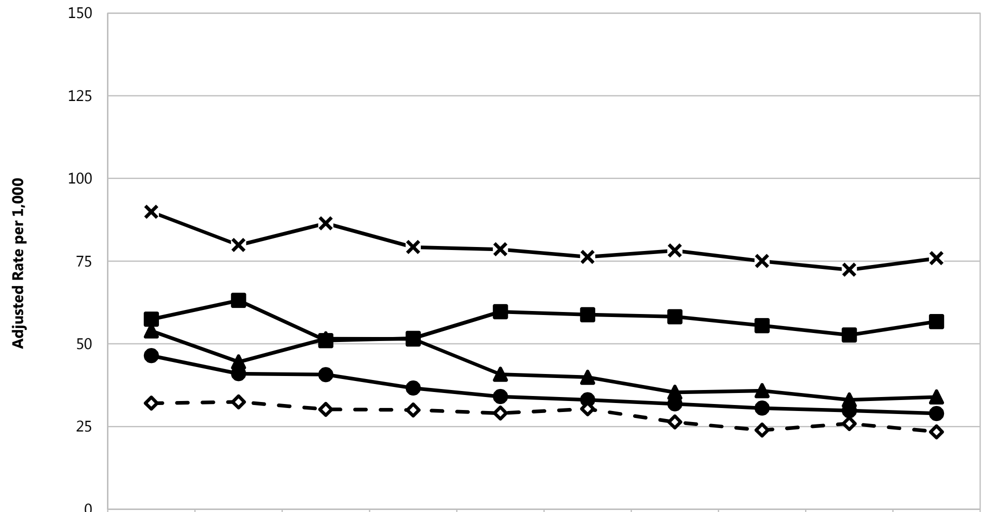
Changes in Inequity Over Time

Figures 3.20 and 3.21 show the inequities in hospitalization rates in 2000/01 and 2009/10, respectively, for rural areas. In the first year, 37.3% of the hospitalizations occurred in the 23.7% of the population in the lowest income quintile group (R1), with a Gini coefficient of 0.190, indicating a moderate degree of disparity. In the final year, 40.0% of the hospitalizations occurred in the 23.9% of the population in the lowest income quintile group, with a Gini coefficient of 0.246, indicating a high degree of disparity. The Gini coefficient increased significantly from the first to the last time period, indicating a statistically significant increase in inequity in hospitalization rates in rural areas over the study period.

Figures 3.22 and 3.23 show the inequities in hospitalization rates in the first and last time period for urban areas. In 2000/01, 29.5% of the hospitalizations occurred in the 18.8% of the population in the lowest income quintile group, with a Gini coefficient of 0.168, indicating a moderate degree of disparity. In 2009/10, 31.9% of the hospitalizations occurred in the 20.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.182, again indicating a moderate degree of disparity. The Gini coefficient did not change significantly from the first to the last time period, indicating that inequity in hospitalization rates in urban areas remained stable over the study period. The Gini in the rural areas in the final time period was significantly larger than the Gini in the urban areas, indicating more inequity in hospitalizations in the rural compared to urban areas.

Figure 3.18: Hospital Episode Rates by Rural Income Quintile, 2000/01–2009/10

Age– & sex–adjusted rates per 1,000 children 0–19 years



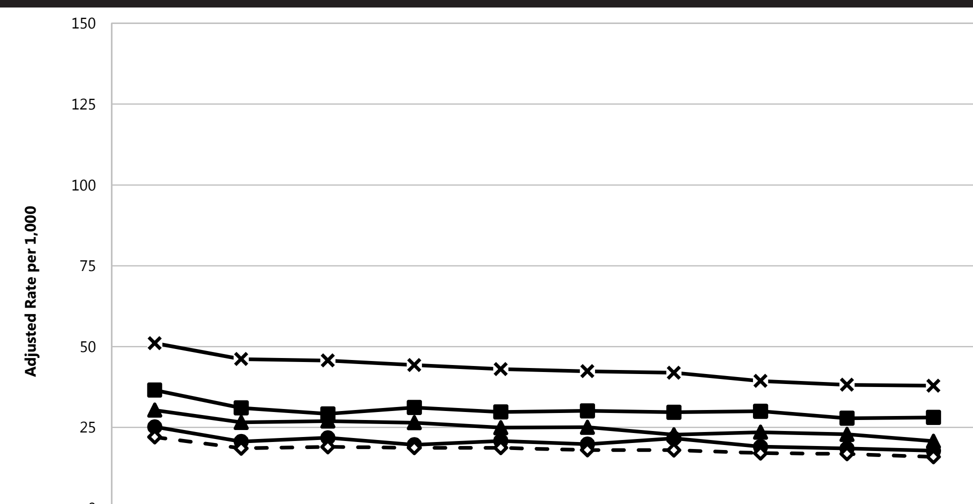
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	86.46	87.21	91.11	62.63	65.73	60.49	63.76	68.36	55.15	60.50
R1 – Lowest Income	89.89	79.82	86.43	79.22	78.56	76.27	78.19	75.00	72.38	75.87
R2	57.43	63.12	50.96	51.65	59.69	58.82	58.21	55.50	52.65	56.74
R3 (t)	53.88	44.52	51.54	51.47	40.79	39.89	35.33	35.82	33.04	33.94
R4 (t)	46.40	40.98	40.69	36.63	34.04	33.08	31.86	30.57	29.78	28.93
R5 – Highest Income (t)	32.03	32.43	30.15	29.98	29.03	30.33	26.33	23.88	25.87	23.37
Linear trend across R1–R5	*	*	*	*	*	*	*	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across rural income quintiles for that time period at p<0.05

Figure 3.19: Hospital Episode Rates by Urban Income Quintile, 2000/01–2009/10

Age– & sex–adjusted rates per 1,000 children 0–19 years



	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	86.46	87.21	91.11	62.63	65.73	60.49	63.76	68.36	55.15	60.50
U1 – Lowest Income (t)	51.03	46.14	45.70	44.28	43.02	42.37	41.91	39.37	38.19	37.90
U2	36.56	31.03	29.18	31.16	29.79	30.13	29.70	30.00	27.84	28.10
U3 (t)	30.36	26.56	26.97	26.46	24.92	25.06	22.74	23.52	22.88	20.73
U4 (t)	25.20	20.65	21.79	19.63	20.84	19.82	21.62	19.04	18.47	17.80
U5 – Highest Income (t)	22.02	18.55	18.98	18.69	18.71	18.00	17.99	17.04	16.81	15.87
Linear trend across U1–U5	*	*	*	*	*	*	*	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across urban income quintiles for that time period at p<0.05

Figure 3.20: Lorenz Curve for Hospital Episodes in Rural Areas, 2000/01
Adjusted by age & sex for children 0–19 years

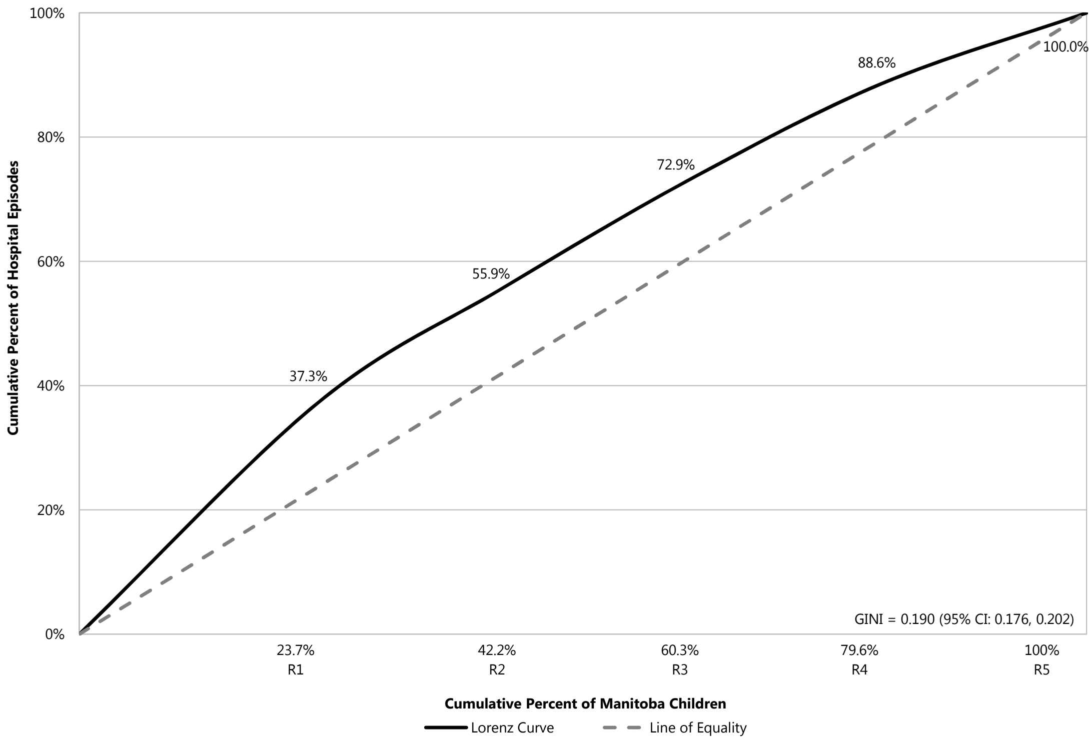


Figure 3.21: Lorenz Curve for Hospital Episodes in Rural Areas, 2009/10
Adjusted by age & sex for children 0–19 years

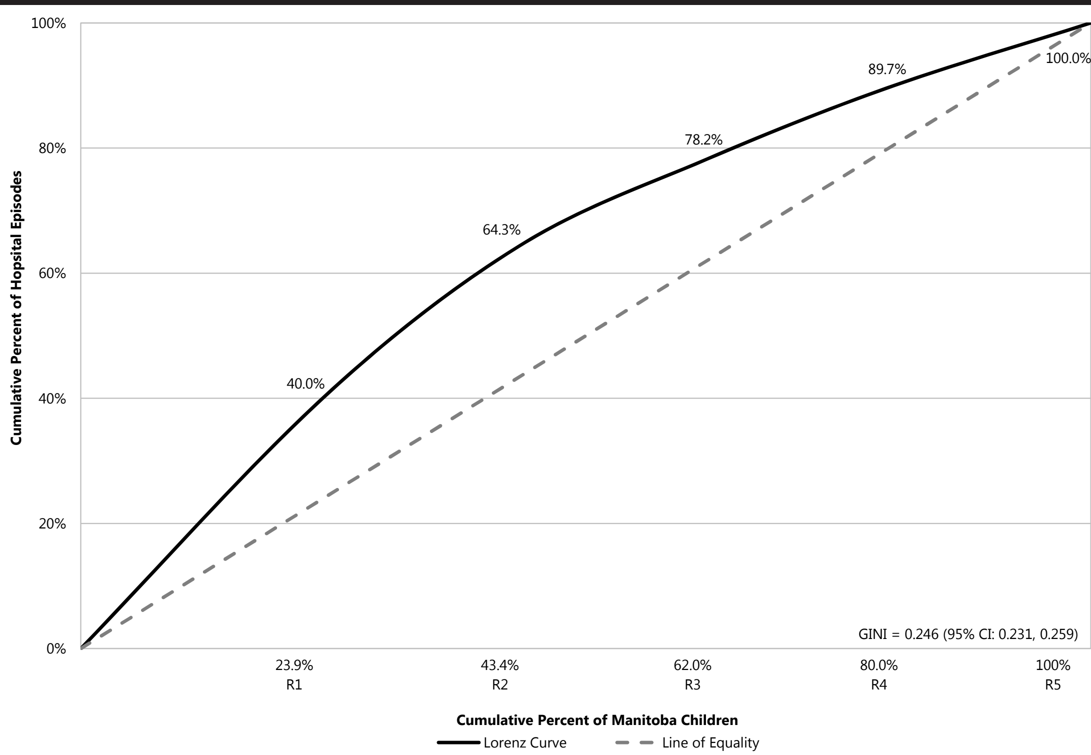


Figure 3.22: Lorenz Curve for Hospital Episodes in Urban Areas, 2000/01
Adjusted by age & sex for children 0–19 years

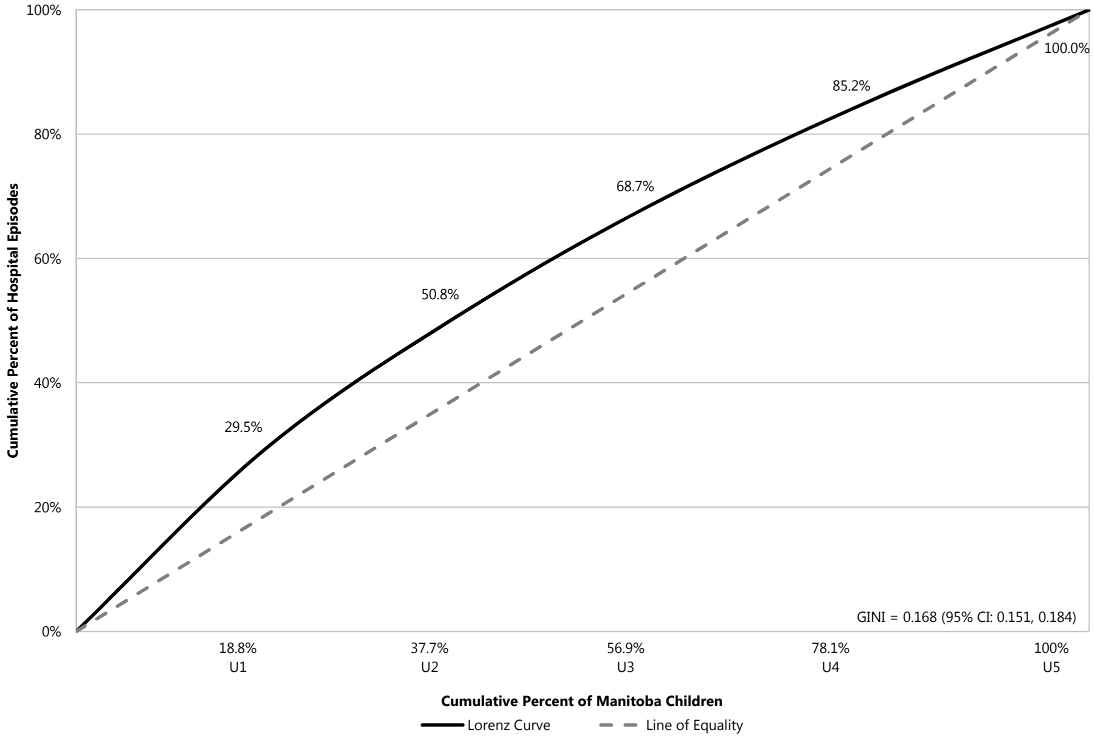
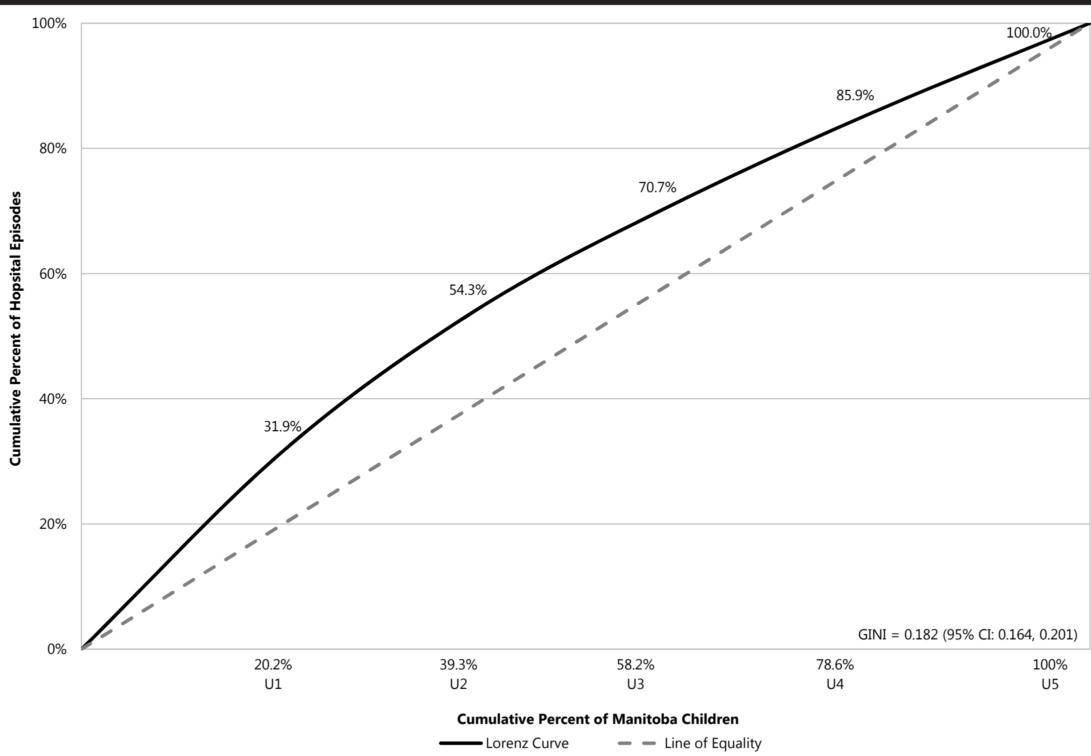


Figure 3.23: Lorenz Curve for Hospital Episodes in Urban Areas, 2009/10
Adjusted by age & sex for children 0–19 years



What do these results mean?

Hospitalization rates for Manitoba children decreased over the study period; from the data available in this report it is difficult to tell whether this decrease represents improvements in health, more appropriate use of inpatient services, more outpatient treatment, or decreased access to hospital care. There are inequities in hospitalization rates; children living in Northern Manitoba and children from lower income rural and urban areas had the highest hospitalization rates. Universal strategies should be supplemented with targeted approaches, to reduce hospitalizations in these groups of children, focusing on strategies to reduce respiratory illnesses in younger children (e.g., frequent hand washing, covering mouth and nose when coughing and sneezing) and injuries and mental health disorders in teenagers (e.g., reduction in alcohol consumption) (see next section on Causes of Hospitalization).

Causes of Hospitalization

Hospitalizations can be categorized according to the cause of hospitalization, using the "most responsible" diagnosis attributed during the hospital stay, and the International Classification of Diseases (ICD) chapters to group the diagnoses.[17]

Figures 3.24 and 3.25 show the different causes of hospitalization for children 0 to 19 years in each of the two time periods. The top 5 causes of hospitalization for Manitoba children 0 to 19 years were the same for the two time periods, with the last two top causes changing position in the first and last time period. The top five causes were: Respiratory (comprising 24.5% of hospitalizations in time 1 and 18.7% in time 10); Pregnancy/Childbirth (comprising 13.2% in time 1 and 15.9% in time 10); Injuries (comprising 12.5% in time 1 and 12.3% in time 10); Digestive (10.2% in time 1 and 8.1% in time 10); and Symptoms, Signs, and Ill–Defined Conditions (7.5% in time 1 and 8.9% in time 10.)

Results with Complications of Pregnancy, Childbirth and the Pueriperium excluded can be found in Appendix 4.

The top 3 causes of hospitalization were the same in all 10 years of the study period, although the Injury category and the Complications of Pregnancy/Childbirth category changed places in 2003/04, 2004/05, and 2005/06 and Respiratory Diseases and Pregnancy/Childbirth changed places in 2007/08. There was some change in the fourth and fifth top causes over the years—Mental Disorders was the fifth top cause in 2004/05 and Digestive Disorders and Symptoms, Signs and Ill–defined Conditions switched positions in some years (see online Appendix).

17 **ICD–9–CM** diagnostic codes were used in Manitoba hospitals up to March 31, 2004; on April 1, 2004, Manitoba hospitals started using ICD–10–CA to code diagnoses. For categorizing causes of hospitalization in this report, ICD–10–CA data were converted to ICD–9–CM, in order to have consistent categories over the study period.

Figure 3.24: Causes of Hospitalization, 2000/01
Crude percent of children 0–19 years

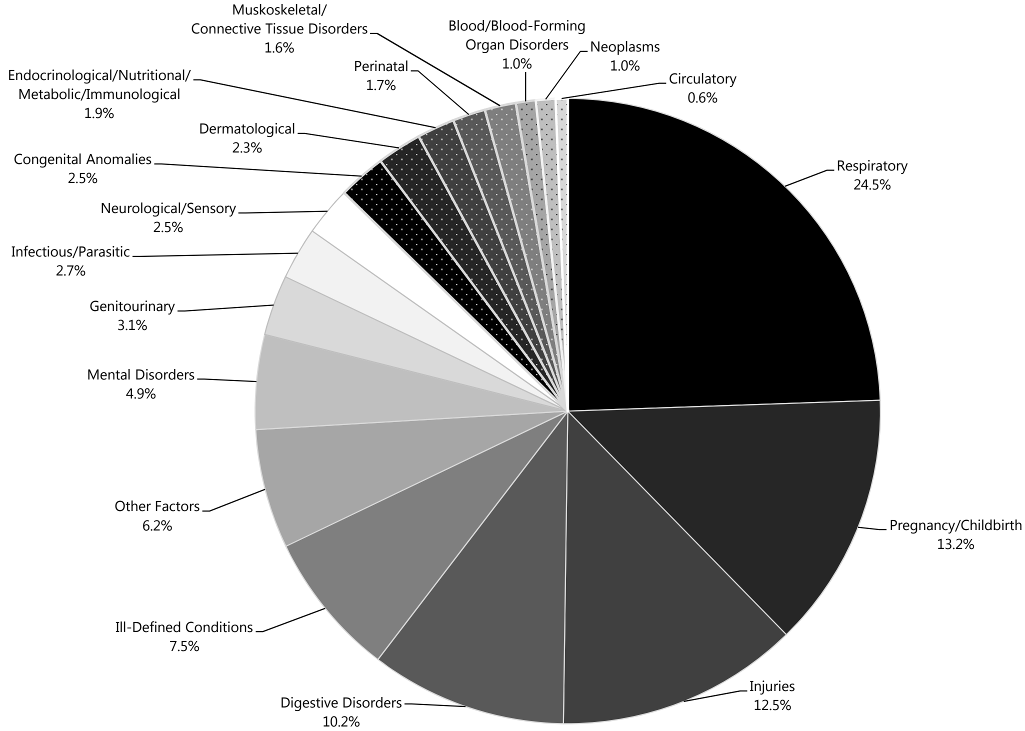
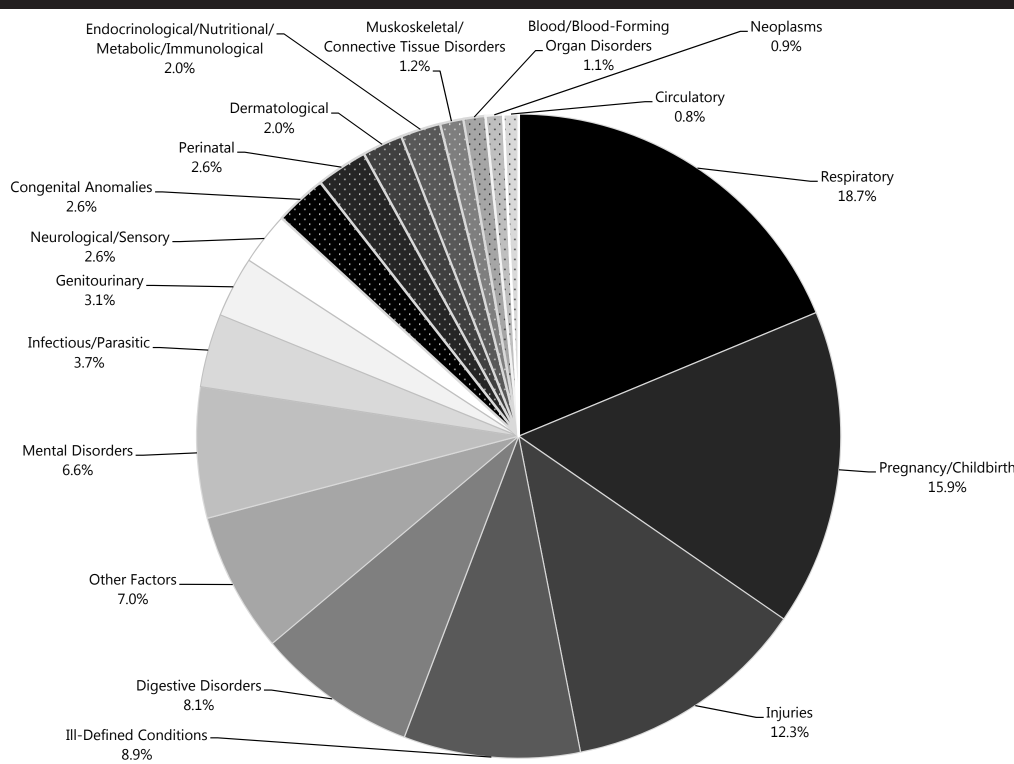
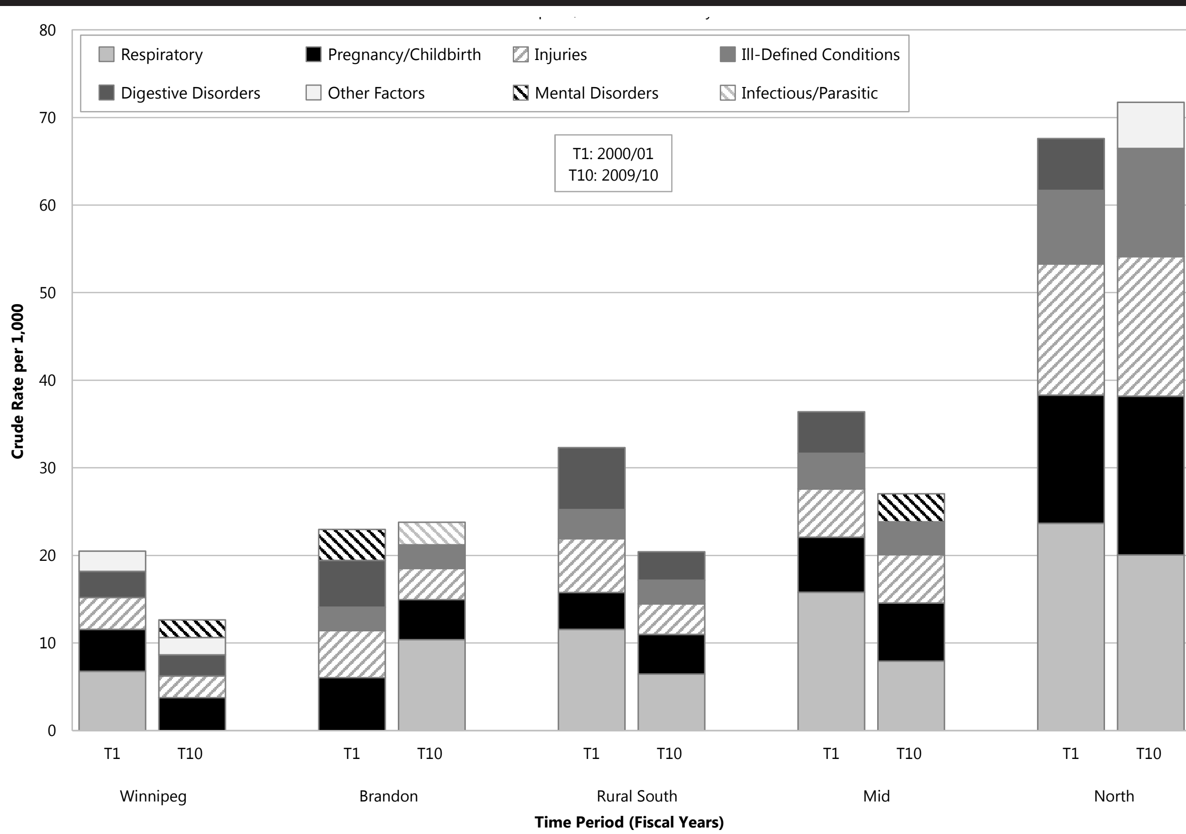


Figure 3.25: Causes of Hospitalization, 2009/10
Crude percent of children 0–19 years



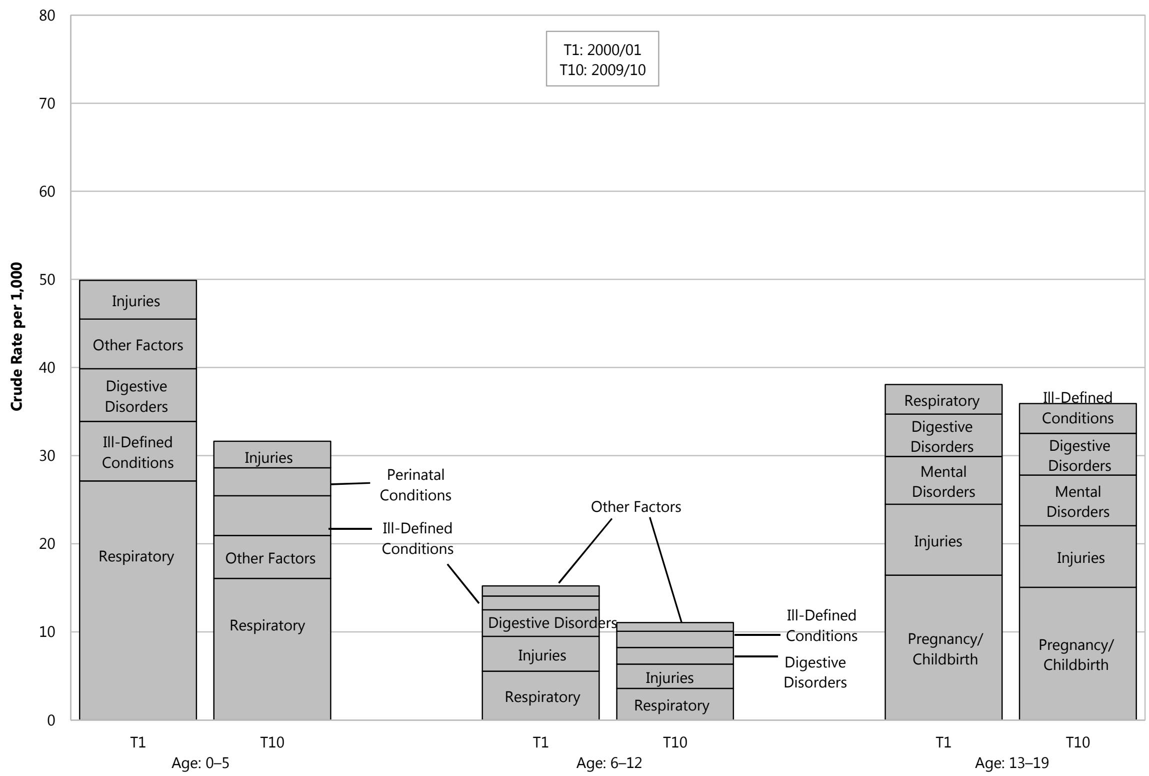
For all aggregate regions, the top cause of hospitalization was Diseases of the Respiratory System (Figure 3.26). All aggregate regions also included Fractures, Wounds, and Injuries; Complications of Pregnancy, Childbirth, and the Pueriperium; and Digestive System Diseases in their top 5 causes of hospitalization, though the ordering differed by region and by year. Mental Disorders was in the top 5 in Brandon and Winnipeg, whereas in the other regions Symptoms, Signs and Ill–Defined Conditions was in the top 5. Over the study period, the top 3 causes of hospitalization for all regions were generally Respiratory Diseases, Injuries, and Pregnancy/Childbirth. The exceptions were: Rural South, where from 2000/01 through 2006/07, Digestive Diseases replaced Pregnancy/Childbirth in the top 3, and in 2007/08 and 2008/09, Digestive Diseases replaced Injury in the top 3 and Brandon, where in 2006/07 and 2007/08, Digestive Diseases replaced Pregnancy/Childbirth in the top 3. Graphs of detailed information by region and year are available in Appendix 3.

Figure 3.26: Top 5 Causes of Hospitalization by Aggregate Region, 2000/01 and 2009/10
Crude rate per 100,000 children 0–19 years



The top causes of hospitalizations differ across age groups. For the 0 to 5 and 6 to12 age groups, the top 5 causes were fairly similar, with Respiratory Disorders the number one cause of hospitalization in both age groups, in both the first and last time period (Figure 3.27). Hospitalizations for Respiratory Diseases accounted for about 38% of the hospitalizations for 0– to 5–year–olds over the study period and for about 23% of the hospitalizations for 6– to 12–year–old children over the study period. As children grow from the preschool (0 to 5) to the middle–childhood period (6 to12), to adolescence (13 to 19), Injuries become a more prominent reason for hospitalization, accounting for about 7% of the hospitalizations for 0– to 5–year–old children over the study period, but 19% for the 6– to 12–year–olds and 17% for the 13– to 19–year–olds over the study period. In the 13 to 19 age group, the number one reason for hospitalization is Complications of Pregnancy/Childbirth (32% of the hospitalizations over the study period). Mental Disorders also becomes a prominent category in this age group, accounting for about 12% of the hospitalizations over the study period. When Complications of Pregnancy/Childbirth are excluded (Appendix 4), Injuries are the most common cause of hospitalization for 13– to 19–year–olds, comprising 21.6% of all hospitalizations for this age group.

Figure 3.27: Top 5 Causes of Hospitalization by Age Group, 2000/01 and 2009/10
Crude rate per 1,000 children 0–5, 6–12, and 13–19 years



The top causes of hospitalization were similar across both the rural and urban income quintiles (Figures 3.28 and 3.29). The top 3 causes were again Respiratory Diseases, Injuries, and Pregnancy/Childbirth, with the exception of U5 (highest urban) in which Digestive Disorders replaced Pregnancy/Childbirth in the top 3 causes of hospitalization over the study period. Additional information about causes of hospitalization by region and income quintiles can be found in the online Appendix. Information on **Injury Hospitalizations** can be found in Chapter 4: Safety and Security.

Figure 3.28: Top 5 Causes of Hospitalization by Rural Income Quintile, 2000/01-2009/10
Crude rate per 1,000 children 0-19 years

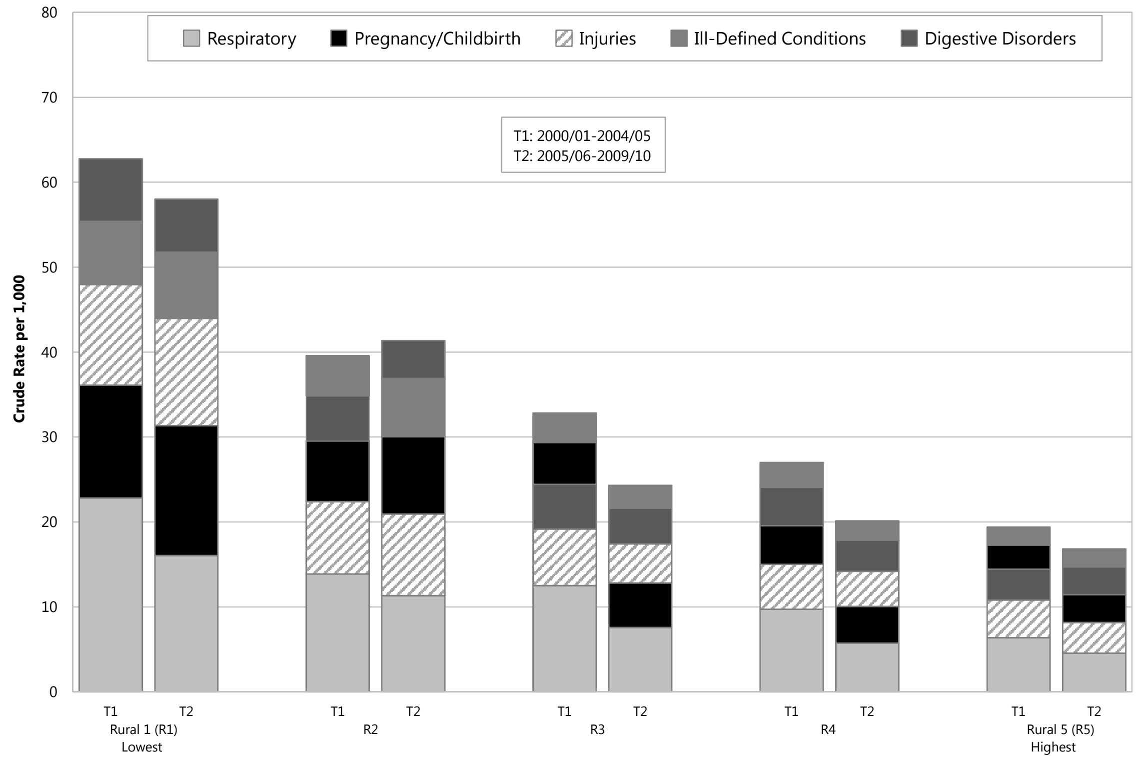
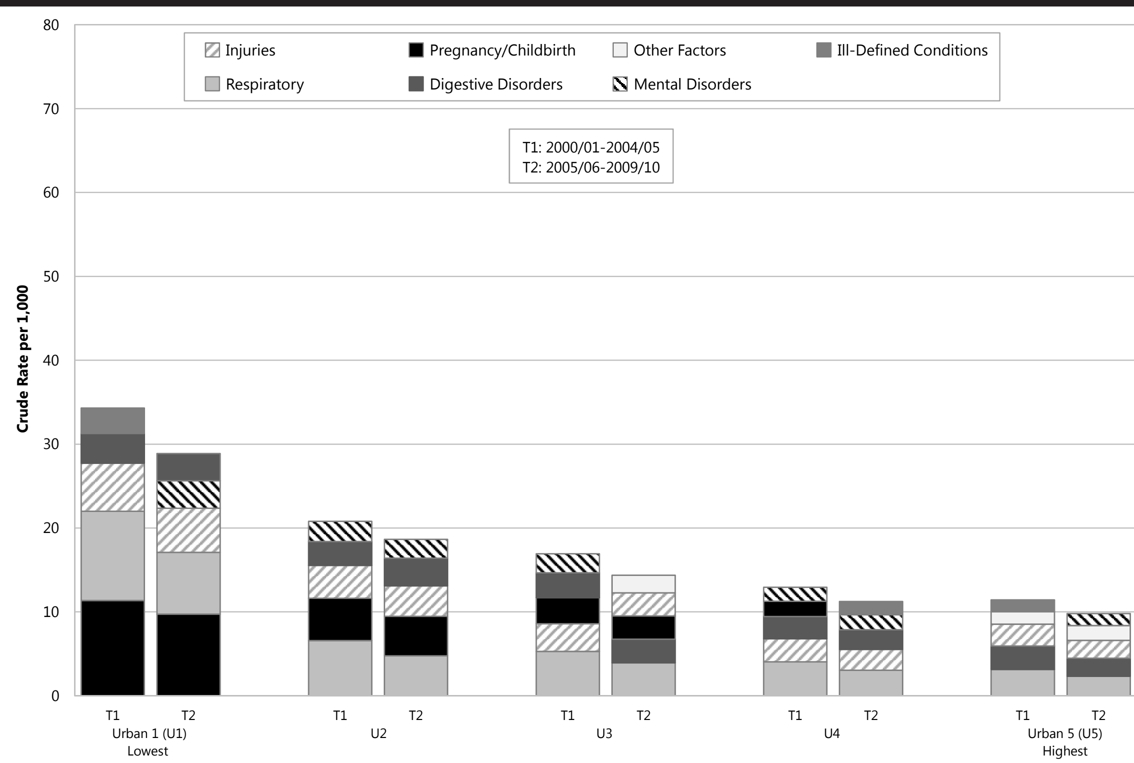


Figure 3.29: Top 5 Causes of Hospitalization by Urban Income Quintile, 2000/01-2009/10
Crude rate per 1,000 children 0-19 years



Physician Visits

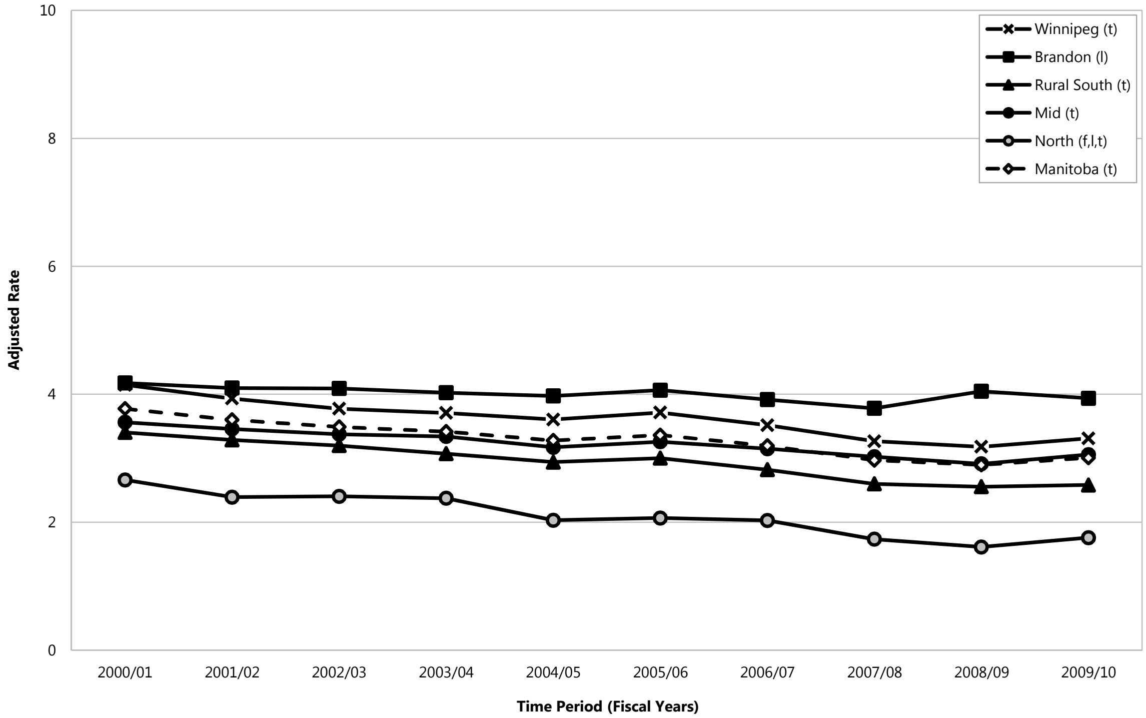
Physician visits, also called ambulatory visits, include all contacts with physicians including office visits, walk–in clinics, visits to outpatient departments, some emergency room visits (where data are recorded), and in northern/remote nursing stations. Physician visits that occur during inpatient hospital stays, as well as visits for **prenatal care**, are excluded from the analyses in this section. Visits are allocated to the area of residence of the child, regardless of where the visit took place. Most physicians in Manitoba are paid through fee–for–service, which means that they must submit a claim that includes the reason (diagnosis) for the visit. About 20% of Manitoba physicians are not paid by fee–for–service (Watson et al., 2004). Physicians working under alternative payment schemes (e.g., salary) are encouraged to submit shadow–billing claims, but these data are not complete and so our results underestimate true physician visit rates. Shadow billings appear to be missing for about one third of visits provided by salaried physicians (Katz et al., 2009). Because there are more salaried physicians in northern remote areas of Manitoba, physician visit data from these areas may be less complete than in other areas. As well, many residents in northern and remote communities may receive their care from nurse practitioners; care provided by nurses or nurse practitioners began to be captured in the medical claims in July 2005 and would be included here in our physician counts, but were not captured consistently throughout the study period.

For this indicator we looked at visits to general practitioners, Paediatricians, and "other" practitioners, which included Psychiatrists, Obstetricians and Gynaecologists, Medical Specialists, General Surgeons, Surgical Specialists, and Technical Specialists.

Regional Trends Over Time

Figure 3.30 shows physician visits over time for aggregate regions of Manitoba. The provincial rate of physician visits decreased significantly over the 10–year time period, going from 3.8 visits per child in 2000/01 to 3.0 visits per child in 2009/10. The rates in the North were significantly lower than the provincial average across all times periods. They decreased significantly over time, from 2.7 visits in 2000/01 to 1.8 in 2009/10 (a reminder that claims from the North may be less complete). Physician visits in Brandon were significantly higher than the provincial average in several years, including the last time period (2009/10) when the rate was 3.9 visits per child. The rate in Brandon did not change significantly over the study period; but for all other aggregate regions, there were statistically significant decreases in physician visits from 2000/01 to 2009/10: Winnipeg dropped from 4.1 to 3.3, Mid from 3.6 to 3.1, and Rural South decreased from 3.4 to 2.6 visits per child per year.

Figure 3.30: Physician Visit Rates by Aggregate Region, 2000/01–2009/10
Age– & sex–adjusted rates per child 0–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at $p<0.01$
l indicates region's rate was statistically different from Manitoba average in the last time period at $p<0.01$
t indicates change over time was statistically significant for that region at $p<0.05$

Trends by Age Group

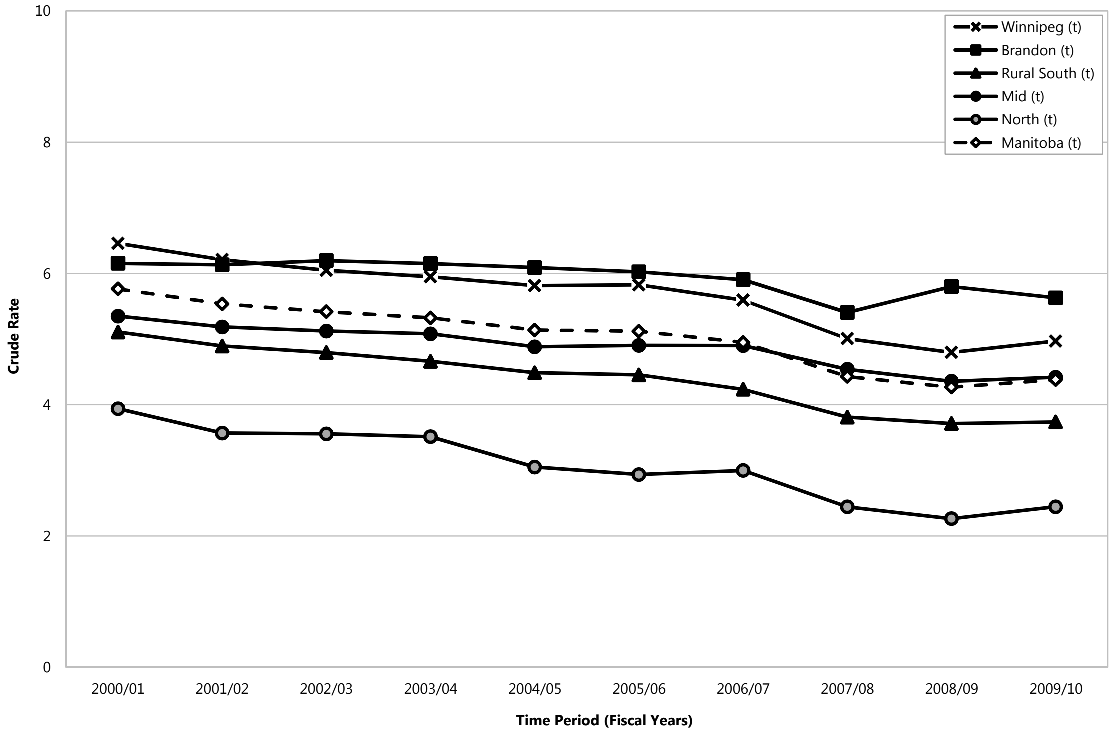
Figures 3.31 to 3.33 show physician visits for each of the three age categories. The youngest age group, 0 to 5 years, had the highest rates of visits, followed by the 13 to 19 age group, and then the 6 to 12 age group.

For the 0 to 5 age group, the Manitoba rate decreased from 5.8 visits per child to 4.4 over the 10–year period, a statistically significant decrease. Decreases over time were evident for all aggregate regions: Brandon went from 6.2 to 5.6, Winnipeg went from 6.5 to 5.0, Mid went from 5.3 to 4.4, Rural South went from 5.1 to 3.7, and the North went from 3.9 to 2.4. All of these decreases were statistically significant.

For the 6 to12 age group, the Manitoba rate decreased significantly from 2.9 visits per child to 2.3; and significant decreases over time were also found for the all aggregate regions, except Brandon: Winnipeg 3.3 to 2.5, Mid 2.7 to 2.3, Rural South 2.5 to 1.8, and North 1.9 to 1.3.

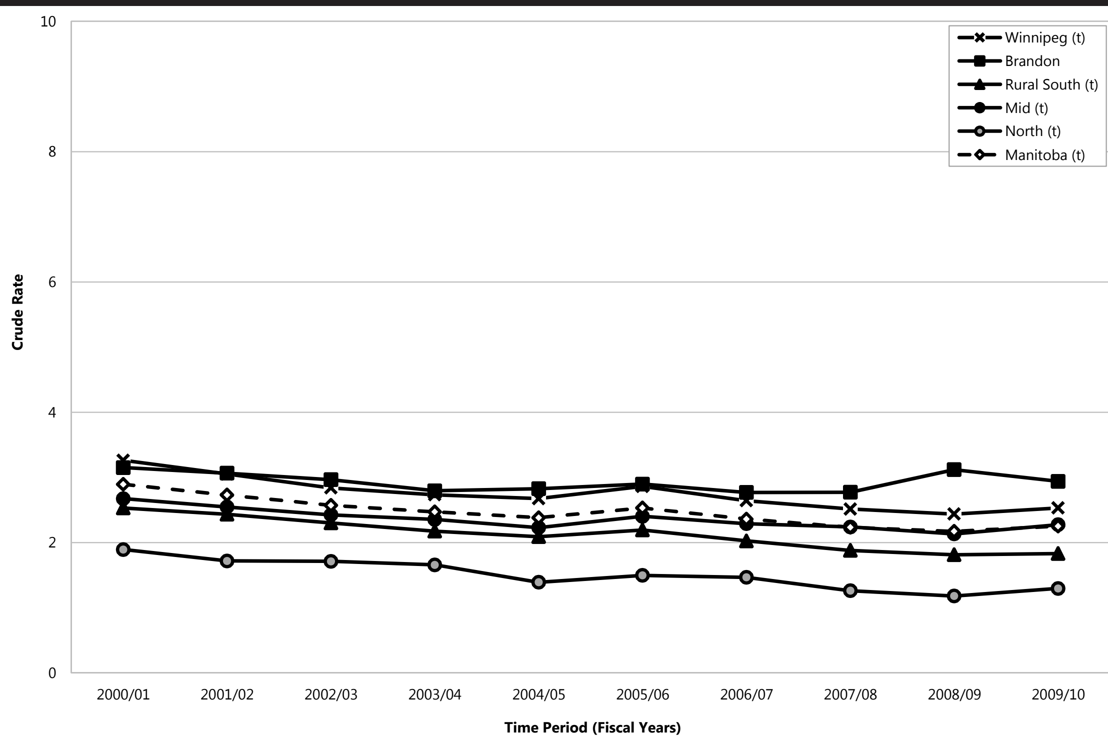
For the 13 to 19 age group, the Manitoba rate decreased from 3.1 to 2.7 over the study period, a statistically significant decrease. All aggregate regions, except Brandon, also showed statistically significant decreases in physician visits over time: Winnipeg 3.3 to 2.8, Mid 3.0 to 2.7, Rural South 2.9 to 2.4, and North 2.4 to 1.7 visits per youth over the study period.

Figure 3.31: Physician Visit Rates by Aggregate Region and 0 to 5 Age Group, 2000/01–2009/10
Crude rates per child



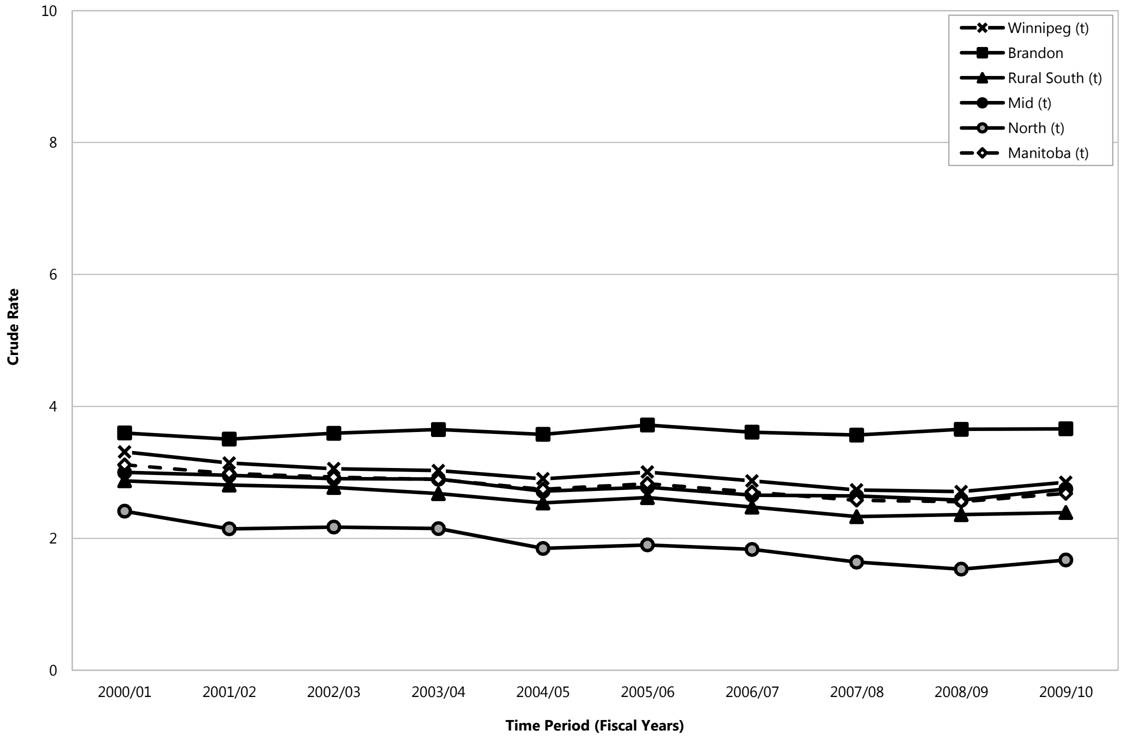
t indicates change over time was statistically significant for that region at $p<0.05$

Figure 3.32: Physician Visit Rates by Aggregate Region and 6 to 12 Age Group, 2000/01–2009/10
Crude rates per child



t indicates change over time was statistically significant for that region at $p<0.05$

Figure 3.33: Physician Visit Rates by Aggregate Region and 13 to 19 Age Group, 2000/01–2009/10
Crude rates per child



t indicates change over time was statistically significant for that region at p<0.05

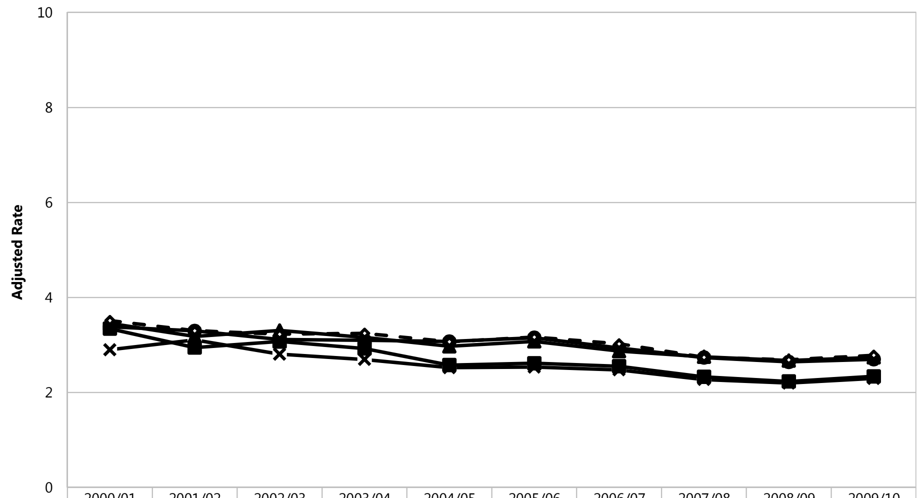
Trends by Socioeconomic Status

Figure 3.34 shows physician visits by rural income quintiles over the 10–year study period. There is a significant SES gradient in rates of visits specifically in the first time period and from 2003/04 onward, with R1 (lowest) and R2 having lower visit rates than R3, R4, and R5. As was found with the regional results, physician visits decreased over time for all rural income groups; and these decreases were all statistically significant: R1 went from 2.9 to 2.3; R2 went from 3.3 to 2.3, R3 went from 3.5 to 2.7, R4 went from 3.4 to 2.7, and R5 went from 3.5 to 2.8.

Figure 3.35 shows physician visit rates by urban income quintiles. The rates in the urban areas are higher than those found in the rural areas. The SES gradients are very small at the beginning of the time period and almost non–existent from 2005/06 onward; none of the differences across urban income quintiles were significantly different in any of the years of the study period. Physician visits decreased significantly over time for all urban income groups: U1 (lowest) went from 4.4 to 3.5; U2, U3, and U4 all went from 4.1 to 3.3; and U5 went from 4.0 to 3.4.

Figure 3.34: Physician Visit Rates by Rural Income Quintile, 2000/01–2009/10

Age– & sex–adjusted rates per child 0–19 years



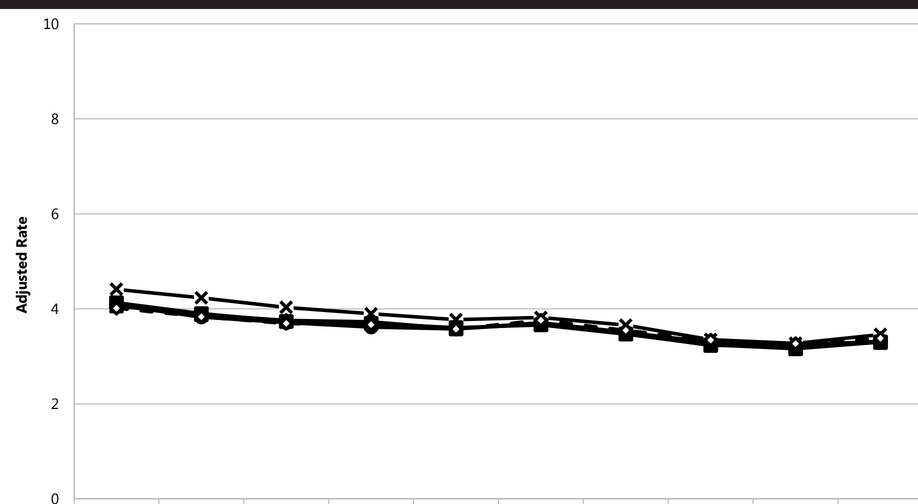
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	4.44	3.82	4.35	4.30	3.95	4.03	3.92	3.65	3.19	3.43
R1 – Lowest Income (t)	2.90	3.11	2.81	2.69	2.52	2.53	2.47	2.27	2.20	2.29
R2 (t)	3.34	2.95	3.07	2.93	2.58	2.61	2.55	2.33	2.23	2.34
R3 (t)	3.45	3.18	3.30	3.16	2.97	3.07	2.87	2.75	2.67	2.74
R4 (t)	3.38	3.30	3.12	3.10	3.07	3.15	2.94	2.73	2.64	2.70
R5 – Highest Income (t)	3.51	3.30	3.23	3.25	3.07	3.17	3.02	2.74	2.69	2.78
Linear trend across R1–R5	*			*	*	*	*	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 3.35: Physician Visit Rates by Urban Income Quintile, 2000/01–2009/10

Age– & sex–adjusted rates per child 0–19 years



	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	4.44	3.82	4.35	4.30	3.95	4.03	3.92	3.65	3.19	3.43
U1 – Lowest Income (t)	4.41	4.23	4.03	3.90	3.77	3.82	3.66	3.35	3.27	3.46
U2 (t)	4.13	3.90	3.74	3.69	3.60	3.66	3.47	3.24	3.16	3.30
U3 (t)	4.06	3.88	3.76	3.73	3.58	3.68	3.48	3.23	3.23	3.29
U4 (t)	4.08	3.83	3.71	3.62	3.58	3.71	3.51	3.29	3.23	3.32
U5 – Highest Income (t)	4.01	3.83	3.69	3.67	3.57	3.76	3.55	3.34	3.27	3.38
Linear trend across U1–U5										

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 3.36 and 3.37 show the inequities in physician visit rates in 2000/01 and 2009/10, respectively, for rural areas. In both time periods, the lowest income quintile (R1) had a lower visit rate than expected given the proportion of the population. In the first year, only 20.9% of the physician visits were made by the 23.7% of the child population in R1, with a Gini coefficient of 0.034, indicating very low disparity. In the final year, 21.5% of the physician visits were made by the 23.9% of the population in R1, with a Gini coefficient of 0.043, also indicating low disparity. The Gini coefficient increased from the first to the last time period, indicating a statistically significant increase in inequity in physician visit rates in rural areas over the study period; however the figure suggests that this change in inequity seems to be operating more in the middle income quintiles than the lower income quintile. It should be noted that for an indicator such as physician visits, a greater number of visits would be expected for children from lower SES areas, given their higher rates of poor health outcomes.

Figures 3.38 and 3.39 show that there are almost no inequities in physician visit rates in both time periods for urban areas. In 2000/01, 20.1% of the physician visits occurred in the 18.8% of the population in the lowest income quintile group, with a Gini coefficient of 0.016, indicating very little disparity. As mentioned, equity in physician visits is not actually expected, given the higher rates of poor health associated with low SES. In 2009/10, 20.8% of the physician visits occurred in the 20.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.003, indicating almost no disparity. The Gini coefficient decreased significantly from the first to the last time period, indicating that inequity in physician visit rates in urban areas decreased over the study period. A comparison of the GINI coefficients in the last time period indicated that there was significantly more inequity in the rural compared to the urban income areas.

What do these results mean?

There were significant decreases in physician visit rates over the study period, with the greatest decreases in the youngest (0 to 5 years) age group. Whether these decreases represent better health, more appropriate use of services, or reduced access is difficult to tell from these data. The decreases observed do not appear to be simply a function of poorer data capture due to more salaried physicians in Manitoba (who may not be submitting shadow billing claims for all their visits), as the number of salaried physicians was relatively stable over the study period (Alan Katz, personal communication, July 2012). In a previous study, even when incomplete billing by salaried physicians in rural areas was accounted for, significant decreases in pediatric visits were found between 1984 and 2005.

There is relatively little inequity in physician visits, meaning that children in low income areas are making similar numbers of visits compared to children in higher income areas. Given the poorer health outcomes reported throughout this report for children of lower income areas, the finding of relative equity of visits is somewhat surprising and may require further exploration, to ensure children who may be most in need of physician services are receiving those services.

Figure 3.36: Lorenz Curve for Physician Visits in Rural Areas, 2000/01
Adjusted by age & sex for children 0-19 years

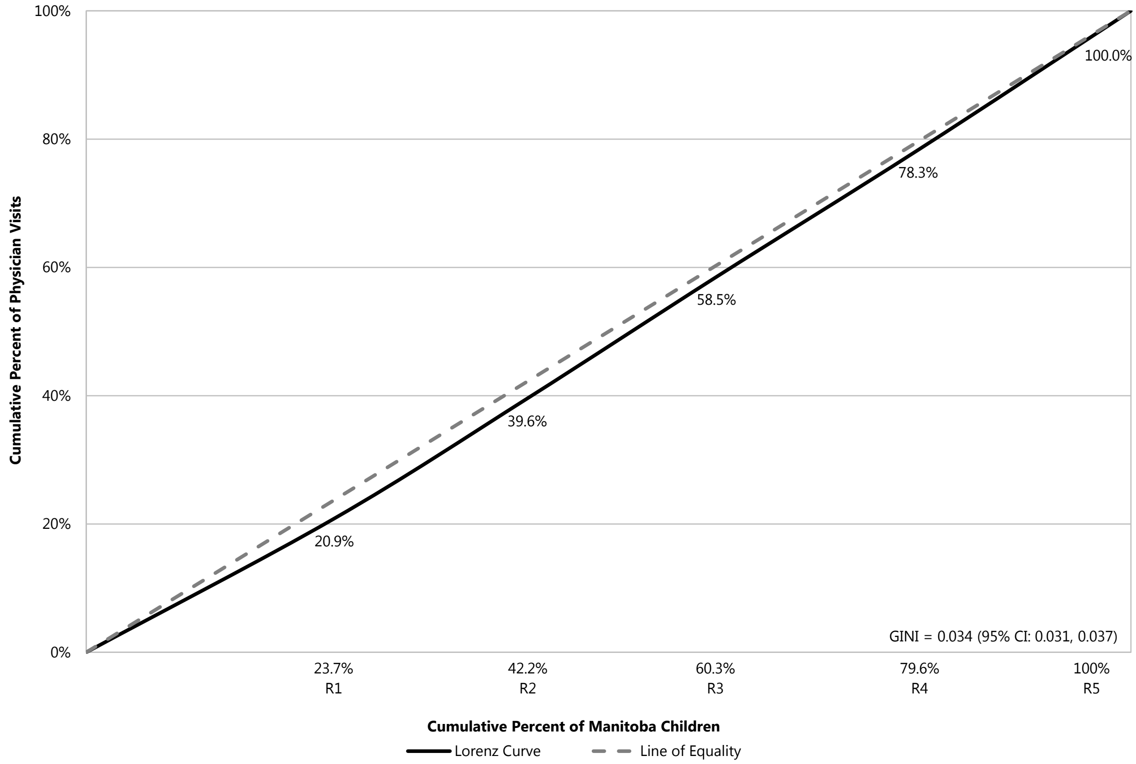


Figure 3.37: Lorenz Curve for Physician Visits in Rural Areas, 2009/10
Adjusted by age & sex for children 0-19 years

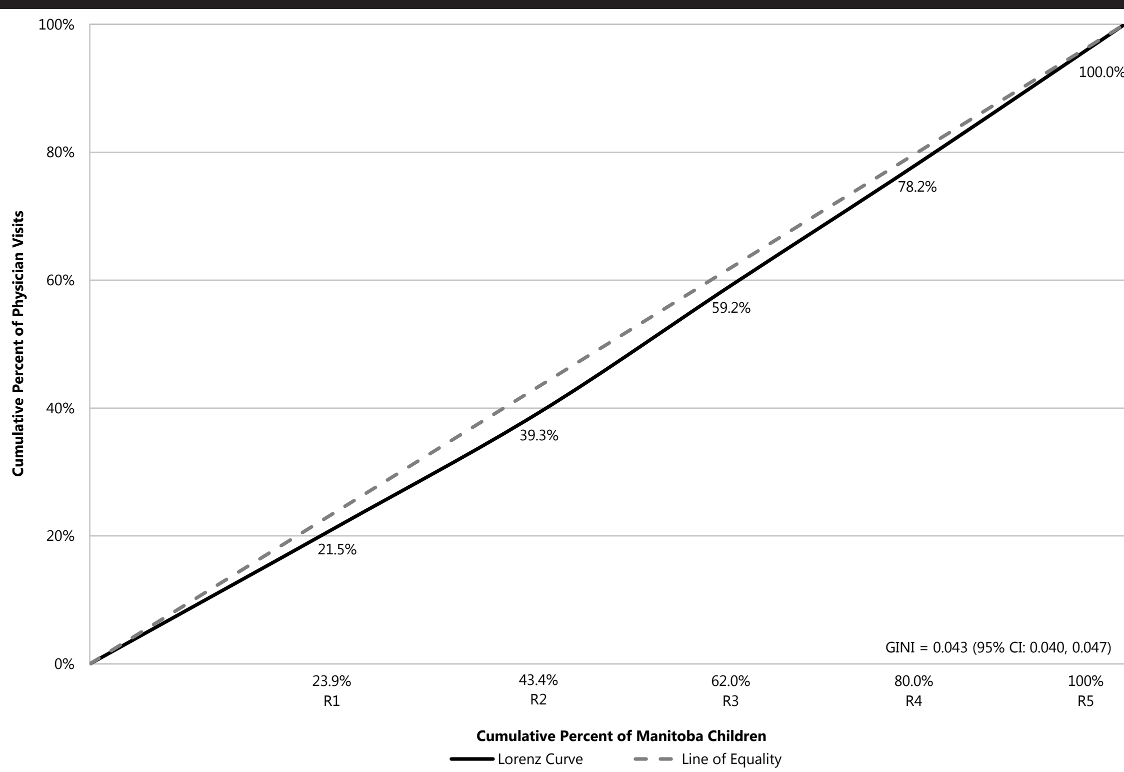


Figure 3.38: Lorenz Curve for Physician Visits in Urban Areas, 2000/01
Adjusted by age & sex for children 0-19 years

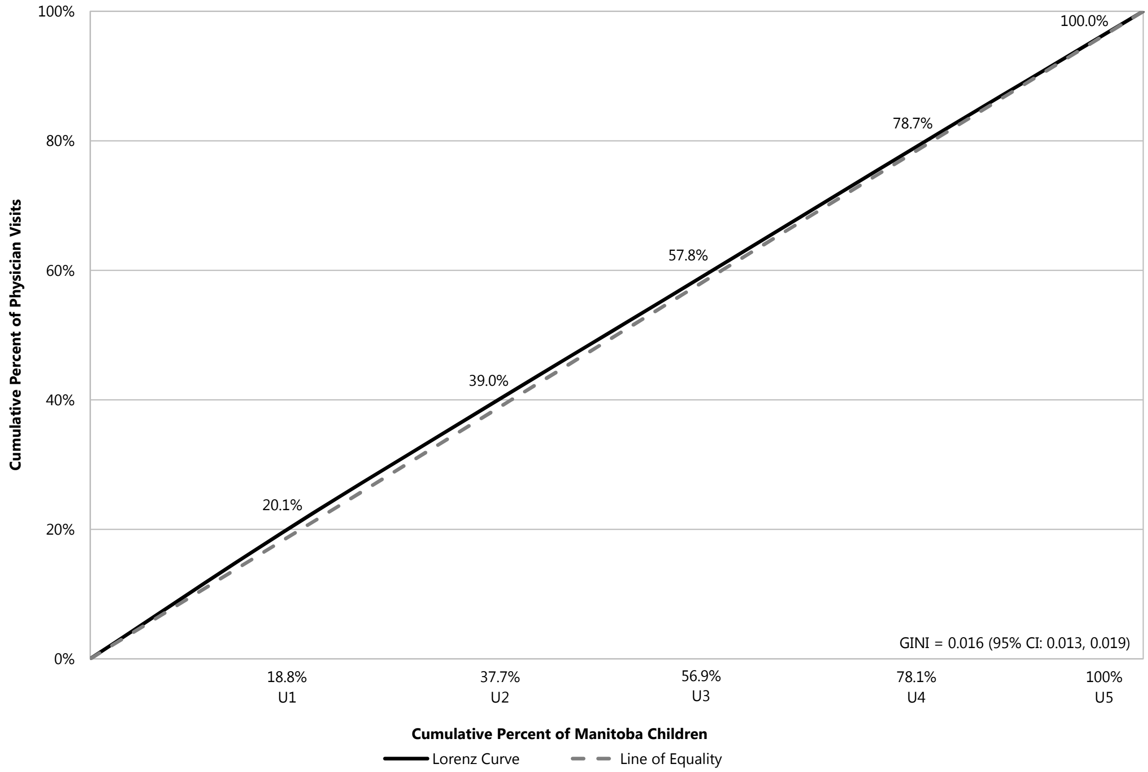
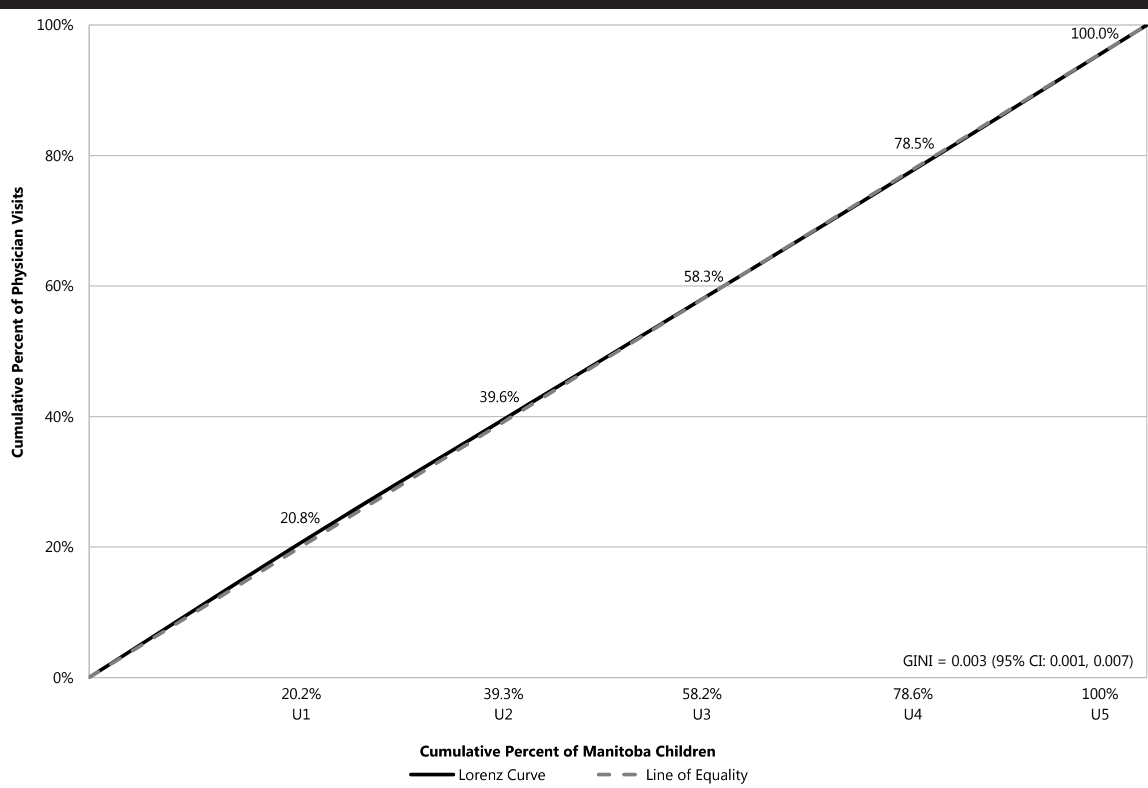


Figure 3.39: Lorenz Curve for Physician Visits in Urban Areas, 2009/10
Adjusted by age & sex for children 0-19 years



Asthma

Asthma is the most common **chronic condition** in children. This condition involves inflammation of the airways that leads to restriction of airflow into and out of the lungs. Estimates of asthma prevalence in children less than 5 years old are often difficult to obtain because definitions of asthma based on symptoms, physician diagnosis, or **drug prescription** often cannot distinguish chronic asthma from wheezing (Bisgaard & Bonnelykke, 2010; Kozyrskyj, Mustard, & Becker, 2004). In previous MCHP studies, asthma definitions have been validated only for children 5 years of age or older (Kozyrskyj et al., 2004; Brownell et al., 2008). Asthma prevalence generally also declines with age, as children may "grow out of" asthma as they get older (Barbee & Murphy, 1998). This pattern has been observed previously in asthma treatment prevalence (Kozyrskyj & Hildes-Ripstein, 2002).

In this study, asthma prevalence was calculated for children 6 to 19 years old who are diagnosed with asthma or who receive asthma care. The definition of asthma used in this report is based on various combinations of physician diagnosis, symptom treatment during brief hospitalizations and drug prescriptions, in order to improve the sensitivity of the definition. However, children suffering from untreated asthma may not be captured in this study because the definition provides a measure of treatment prevalence, and includes only children with contacts with the health care system (Brownell et al., 2008).

Regional Trends Over Time

Figure 3.40 shows asthma prevalence for children 6 to 19 years of age over time for five 2–year time periods by aggregate regions of Manitoba. The provincial prevalence of asthma remained stable over time, at 13.8% in 2000/01–2001/02 and 14.3% in 2008/09–2009/10. None of the regions showed significant changes in asthma prevalence over time. Asthma prevalence in the North and in Rural South was lower in all time periods than the provincial average, whereas prevalence in Winnipeg was higher than the provincial average in all time periods. For example, in 2008/09–2009/10, asthma prevalence was 7.5% in the North, 11.8% in Rural South, and 16.3% in Winnipeg. It should be noted that prevalence in the North may be underestimated due to children being treated for asthma at Nursing Stations, which would not be captured for all years.

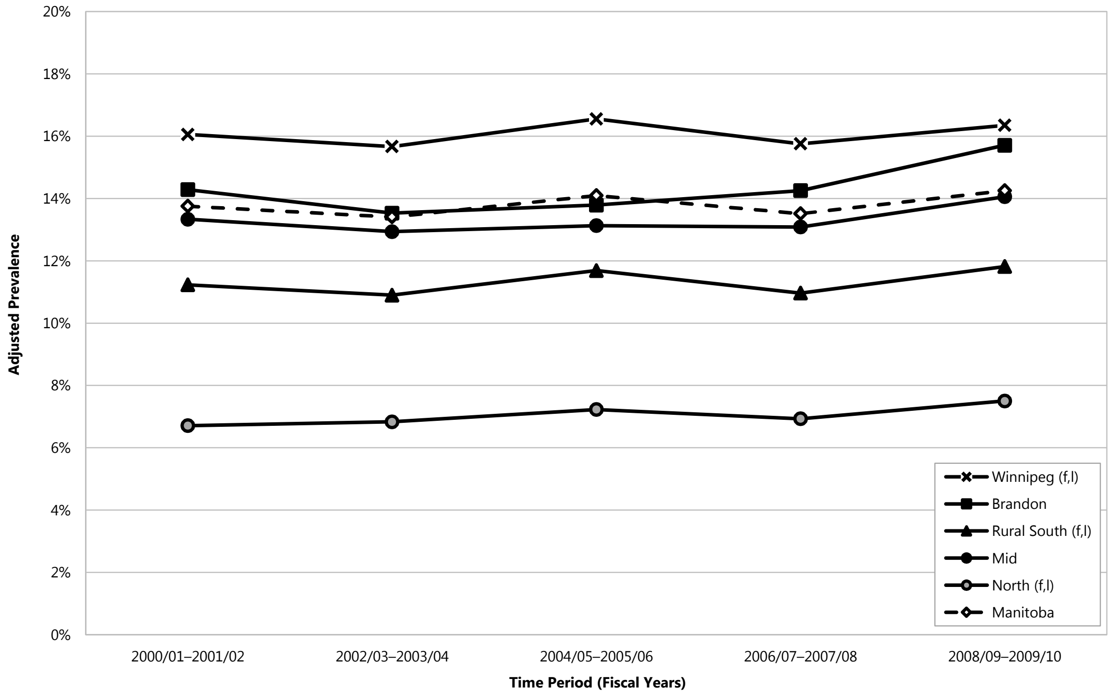
Trends by Age Group

Figures 3.41 and 3.42 show asthma prevalence for two age categories over the time period. Asthma prevalence is somewhat higher in the younger age group. The prevalence of asthma for all Manitoba 6– to 12–year–olds was stable over time, at 16.0% in 2000/01–2001/02 and 16.2% in 2008/09–2009/10. As was seen for all ages together, asthma prevalence in 6– to 12–year–olds was highest in Winnipeg and lowest in the North. None of the aggregate regions showed significant changes over time for this age group.

For the 13 to 19 year group, the Manitoba asthma prevalence was stable over the study period, at 11.5% in the first time period and 12.1% in the last time period. Asthma prevalence in Brandon for 13– to 19–year–olds increased significantly over the time period. Once again, prevalence in the North was the lowest.

Figure 3.40: Asthma Prevalence by Aggregate Region, 2000/01–2001/02 to 2008/09–2009/10

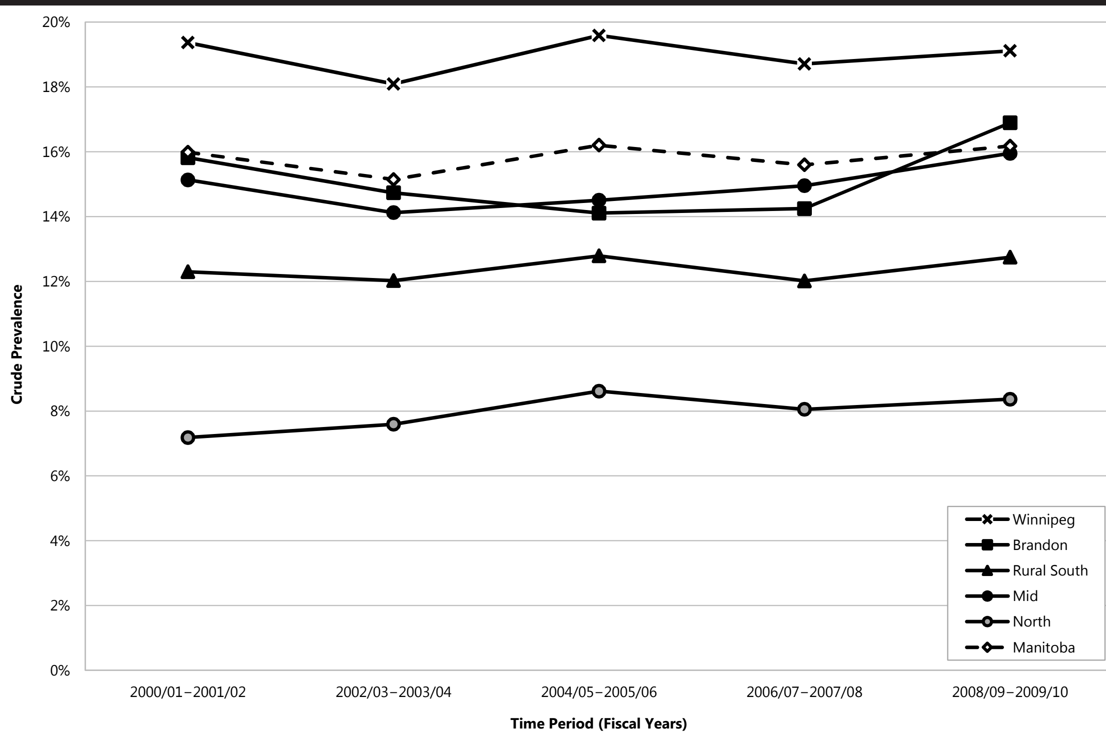
Age– & sex–adjusted prevalence for children 6–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

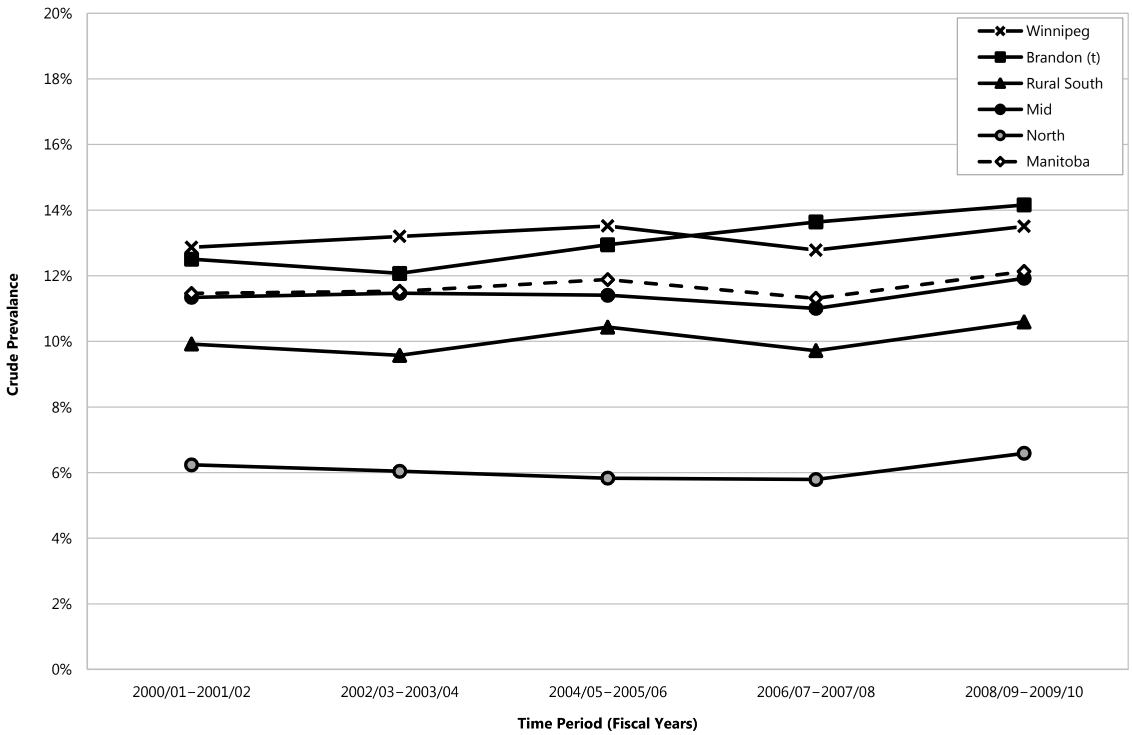
Figure 3.41: Asthma Prevalence by Aggregate Region and 6 to 12 Age Group, 2000/01–2001/02 to 2008/09–2009/10

Crude prevalence for children



t indicates change over time was statistically significant for that region at p<0.05

Figure 3.42: Asthma Prevalence by Aggregate Region and 13 to 19 Age Group, 2000/01–2001/02 to 2008/09–2009/10
Crude prevalence for children



t indicates change over time was statistically significant for that region at p<0.05

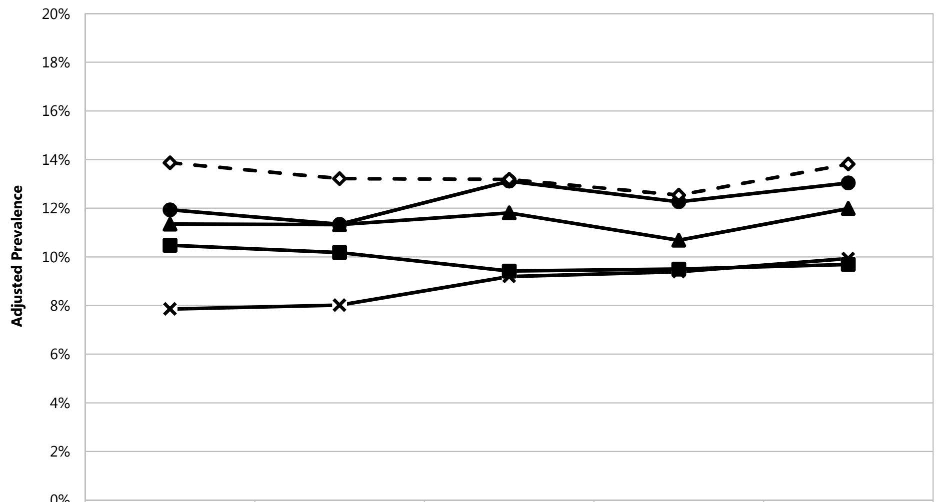
Trends by Socioeconomic Status

Figure 3.43 shows asthma prevalence by rural income quintiles over the study period. There is a significant SES gradient in asthma prevalence in each of the five time periods, with lower income areas having lower prevalence compared to higher income areas. For example, in 2008/09–2009/10, the prevalence of asthma was 9.9% in R1 and was 13.8% in R5. Note, that finding lower prevalence for a medical condition in lower income quintiles is a different pattern than found for most other indicators in this report. Whether this reflects true prevalence or is due to missing data potentially affecting lower rural income areas is not known. R1 and R4 showed a significant increase in asthma prevalence over time, from 7.9% to 9.9% and 11.9% to 13.0%, respectively. R2 showed a significant decrease from 10.5% to 9.7%.

Figure 3.44 shows asthma prevalence by urban income quintiles, and it is evident that there is less disparity across income quintiles than was found in the rural areas. The trend across income quintiles was not significant in any of the time periods, indicating no significant gradient for asthma prevalence in the urban areas. None of the income quintiles in urban areas showed significant changes in asthma prevalence over time.

Figure 3.43: Asthma Prevalence by Rural Income Quintile, 2000/01–2001/02 to 2008/09–2009/10

Age– & sex–adjusted prevalence for children 6–19 years



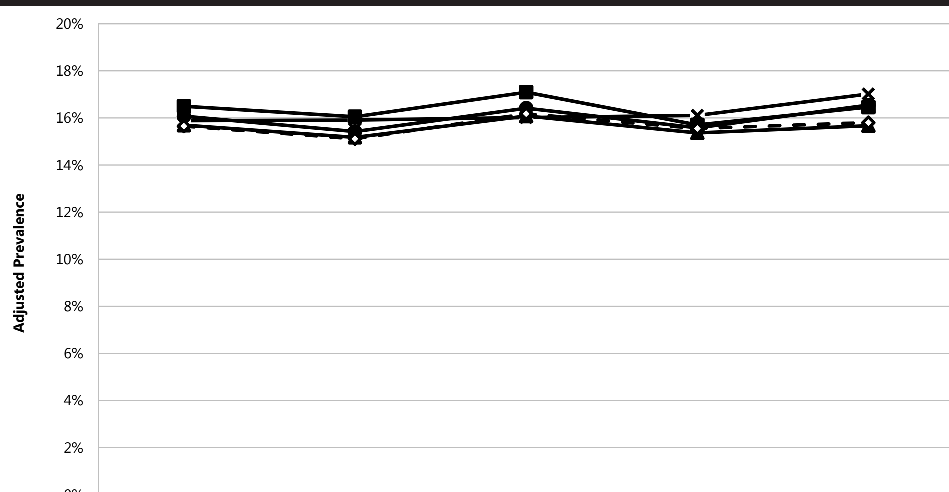
	2000/01–2001/02	2002/03–2003/04	2004/05–2005/06	2006/07–2007/08	2008/09–2009/10
Income Unknown (t)	13.81%	14.13%	15.78%	16.20%	17.06%
R1 – Lowest Income (t)	7.86%	8.02%	9.19%	9.39%	9.93%
R2 (t)	10.48%	10.18%	9.42%	9.50%	9.69%
R3	11.35%	11.32%	11.81%	10.69%	11.99%
R4 (t)	11.94%	11.34%	13.11%	12.27%	13.04%
R5 – Highest Income	13.87%	13.22%	13.19%	12.54%	13.81%
Linear trend across R1–R5	*	*	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 3.44: Asthma Prevelance by Urban Income Quintile, 2000/01–2001/02 to 2008/09–2009/10

Age– & sex–adjusted prevalence for children 6–19 years



	2000/01–2001/02	2002/03–2003/04	2004/05–2005/06	2006/07–2007/08	2008/09–2009/10
Income Unknown (t)	13.81%	14.13%	15.78%	16.20%	17.06%
U1 – Lowest Income	15.88%	15.91%	16.01%	16.10%	17.01%
U2	16.49%	16.05%	17.09%	15.70%	16.46%
U3	15.69%	15.17%	16.08%	15.36%	15.67%
U4	16.07%	15.42%	16.41%	15.58%	16.54%
U5 – Highest Income	15.65%	15.11%	16.17%	15.55%	15.80%
Linear trend across U1–U5					

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 3.45 and 3.46 show the inequities in asthma prevalence in 2000/01–2002/03 and 2008/09–2009/10, respectively, for rural areas. In both time periods, the lowest income quintile (R1) had lower asthma prevalence than expected given the proportion of the population. In the first time period, the 22.7% of the population that makes R1 accounted for only 16.2% of the asthma prevalence R1. The Gini coefficient was 0.103, indicating a moderate degree of disparity across rural income quintiles. In the last time period, the 22.9% of the population that makes up R1 accounted for 19.5% of the asthma prevalence. The Gini coefficient was 0.077, also indicating moderate disparity. The change in the Gini coefficient over the study period in the rural areas was statistically significant, indicating a decrease in disparity over time.

Figures 3.47 and 3.48 show that there were no inequities in asthma prevalence in both time periods for urban areas. In 2000/01–2002/03, 17.3% of asthma prevalence was found in the 17.3% of the population in the lowest income quintile group, with a Gini coefficient of 0.005, indicating no disparity. In 2008/09–2009/10, 19.3% of the asthma prevalence occurred in the 18.5% of the population in the lowest income quintile group, with a Gini coefficient of 0.011, indicating very little disparity. There was no significant change in the Gini coefficient over time in urban areas. A comparison of the Gini coefficients in the last time period indicated that there was a statistically significant difference in inequity in rural and urban income areas, with rural area having more disparity in asthma prevalence.

What do these results mean?

Asthma prevalence remained stable throughout the study period, and a similar stability in prevalence has been noted in recent years (Garner & Kohen, 2008). Our study found 12.1% of 13– to 19–year–olds had asthma in 2009/10 which is similar to the national prevalence of 11.8% found for 12– to 19–year–olds (Public Health Agency of Canada, 2012a). The Canadian prevalence of 16% for 4– to 11–year–olds (Public Health Agency of Canada, 2012a) is also similar to our finding of 16.2% for 6– to 12–year–old Manitobans.

There is almost no inequity in asthma prevalence in urban areas, and in rural areas, the inequity observed is driven by higher prevalence in higher income areas compared to lower income areas. Whether this is due to incomplete recording of visits for asthma in lower income rural areas, or reflects true differences in prevalence was not determined in this report.

Figure 3.45: Lorenz Curve for Asthma in Rural Areas, 2000/01-2001/02
Adjusted by age & sex for children 6–19 years

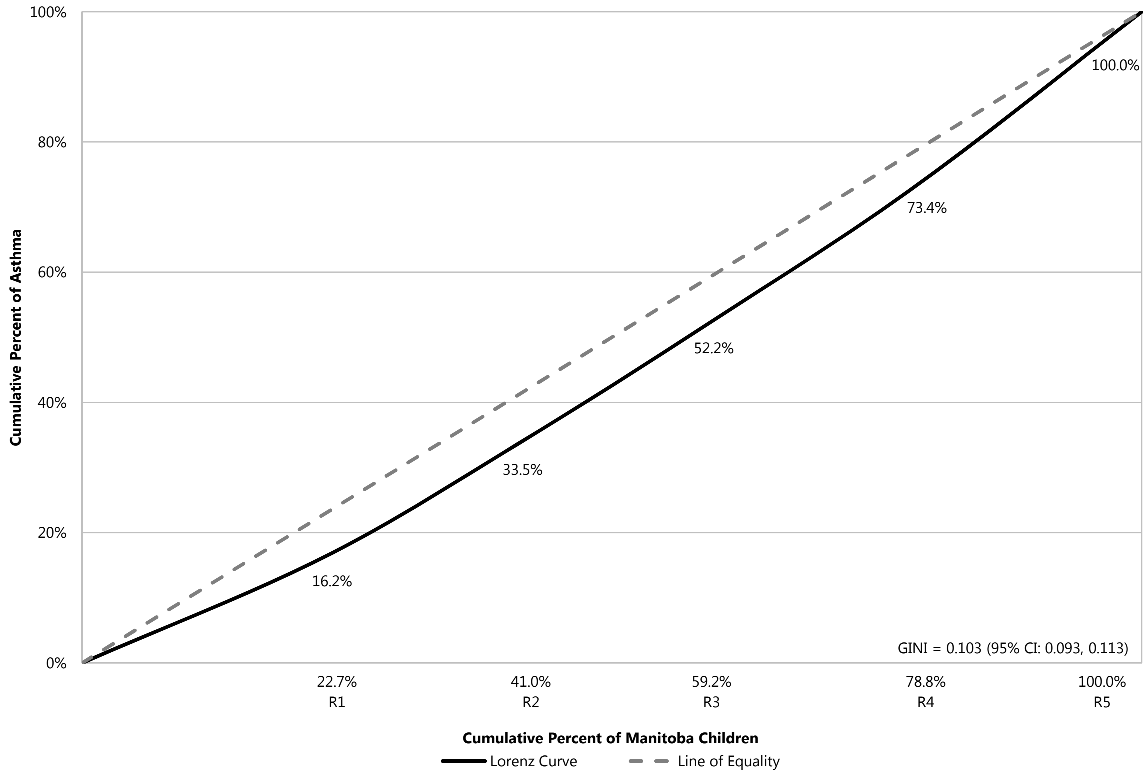


Figure 3.46: Lorenz Curve for Asthma in Rural Areas, 2008/09-2009/10
Adjusted by age & sex for children 6–19 years

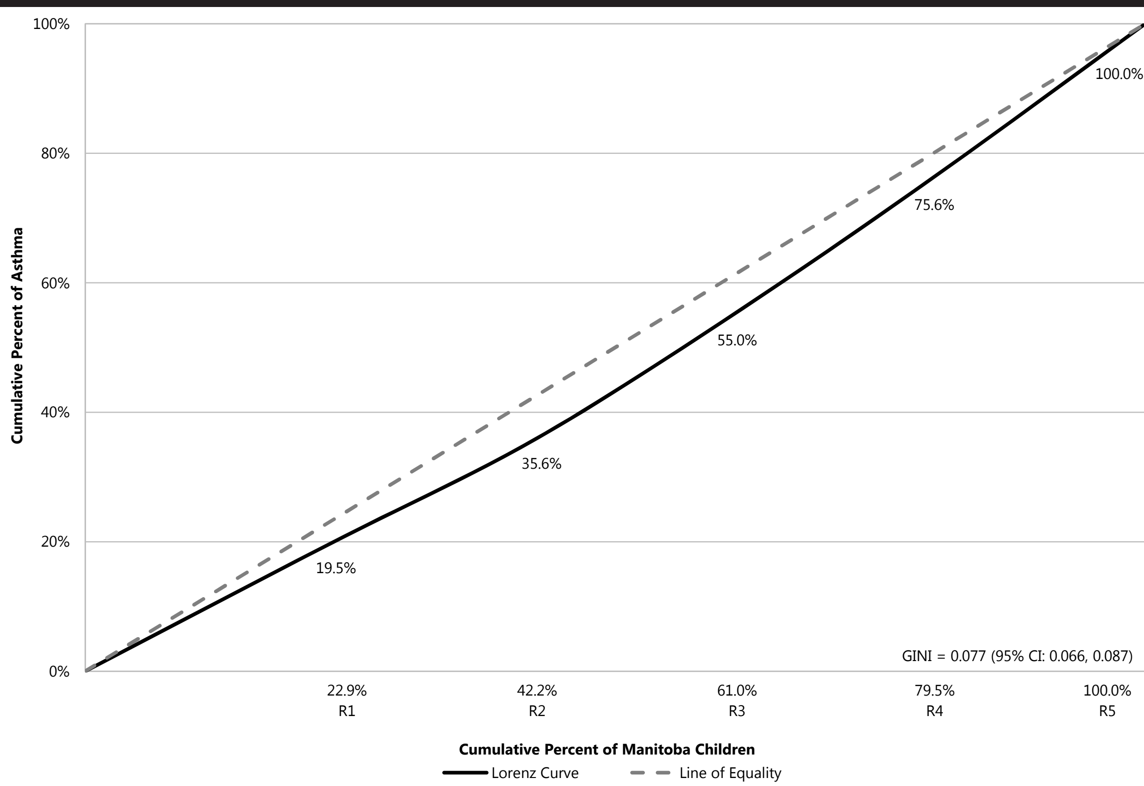


Figure 3.47: Lorenz Curve for Asthma in Urban Areas, 2000/01-2001/02
Adjusted by age & sex for children 6–19 years

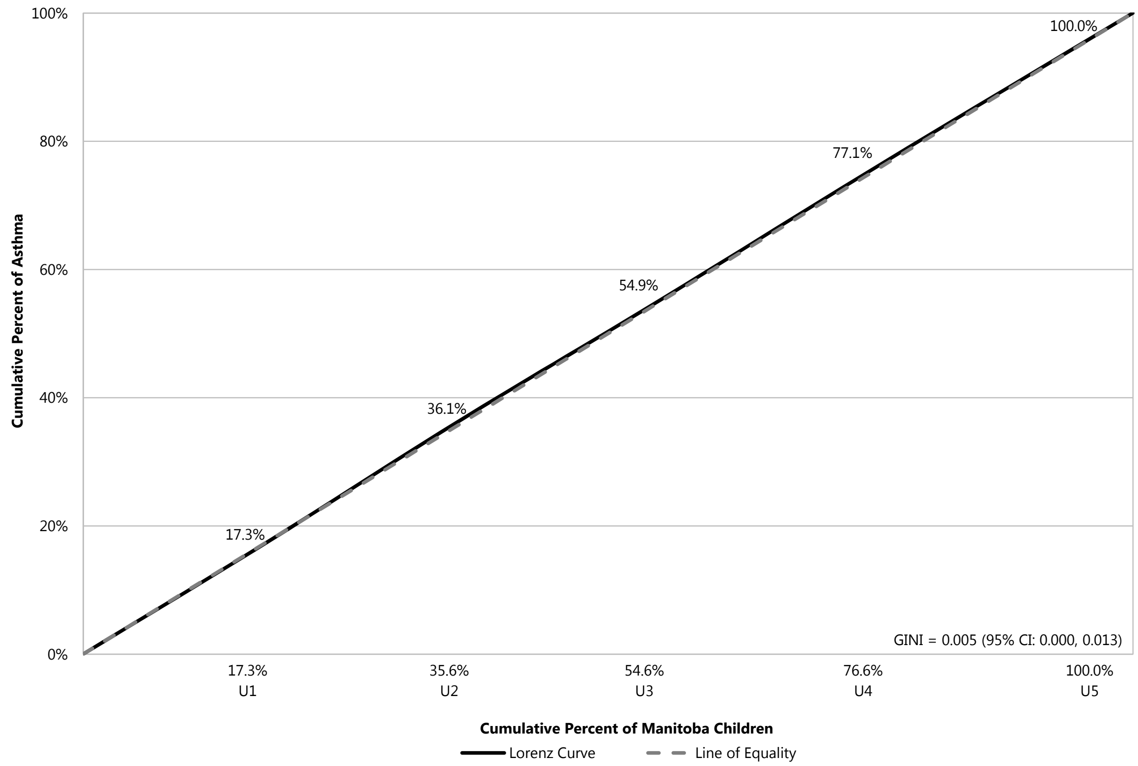
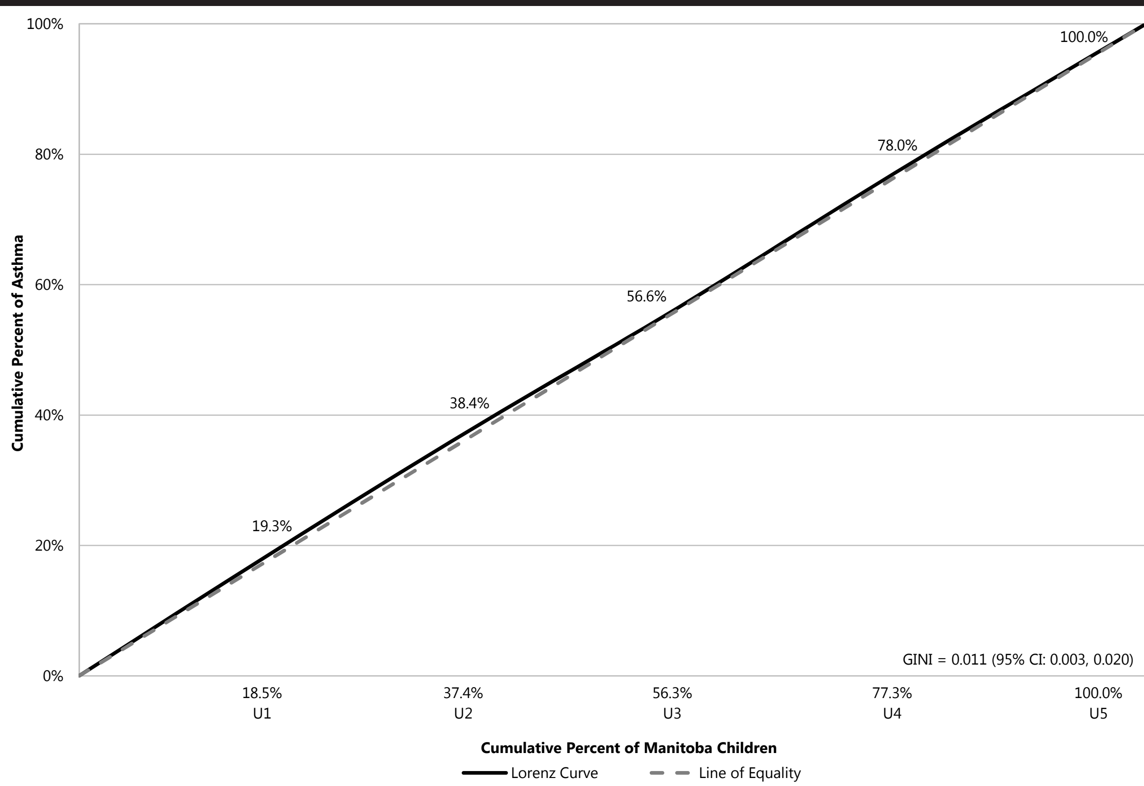


Figure 3.48: Lorenz Curve for Asthma in Urban Areas, 2008/09–2009/10
Adjusted by age & sex for children 6–19 years



Diabetes

Diabetes mellitus is a chronic endocrine condition relating to a deficiency of the hormone insulin. Type 1 diabetes involves low production of insulin by the pancreas and Type 2 diabetes involves an insensitivity of cells in the body to insulin and resultant defects of glucose absorption. Type 1 diabetes typically develops in childhood or adolescence, potentially as a result of various genetic and environmental interactions (Center for Chronic Disease Prevention and Control, Population and Public Health Branch, and Health Canada, 2002). Type 2 diabetes often develops in adulthood and has been shown to be related to the interplay between genetic and environmental factors (behaviours related to diet, body weight, and physical activity) (Center for Chronic Disease Prevention and Control et al., 2002). The prevalence of Type 2 diabetes in children and youths has risen in recent years (American Diabetes Association, 2000; Sellers, Wicklow, & Dean, 2012) and accounts for about a fifth of the prevalent cases of diabetes in Manitoba youths (Dart et al., 2011) and close to half of the incident cases (Sellers, Wicklow, & Dean, 2012). Diabetes can also develop in the second or third trimester of pregnancy as gestational diabetes, and often resolves after delivery. Type 1 and Type 2 diabetes may lead to the development of health complications that affect multiple organ functions, including renal failure, neuropathy, heart disease, stroke, and blindness.

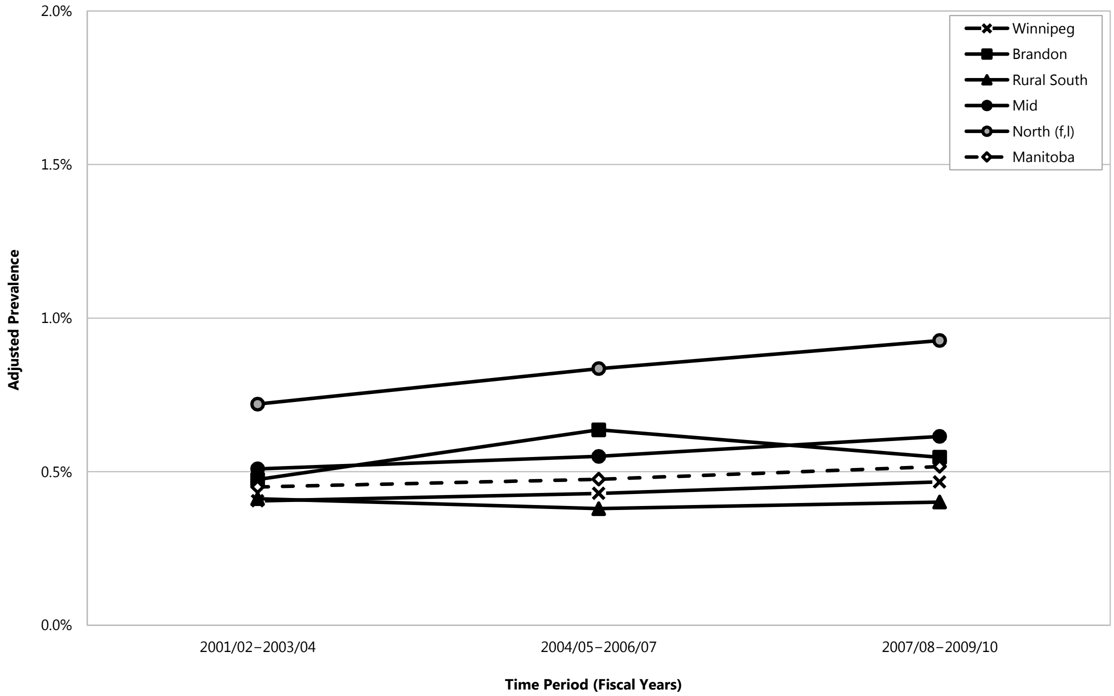
Type 1 and 2 diabetes cannot be distinguished in physician visit data available in the MCHP database; for this reason the diabetes prevalence in this report included Type 1 and Type 2 diabetes combined. Prevalence was calculated for children 6 to 19 years old, who receive care for diabetes or who receive diabetes medications[18]. Previous research has suggested that less than 5% of diabetes cases in children 0 to19 years of age occur before the age of 5 (Brownell et al., 2008).

Regional Trends Over Time

Figure 3.49 shows diabetes prevalence over time for three time periods by aggregate regions of Manitoba. The provincial prevalence of diabetes went from 0.45% in 2001/02–2003/04 to 0.52% in 2007/08–2009/10, an increase that was not statistically significant. The North had the highest prevalence overall, from 0.72% in 2001/02–2003/04 to 0.93% in 2007/08–2009/10, significantly higher than the Manitoba average is those time periods. Diabetes prevalence did not change significantly over time for any of the aggregate regions.

18 Some diabetes medications may be used to treat other conditions. In particular, metformin is used to treat polycystic ovary syndrome (PCOS) and other obesity-related complications that are not diabetes. Over the nine-year period of our study, less than 5% (157 out of 3383) of the cases identified as diabetes were identified only from metformin prescriptions.

Figure 3.49: Diabetes Prevalence by Aggregate Region, 2001/02–2003/04 to 2007/08–2009/10
Age– & sex–adjusted prevalence for children 6–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

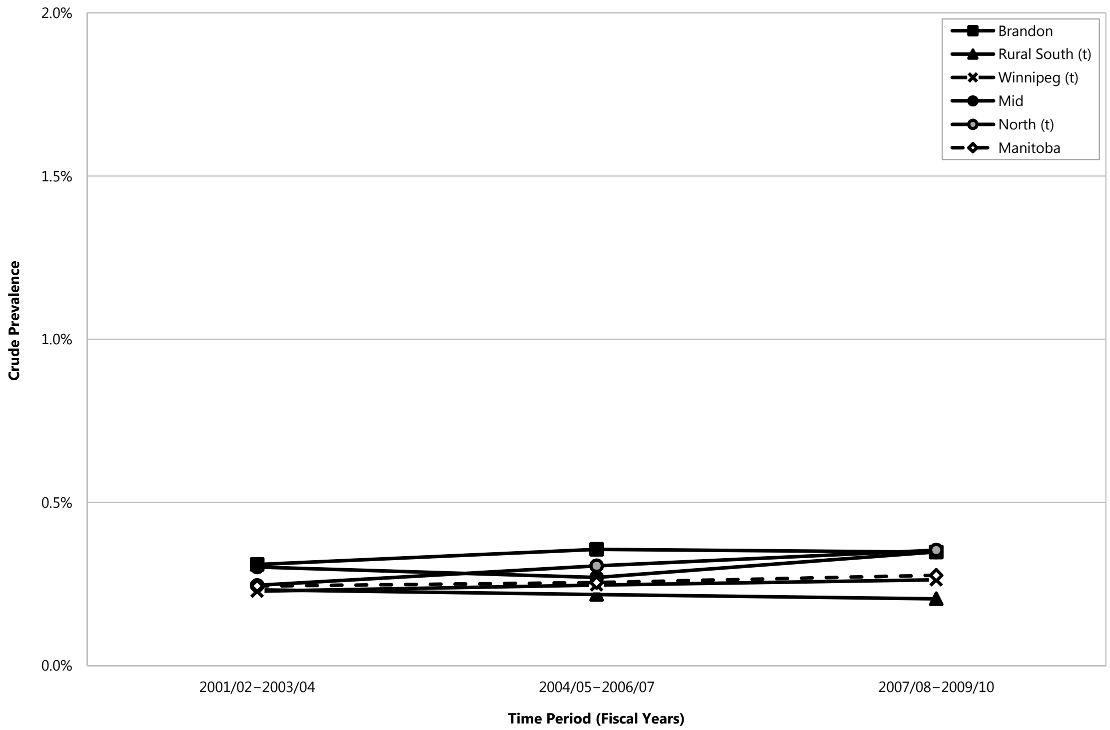
Trends by Age Group

Figures 3.50 and 3.51 show diabetes prevalence for two age categories over the time period. It is clear from the two graphs that diabetes prevalence increases with age in all aggregate regions. The prevalence of diabetes for all Manitoba 6– to 12–year–olds was 0.24% in 2001/02–2003/04 and 0.28% in 2007/08–2009/10, an increase that was not statistically significant. The prevalence in Winnipeg increased from 0.23% in the first time period to 0.26% in the last time period, a statistically significant increase. The lowest prevalence was found in rural South, where rates decreased from 0.23% in 2001/02–2003/04 to 0.20% 2007/08–2009/10, a statistically significant decrease. Prevalence in the North increased significantly, from 0.25% to 0.35% over the study period.

For the 13 to19 age group, the Manitoba prevalence was 0.66% in the first time period and 0.75% in the last time period, a statistically significant increase. For this age group, the highest diabetes prevalence was found in the North, going from 1.2% in the first time period to 1.5% in the last time period, a statistically significant increase.

Figure 3.50: Diabetes Prevalence by Aggregate Region and 6 to 12 Age Group, 2001/02–2003/04 to 2007/08–2009/10

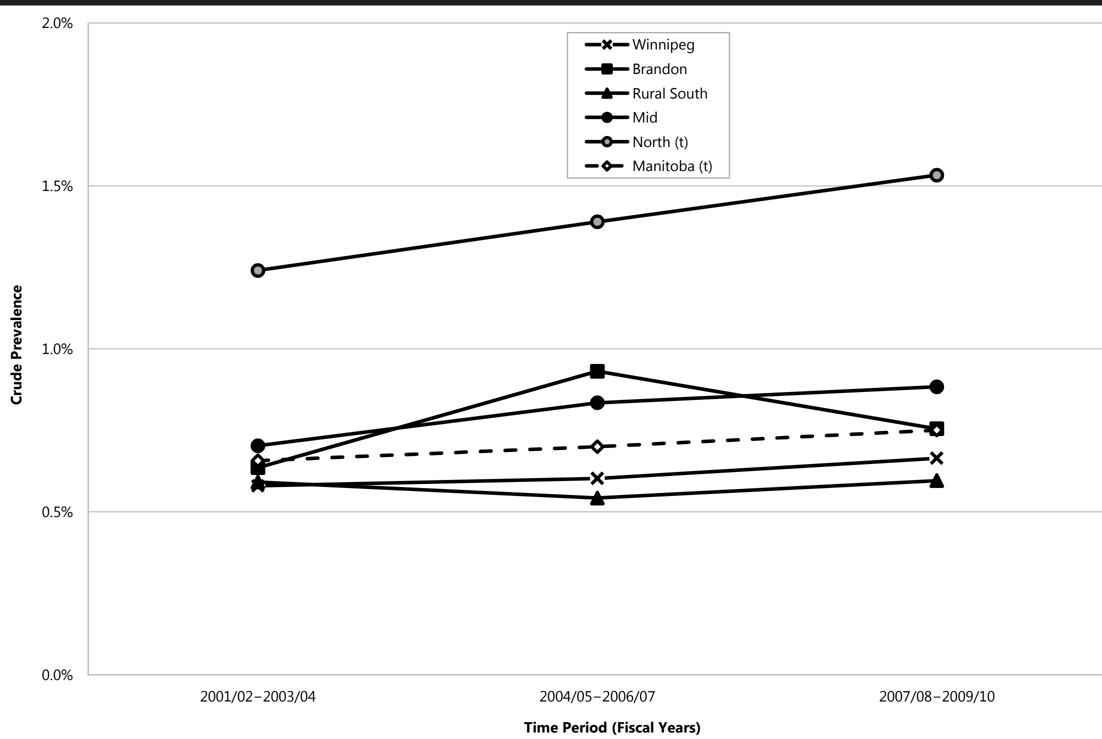
Crude prevalence for children



t indicates change over time was statistically significant for that region at $p<0.05$

Figure 3.51: Diabetes Prevalence by Aggregate Region and 13 to 19 Age Group, 2001/02–2003/04 to 2007/08–2009/10

Crude prevalence for children



t indicates change over time was statistically significant for that region at $p<0.05$

Trends by Socioeconomic Status

Figure 3.52 shows diabetes prevalence by rural income quintiles over the study period. There are significant SES gradients in diabetes prevalence in each of the three time periods, with R1 (lowest) having the highest prevalence and R3, R4, and R5 having similar and lower prevalence in each time period. For example, in 2007/08–2009/10, the prevalence of diabetes was 0.73% in R1 and was 0.50% in R3, R4, and R5. None of the income quintiles showed significant increases in diabetes prevalence over time.

Figure 3.53 shows diabetes prevalence by urban income quintiles, and it is evident that there is less disparity across them than was found in the rural areas, with none of the time periods showing significant SES gradients. In the middle urban income quintile (U3), there was a significant increase in diabetes prevalence over the study period, going from 0.35% in 2001/02–2003/04 to 0.56% in 2007/08–2009/10. None of the changes in other income quintiles over time were significant.

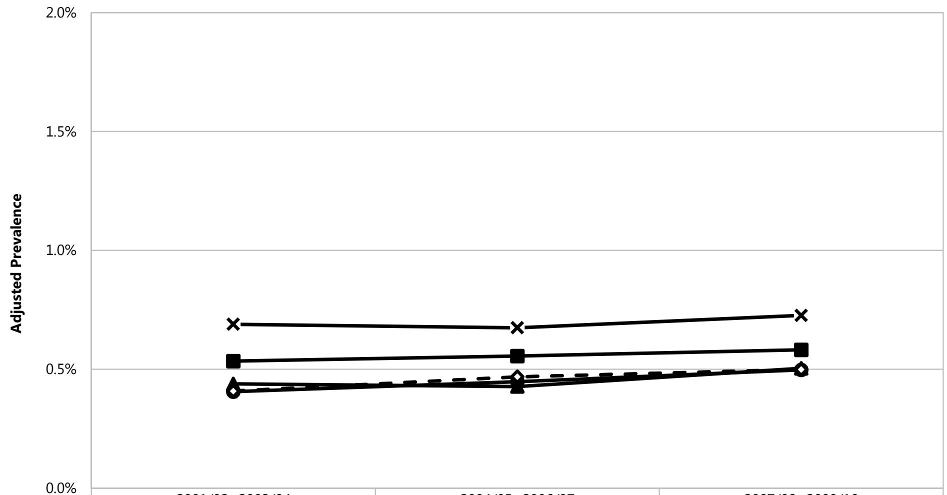
Changes in Inequity Over Time

Figures 3.54 and 3.55 show the inequities in diabetes prevalence in 2001/02–2003/04 and 2007/08–2009/10, respectively, for rural areas. In both time periods, the lowest income quintile (R1) had higher diabetes prevalence than expected given the proportion of the population. In the first time period, 31.9% of the diabetes prevalence was found in the 23.2% of the population in R1. The Gini coefficient was 0.116, indicating a moderate degree of disparity across rural income quintiles. In the last time period, 29.3% of the diabetes prevalence was found in the 22.9% of the child population in R1. The Gini coefficient was 0.081, also indicating moderate disparity, though somewhat less than in the first time period. The change in the Gini coefficient over the study period in the rural areas was not statistically significant, indicating no change in disparity over time.

Figures 3.56 and 3.57 show that there were minimal inequities in diabetes prevalence in both time periods for urban areas. In 2001/02–2003/04, 17.7% of diabetes prevalence was found in the 17.8% of the population in the lowest income quintile group. The Gini coefficient was 0.021, and the figure indicates that this slight disparity was found in the middle income quintiles. In 2007/08–2009/10, 17.7% of the diabetes prevalence occurred in the 18.5% of the population in the lowest income quintile group, with a Gini coefficient of 0.003, indicating no disparity. There was no significant change in the Gini coefficient over time in urban areas. A comparison of the Gini coefficients in the last time period indicated that there was no significant difference in inequity in rural and urban income areas.

Figure 3.52: Diabetes Prevalence by Rural Income Quintile, 2001/02–2003/04 to 2007/08–2009/10

Age– & sex–adjusted prevalence for children 6–19 years



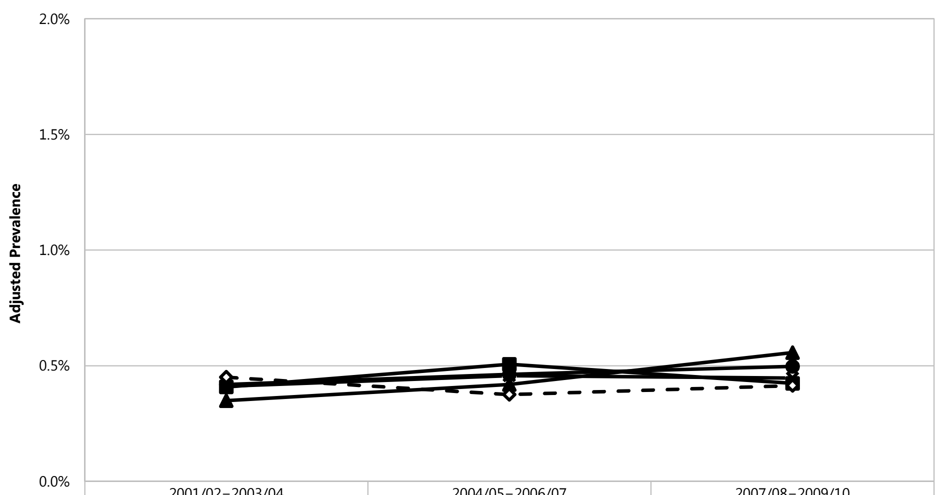
	2001/02–2003/04	2004/05–2006/07	2007/08–2009/10
Income Unknown	0.57%	0.54%	0.60%
R1 – Lowest Income	0.69%	0.67%	0.73%
R2	0.53%	0.56%	0.58%
R3	0.44%	0.43%	0.50%
R4	0.41%	0.45%	0.50%
R5 – Highest Income	0.41%	0.47%	0.50%
Linear trend across R1–R5	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 3.53: Diabetes Prevalence by Urban Income Quintile, 2001/02–2003/04 to 2007/08–2009/10

Age– & sex–adjusted prevalence for children 6–19 years



	2001/02–2003/04	2004/05–2006/07	2007/08–2009/10
Income Unknown	0.57%	0.54%	0.60%
U1 – Lowest Income	0.41%	0.46%	0.45%
U2	0.41%	0.51%	0.42%
U3 (t)	0.35%	0.42%	0.56%
U4	0.42%	0.46%	0.50%
U5 – Highest Income	0.45%	0.38%	0.41%
Linear trend across U1–U5			

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 3.54: Lorenz Curve for Diabetes in Rural Areas, 2001/02–2003/04
Adjusted by age & sex for children 6–19 years

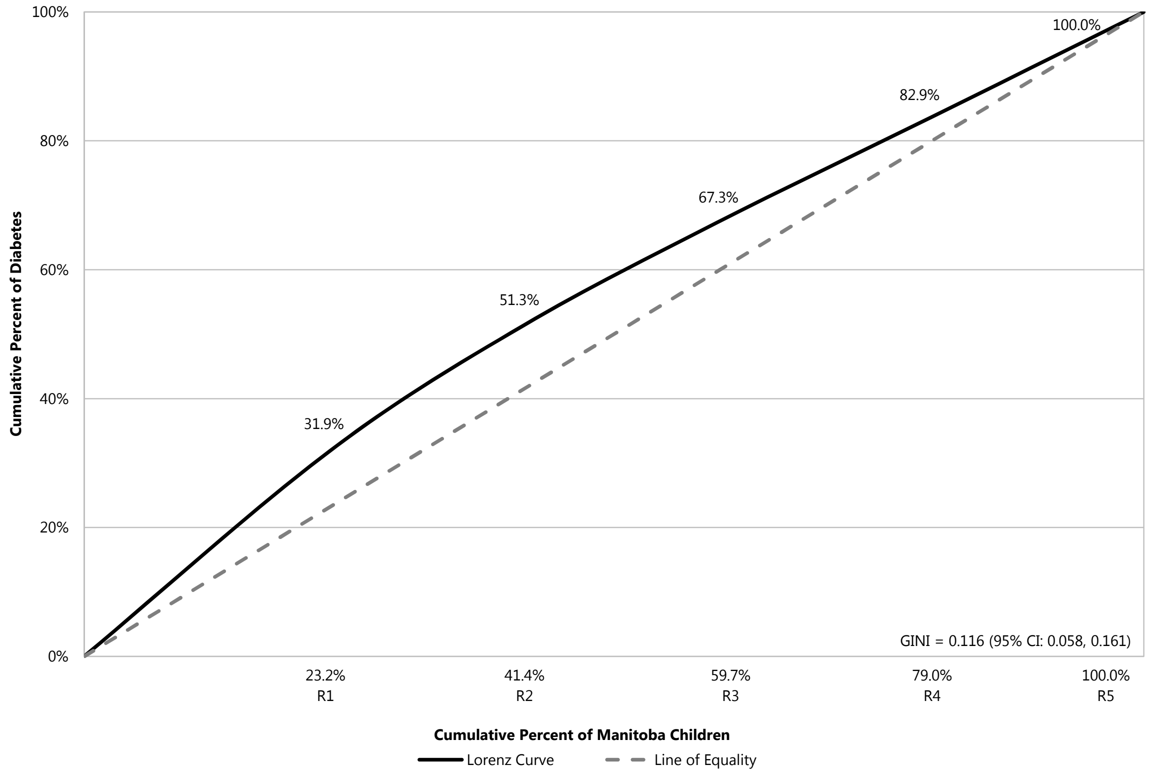


Figure 3.55: Lorenz Curve for Diabetes in Rural Areas, 2007/08–2009/10
Adjusted by age & sex for children 6–19 years

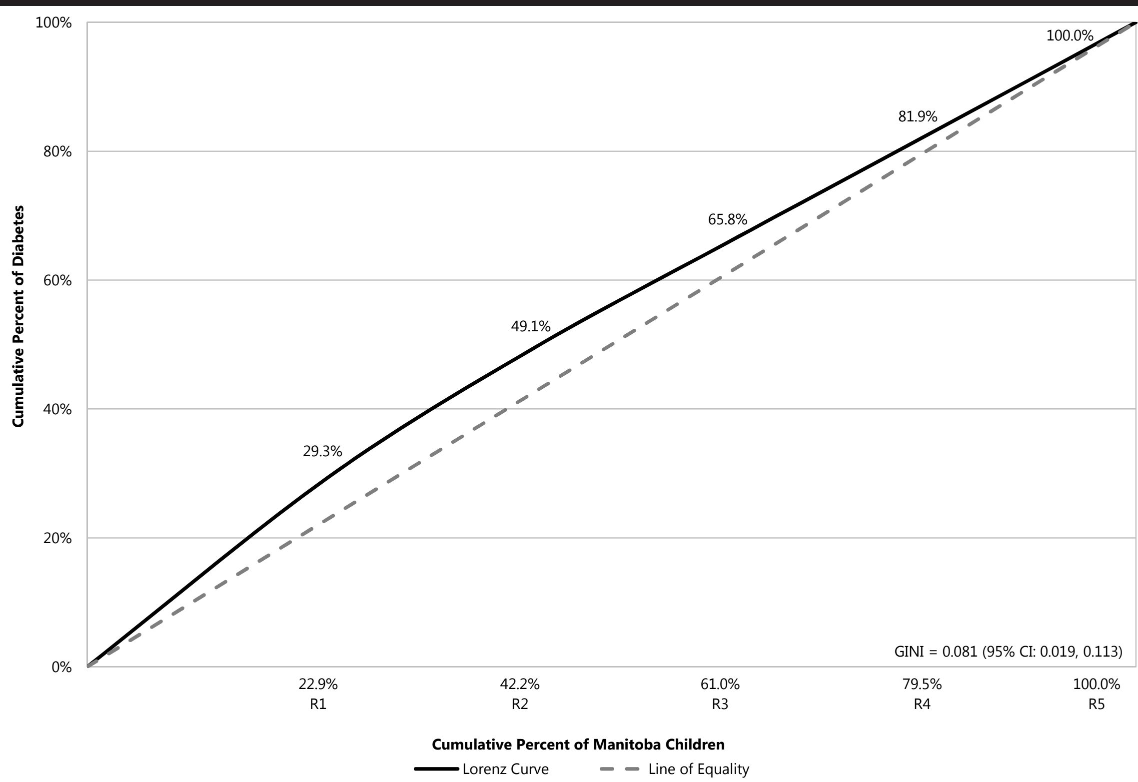


Figure 3.56: Lorenz Curve for Diabetes in Urban Areas, 2001/02–2003/04
Adjusted by age & sex for children 6–19 years

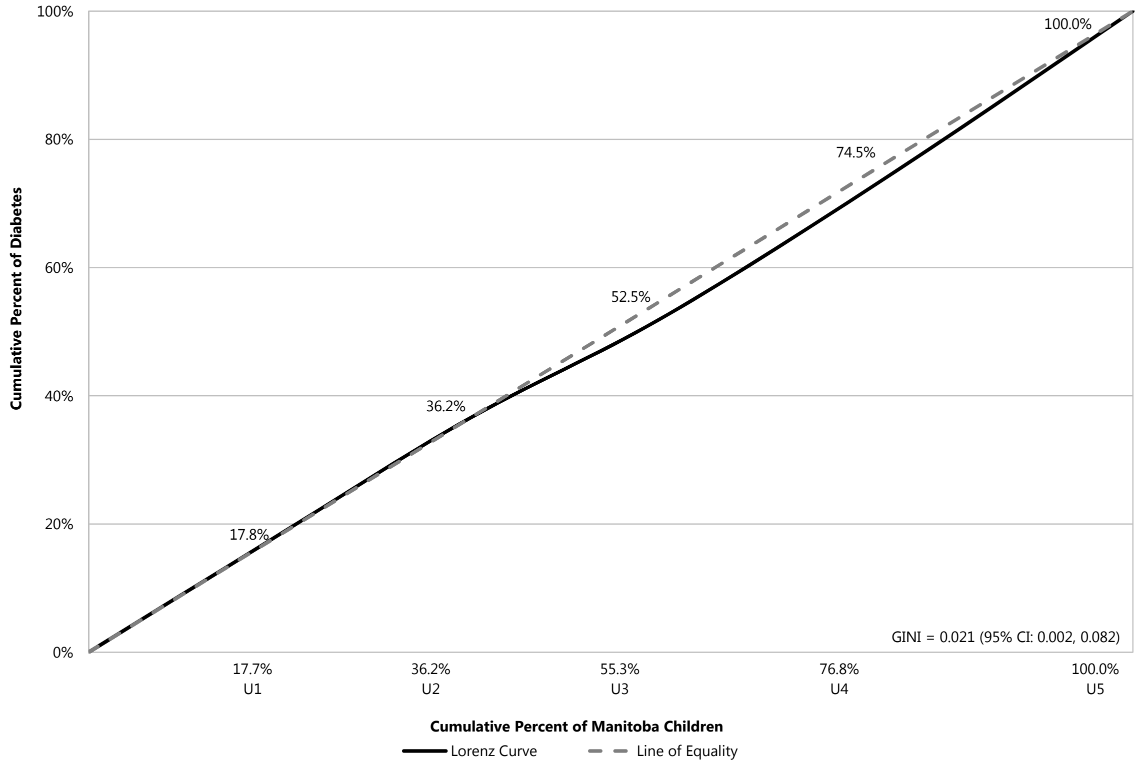
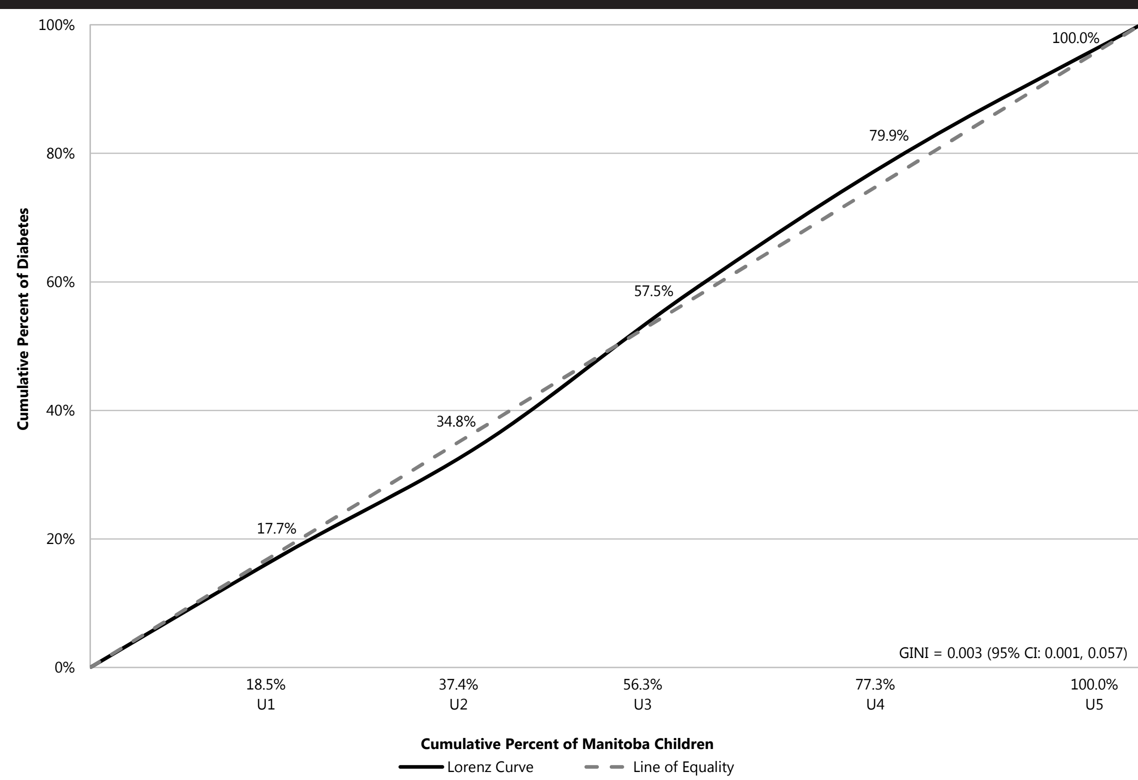


Figure 3.57: Lorenz Curve for Diabetes in Urban Areas, 2007/08–2009/10
Adjusted by age & sex for children 6–19 years



What do these results mean?

The Manitoba prevalence of diabetes for children 6 to 19 years of age did not change significantly over the study period, although the prevalence for 13– to 19–year olds increased significantly. The Manitoba prevalence of 0.75% in 2007/08–2009/10 for 13– to 19–year–olds was substantially higher than the national prevalence of 0.3% for 12– to 19–year–olds in 2005 (Statistics Canada, 2012c). The prevalence of diabetes for teens in the North is a concern at 1.5% in 2007/08–2009/10. The increasing prevalence among teens most likely represents the increased prevalence of Type 2 diabetes, particularly among Aboriginal teens (Dean, Young, Flett, & Wood-Steiman, 1998; Sellers et al., 2012). For decades researchers have reported on the epidemic of Type 2 diabetes among many North American Indian populations (Young, Reading, Elias, & O'Neil, 2000). The age of onset of Type 2 diabetes has shifted downwards and what was once considered an adult disease is often diagnosed in childhood and adolescence; increases in this age group are at least partly due to increased awareness of the disease in this age group and intensified screening (Dean, 1998; Dean et al., 1998; Glaser & Jones, 1996).

Prevention efforts including programs and policies aimed at food security, healthy eating, preventing smoking in children and youths, and promoting physical activity within schools and communities should be fostered. PHAC's Innovation Strategy has given substantial funding to researcher–community projects to explore innovative ways of promoting healthy weights. Results from these projects should be evaluated not only to determine whether they have an impact on overweight and obesity in children and youths but also whether they decrease inequities.

There is a moderate degree of inequity in diabetes in rural areas but not in urban areas. Further exploration of this difference is required and could include an assessment of differences in screening opportunities, healthy living choices, and healthcare utilization between rural and urban children and youths.

Sexually Transmitted Infections

Infections that are transmitted through sexual contact are known as sexually transmitted infections (STIs). Some STIs can also be transmitted by blood, through sharing of intravenous drug needles, and through childbirth. Together these infections are sometimes referred to as sexually transmitted and blood–borne infections (STBBIs). After discussions with our Advisory Group, five infections were selected for examination in this report: Chlamydia, Gonorrhea, Syphilis, Hepatitis B, and the Human Immunodeficiency Virus (HIV). Because the technology for testing various STBBIs has changed over the last several years, examining trends in these infections may not reflect actual trends in the infections themselves but changes in detection. For this reason, we do not examine these infections over time, but for a single recent (2008/09) fiscal year. Data from the Cadham Provincial Lab housed at MCHP was used to examine STIs in this report.

Chlamydia

According to the Manitoba Monthly Surveillance Unit reports (Manitoba Health, 2012), chlamydia has the highest incidence of reported STBBIs in Manitoba for all years, going back to 2005 and through to 2011. Close to half (about 45%) of the cases of chlamydia are found in females in the 15 to 24 age group. Higher rates of chlamydia in girls are expected due to a higher rate of girls seeking care for STIs (Paul Van Caeseele, personal communication, April 2012).

In our analysis, we found fewer than six cases of chlamydia for children under 13 years of age, so only the 13– to 19–year–old group was examined here. The percent of youths with at least one positive detection for chlamydia in 2008/09 in Manitoba differed for males and females; detections for females (2.62%) was more than three times higher than for males (0.83%) ($p<0.0001$).

Regional Trends

Figure 3.58 shows the percent of youths with at least one positive detection for chlamydia in 2008/09 by aggregate region. The Manitoba percent for 13– to 19–year–olds was 1.71%. The percent ranged from 0.76% in Rural South, which was significantly lower than the provincial average, to 5.03% in the North, which was significantly higher than the provincial average.

Trends by Socioeconomic Status

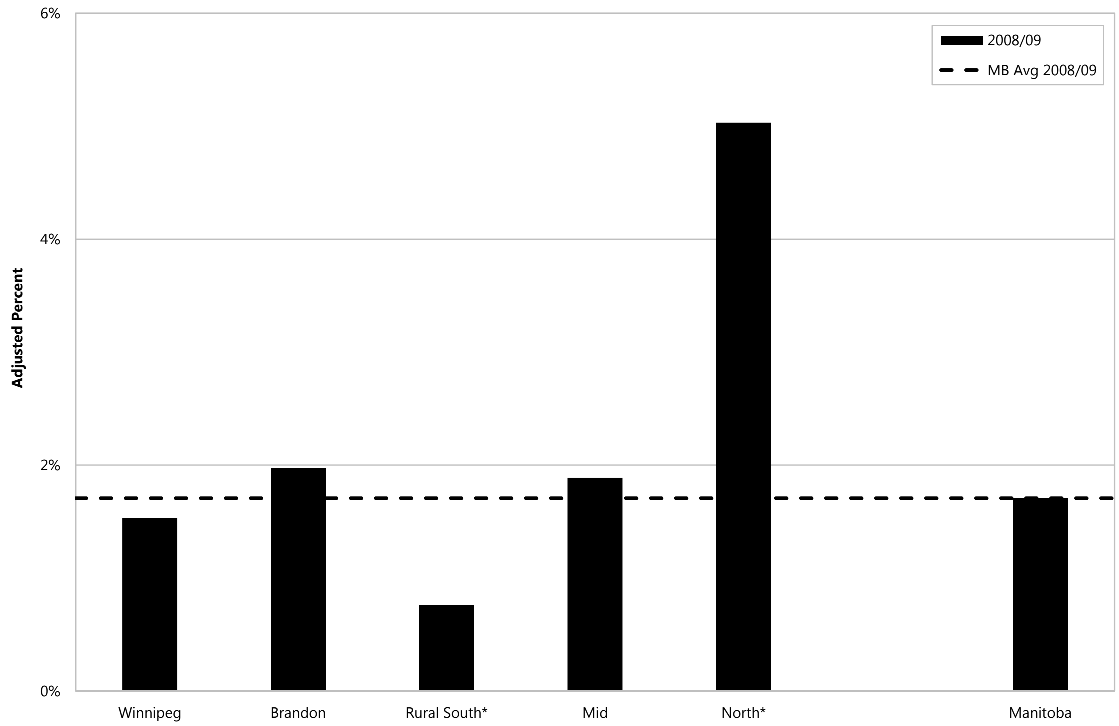
Figure 3.59 shows the percent of youths with at least one positive detection for chlamydia in 2008/09 by rural and urban income quintile. It is clear that there is an SES gradient for chlamydia with the highest percentages found in the areas with the lowest income in urban and rural areas, and the percent decreases as area–level income increases. For example, in R1, the 4.43% of youths had a positive detection for chlamydia compared to 0.90% R5. In U1, the percent was 4.40% compared to 0.43% in U5.

Inequity

Figures 3.60 and 3.61 show the inequities in positive detections for chlamydia in 2008/09 for rural and urban areas. In both areas, the lowest income quintiles (R1 and U1) had much higher positive detections for chlamydia than expected given the proportion of the population. For rural Manitoba, 52.1% of the youths with at least one positive detection for chlamydia were found in the 22.3% of the 13– to 19–year–old population in R1. The Gini coefficient was 0.360, indicating substantial disparity across rural income quintiles. In urban Manitoba, 48.0% of the youths with a positive detection for chlamydia were found in the 17.4% of the youth population in U1. The Gini coefficient was 0.451, also indicating substantial disparity. The Gini coefficient in the urban areas was significantly higher than in rural areas, indicating greater disparity in chlamydia for urban teens than rural teens.

Figure 3.58: Percent of Children with at Least One Positive Detection of Chlamydia by Aggregate Region, 2008/09

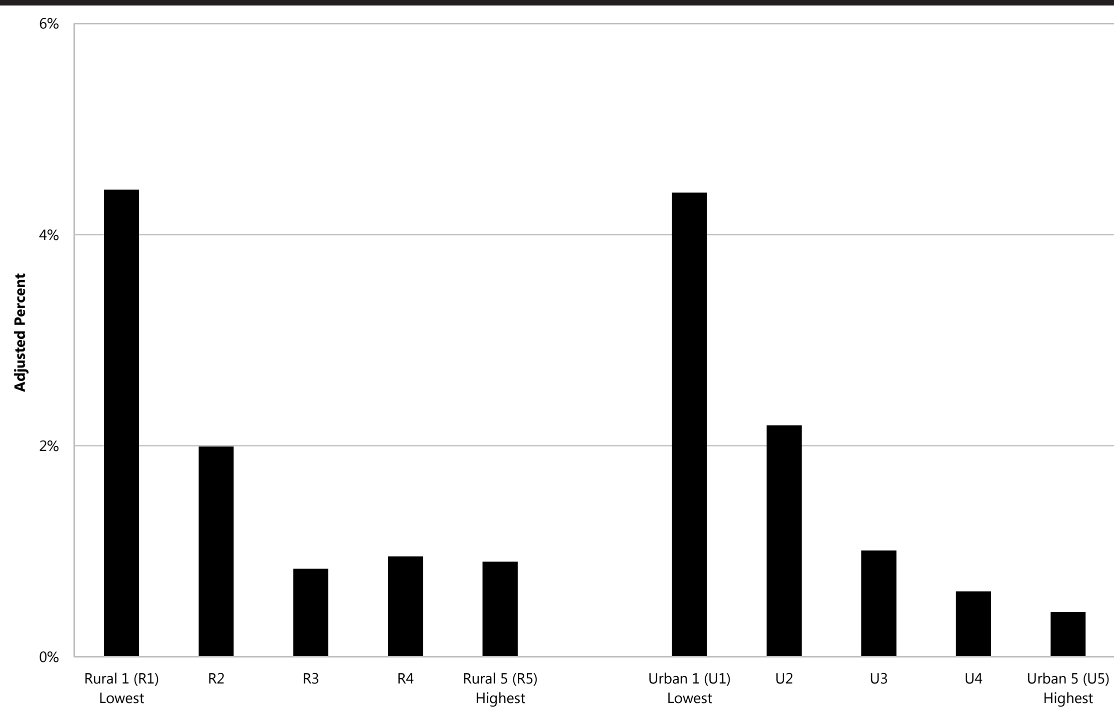
Age- & sex–adjusted percent of children 13–19 years



* indicates region's rate was statistically different from Manitoba average in this time period at p<0.01

Figure 3.59: Percent of Children with at Least One Positive Detection of Chlamydia by Income Quintile*, 2008/09

Age– & sex–adjusted percent of children 13–19 years



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at p<0.05
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at p<0.05

Figure 3.60: Lorenz Curve for Children with at Least One Positive Detection of Chlamydia in Rural Areas, 2008/09
Adjusted by age & sex for children 13–19 years

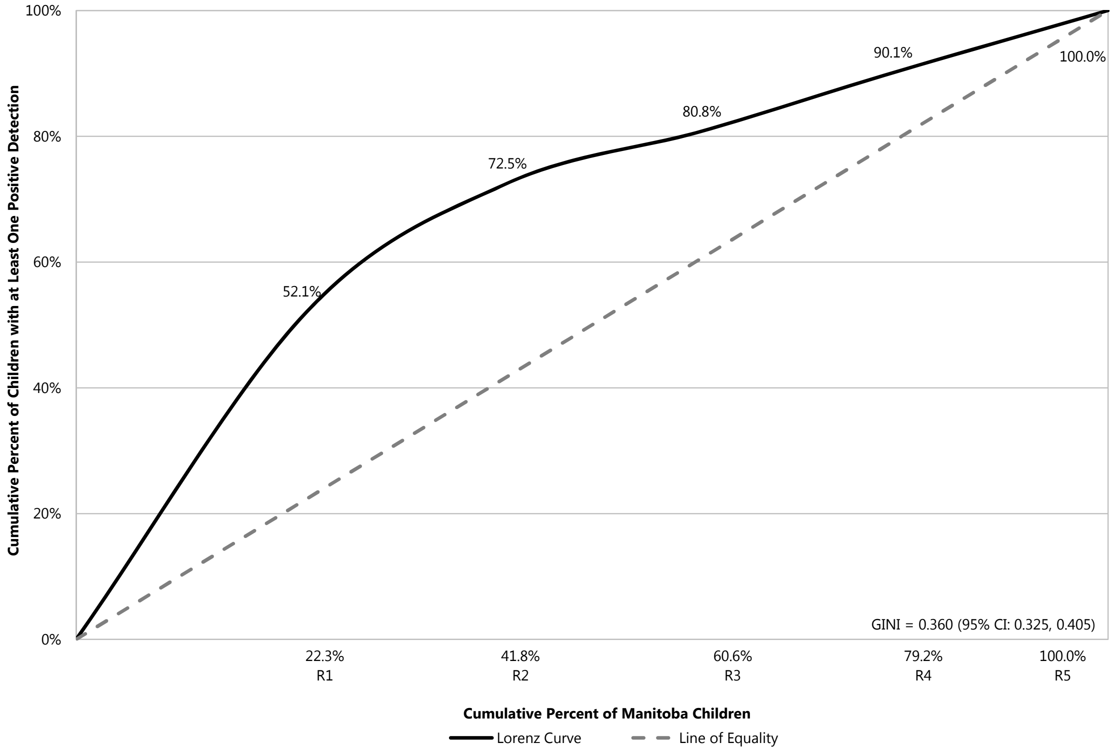
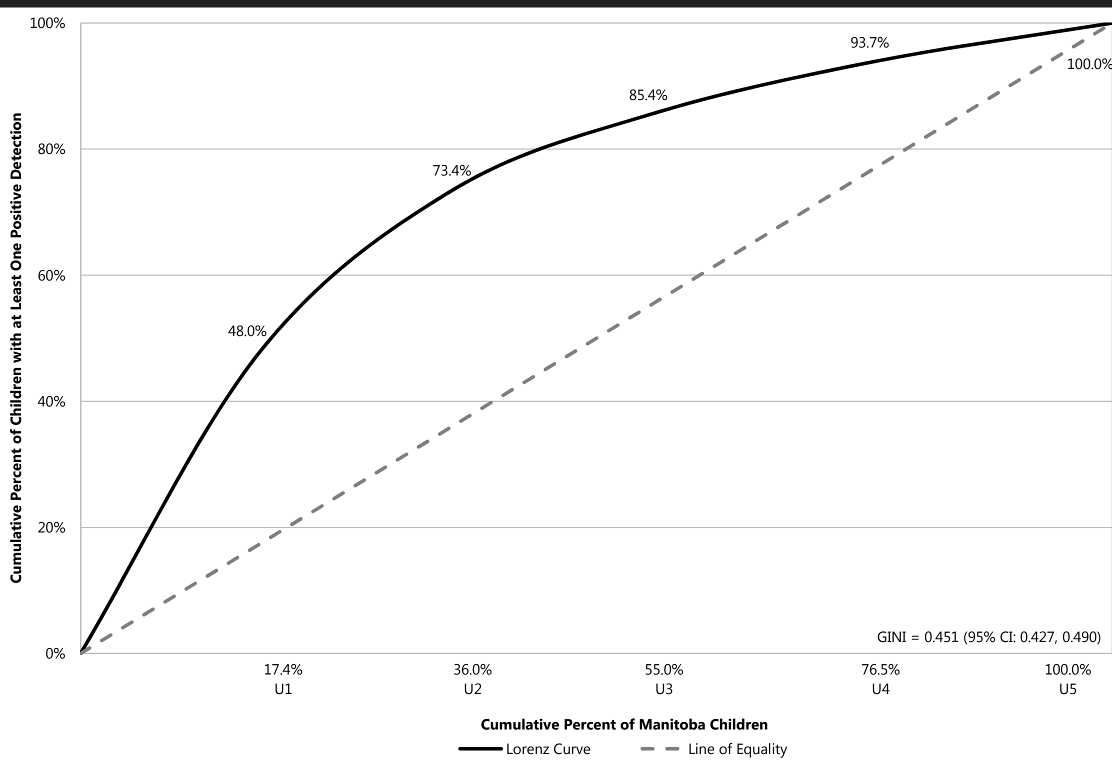


Figure 3.61: Lorenz Curve for Children with at Least One Positive Detection of Chlamydia in Urban Areas, 2008/09
Adjusted by age & sex for children 13–19 years



Gonorrhea

Gonorrhea is a less common infection than chlamydia and often co–occurs with chlamydia infections (Manitoba Health, 2012). As was the case with chlamydia, in our analysis we found there were fewer than six cases of gonorrhea for children under 13 years of age, so only the 13– to 19–year–old group was examined here. The percent of youths with at least one positive detection for gonorrhea in 2008/09 in Manitoba differed for males and females, with the percent for females (0.4%) more than two times higher than for males (0.2%) ($p<0.01$).

Regional Trends

Figure 3.62 shows the percent of youths with at least one positive detection for gonorrhea in 2008/09 by aggregate region. The Manitoba percent of youths with at least one positive detection of gonorrhea infections for 13– to 19–year–olds was 0.3%. Percentages ranged from 0.08% in Rural South, which was significantly lower than the Manitoba average, to 1.2% in the North, which was significantly higher than the Manitoba average.

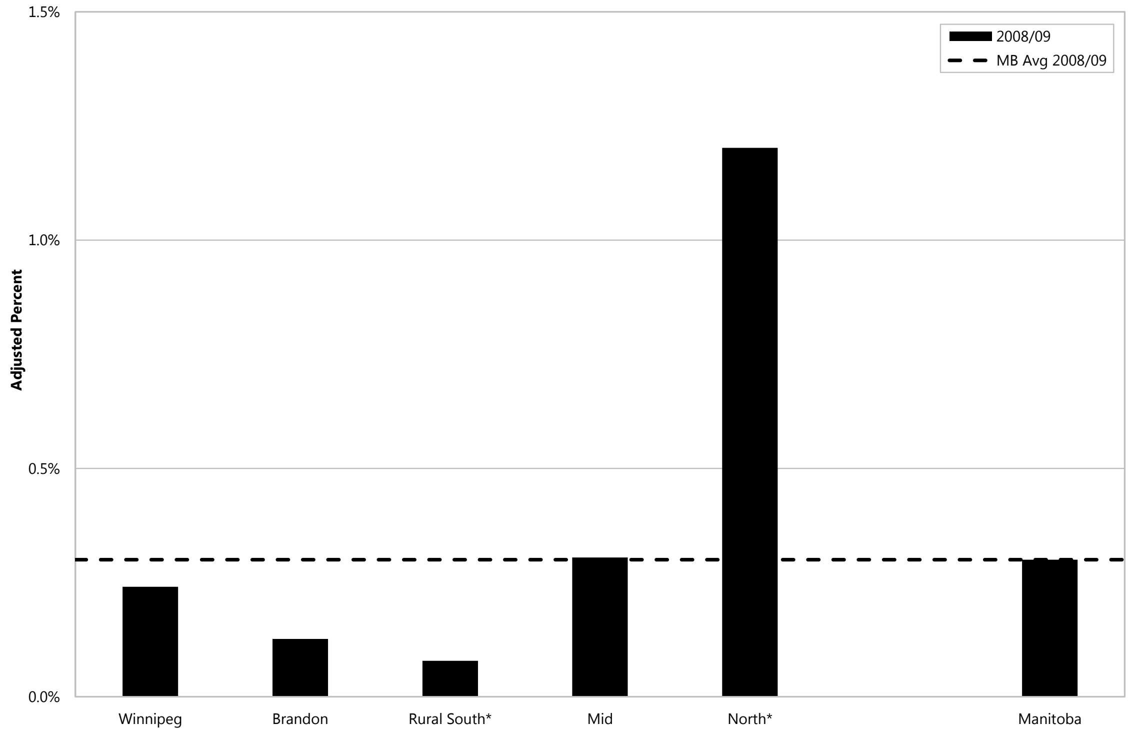
Trends by Socioeconomic Status

Figure 3.63 shows the percent of youths with at least one positive detection for gonorrhea in 2008/09 by rural income quintile. It is clear that there is an SES gradient for gonorrhea in rural areas, with the highest percentages found in the area with the lowest income, and positive detections decreasing as area–level income increases. For example, in R1, the percent was 0.96% compared to 0.10% in R5. In urban areas, the values are not depicted in a graph because they were too low to display for the highest two income quintiles. For U1 to U3, there was a gradient with the highest values found for U1 (0.80%) and decreasing as income increased, with a value of 0.13% in U3.

Inequity

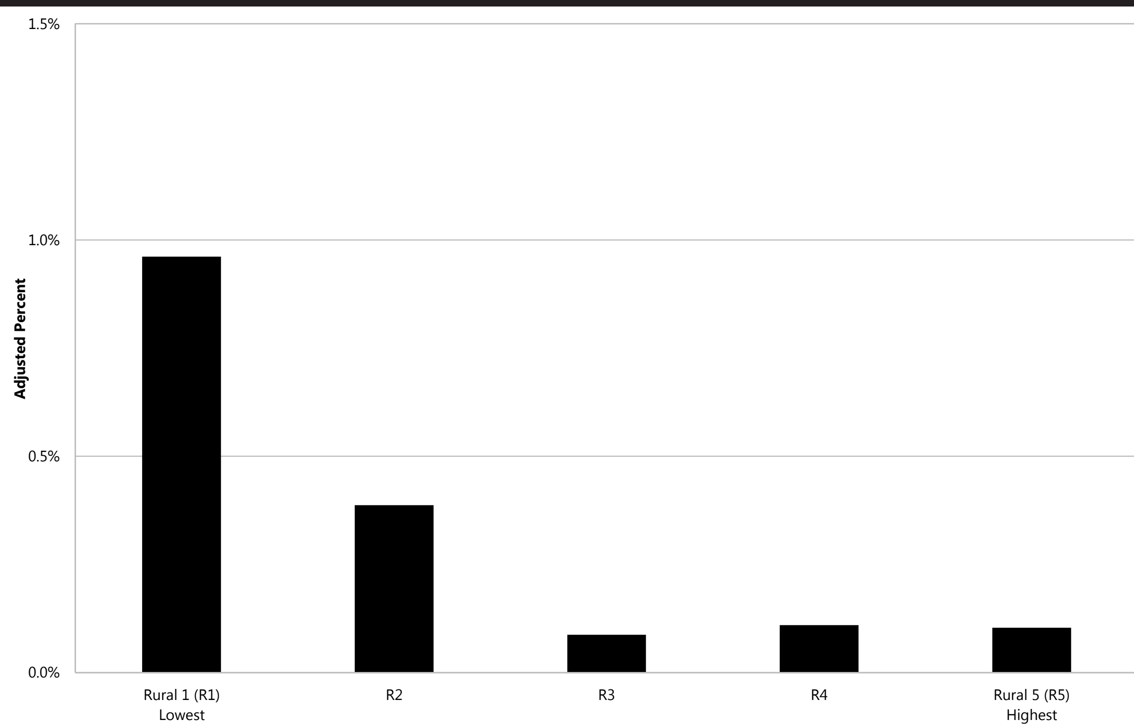
Figure 3.64 shows the inequities in youths with at least one positive detection for gonorrhea in 2008/09 for rural areas. The Lorenz curve for urban areas is not shown because of low number of cases in U4 and U5. In both areas, the lowest income quintiles (R1 and U1) had much higher positive gonorrhea detections than expected given the proportion of the population. For rural Manitoba, 61.6% of the positive detections for gonorrhea were found in the 22.3% of the 13– to 19–year–old population in R1. The Gini coefficient was 0.483, indicating substantial disparity across rural income quintiles. In urban Manitoba, 59.1% of the positive detections for gonorrhea were found in the 17.4% of the youth population in U1. The Gini coefficient was 0.592, also indicating substantial disparity. The Gini coefficient in the urban areas was significantly higher than in rural areas, indicating greater disparity in gonorrhea for urban teens than rural teens.

Figure 3.62: Percent of Children with at Least One Positive Detection of Gonorrhea by Aggregate Region, 2008/09
Age– & sex–adjusted percent of children 13–19 years



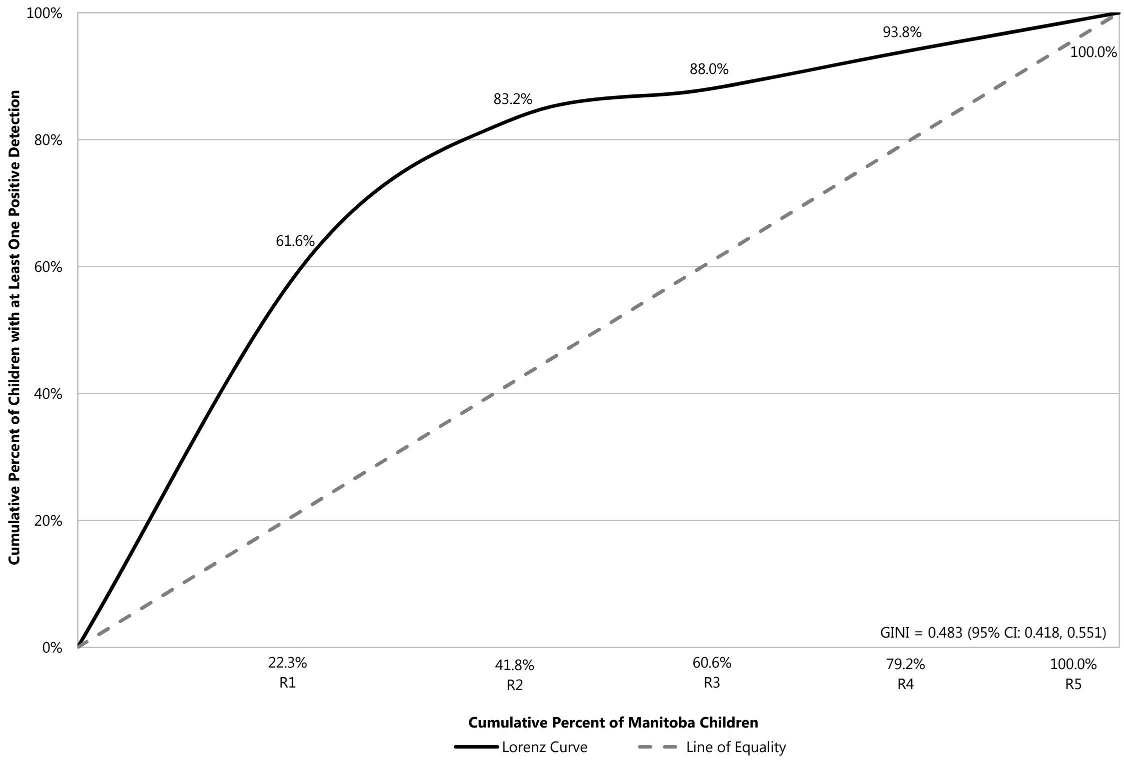
* indicates region's rate was statistically different from Manitoba average in this time period at p<0.01

Figure 3.63: Percent of Children with at Least One Positive Detection of Gonorrhea by Rural Income Quintile*, 2008/09
Age– & sex–adjusted percent of children 13–19 years



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at p<0.05
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at p<0.05; data suppressed due to small numbers

Figure 3.64: Lorenz Curve for Children with at Least One Positive Detection of Gonorrhea in Rural Areas, 2008/09
Adjusted by age & sex for children 13–19 years



Syphilis

The number of cases of syphilis in Manitoba teens is relatively low, and the small numbers preclude presentation by region or income quintile. For this reason, for the purposes of this report, we have taken information from the Manitoba Monthly Surveillance Unit reports to report the provincial counts for the year 2010 (Manitoba Health, 2012). In the monthly reports, syphilis for both infectious and non–infectious cases are counted, as well as those that require additional follow–up to confirm their status. The number of syphilis cases for 15– to 19–year–old females was two; and there were no cases for males in the same age group. There were some syphilis cases at younger ages: for females, there was one case at ages 0 to 4, one case at ages 5 to 9, and one case at ages 10 to 14 years of age. For males, there were no syphilis cases reported for the 0 to 4 or 5 to 9 age groups, but two cases reported for 10 to 14 years.

Hepatitis B

The number of Hepatitis B cases in Manitoba teens is also relatively low, precluding regional or income quintile comparisons. As with Syphilis, number of cases of Hepatitis B are reported in the Manitoba Monthly Surveillance Unit reports (Manitoba Health, 2012). Unlike Syphilis, however, the counts for Hepatitis B infections are not disaggregated by age group, so we could not determine whether they were cases for teens and/or adults. For this reason, counts for Hepatitis B are not reported here.

HIV

As with Hepatitis B and Syphilis, the number of HIV cases in Manitoba teens and children is too low for regional and income quintile reporting. A report by Manitoba Health (Public Health and Primary Health Care Division, 2010) on the number of new cases of HIV in Manitoba provides the age and sex breakdown of cases between 2000 and 2009 for 15– to 19–year–olds as 23 cases for females and six cases for males. During the same time period there were seven new cases for females less than 15 years old, and one case for males in this age group. Data from 2010 report 2 new cases for females and 1 new case for males in the 15– to 19–year–old age group, one new case for females under 15 years, and no cases for males under age 15. For new HIV cases for Manitoba youths in 2000 through 2009, there were over four times as many females as males. The report notes that the number of new cases of HIV was greater for females than for males in age groups younger than 30 years, but greater for males than for females in older age groups.

What do these results mean?

It should be kept in mind that rates of chlamydia and gonorrhea reported here do not necessarily reflect prevalence of these infections, but who gets tested; they likely represent an underestimate of prevalence. Compared with national statistics, rates for Manitoba teens appear high. The rate for males and females ages 10 to 19 years in Canada in 2008 was 0.26% and for ages 15 to 19 years it was 1.04% (Public Health Agency of Canada, 2011a), compared to 1.71% for males and females 13 to 19 years in Manitoba in 2008/09. For gonorrhea, the Canadian rate in 2008 for males and females 10 to 19 years was 0.04% and for 15 to 19 years it was 0.12% compared to the Manitoba rate of 0.3% for 13– to 19–year olds in 2008/09 (Public Health Agency of Canada, 2011b).

The high degree of inequities in chlamydia and gonorrhea coupled with the high degree of inequity in teen pregnancy rates (Chapter 6) suggest the need for targeted strategies to reduce unprotected sex among teens in lower SES areas and in the North.

Children Living with a Mother with Mood and/or Anxiety Disorders

Parental **mood and anxiety disorders** play an important role in the psychological and social development of children in utero (Davis & Sandman, 2010) and after birth (Hammen, Birge, & Stansbury, 1990). The effect of mood and anxiety disorders on parents is thought to negatively impact the interaction between parent and child (Murray & Cooper, 1997; Somers & Willms, 2002). Extensive research findings have linked the exposure to parental depression with negative outcomes in children such as emotional problems, disruptive behaviours, and attention and cognitive problems in early childhood (Kim-Cohen, Moffitt, Taylor, Pawlby, & Caspi, 2005; Brennan et al., 2000). These outcomes often persist into adolescence and may lead to antisocial behaviours (Hay, Pawlby, Angold, Harold, & Sharp, 2003; Munson, McMahon, & Spieker, 2001), academic and behavior problems at school (Sinclair & Murray, 1998), and depression (Cummings, Keller, & Davies, 2005; Hammen & Brennan, 2003). Children living with a parent with an anxiety disorder or depression may also be more likely to experience child maltreatment (Chaffin, Kelleher, & Hollenberg, 1996).

Mothers are often the main focus of studies about parental mood and anxiety disorders. Women experience higher rates of depression, the most prevalent diagnosed mental illness in Manitoba, when compared with men (Martens et al., 2004). In this study, we focus on **children living with a mother with mood and/or anxiety disorders** because using the data Repository at MCHP, we can link children to their mothers with a greater degree of certainty than linking to their fathers.

Mood and anxiety disorders represent a broad spectrum of conditions that range from poor adjustment reactions and anxiety state to anxiety disorders, phobic disorders, obsessive–compulsive disorders, depressive disorders, affective psychoses, and neurotic depression (Doupe et al., 2008; Martens et al., 2004; Martens et al., 2010b). The conditions in this group are often difficult to distinguish in administrative data because of variations in clinical presentations, coding practices, screening, and diagnostic tools (Martens et al., 2004). The majority of patients are identified as having a mood and anxiety disorder based on **physician billings**, which are limited to three–digit diagnostic codes. Conditions such as depression and anxiety require the use of four–digit codes. While the use of pharmaceutical information can distinguish between antidepressant and mood stabilizer drugs, the prescription of these drugs may not be specific to a single condition (Martens et al., 2004). Specific mood and anxiety disorders may be identified in hospital records. However, fewer individuals are hospitalized with a diagnosis of mood and anxiety disorders. Comorbidity among these diseases is also relatively high (Lepine, 2001; Martens et al., 2004; Spaner, Bland, & Newman, 1994), with as many as 6–17% of patients worldwide having both depression and anxiety disorders (Lepine, 2001). In Manitoba, 68.5% of patients with anxiety disorders were also diagnosed or treated for depression (Martens et al., 2004). Both conditions are also more common in females than males (Dick, Sowa, Bland, & Newman, 1994; Dick, Bland, & Newman, 1994; Horwath & Weissman, 2000; Lepine, 2001; Ohayon & Shapiro, 2000; Martens et al., 2004; Wade & Cairney, 1997).

In this study, mood and anxiety disorders are measured using the diagnosis of one or more conditions in this group from hospital and physician records, as well as records of prescriptions for antidepressants or mood stabilizers. We measure the prevalence of children aged 0 to 19 years whose mother has been treated for a mood and/or anxiety disorder during 2000/01–2009/10. It should be noted that the prevalence of mood and anxiety disorders represents treatment of the condition; those suffering from these disorders but not treated by their physicians will not be captured in this analysis (Martens et al., 2004). All results presented in this section are adjusted by the age and sex of children. Approximately 2% of children could not be linked to their mothers so they were excluded from the analysis.

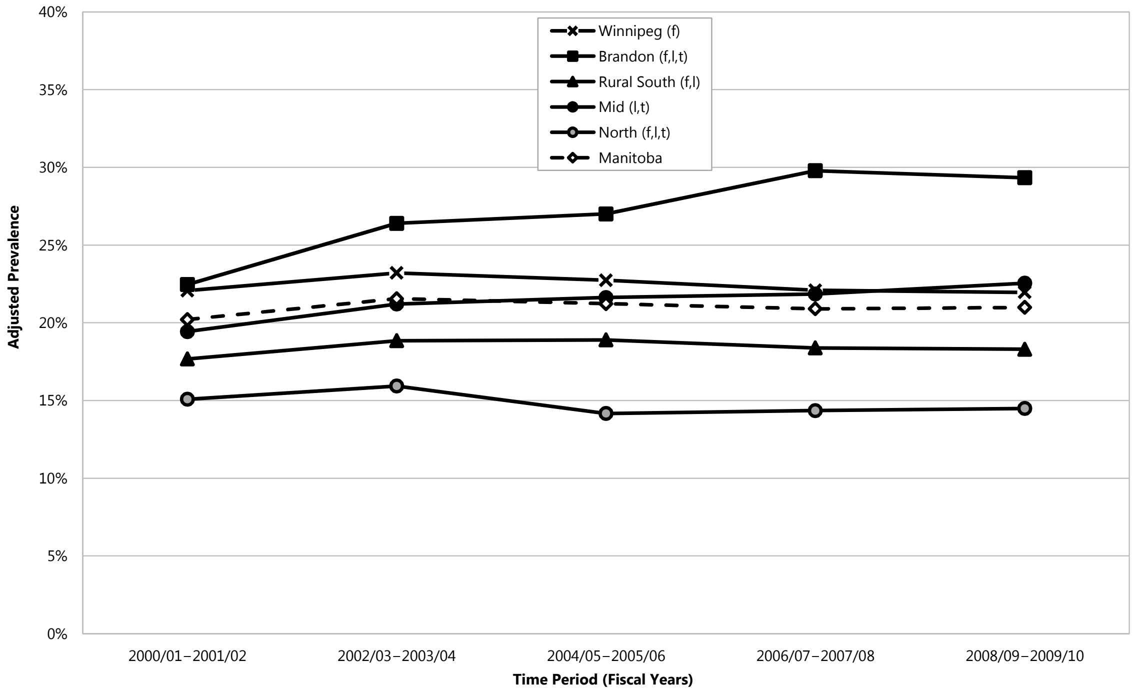
Regional Trends Over Time

Figure 3.65 shows the prevalence of children whose mothers had a mood or anxiety disorder for aggregate regions of Manitoba for five 2–year time periods. The provincial prevalence of children with mothers with mood/anxiety disorders was stable across the study period at 20.2% in 2000/01–2001/02 and 21.0% in 2008/09–2009/10. The prevalence increased over time in Brandon (22.5% to 29.3%) and Mid (19.4% to 22.6%) and decreased over time in the North (15.1% to 14.5%). The prevalence in Brandon was higher in the first and last time periods compared to the provincial average, whereas in Rural South (17.7% and 18.3%) and the North the prevalence was significantly lower than the provincial average in the first and last time period. In Winnipeg, the prevalence was significantly higher than the provincial average in the first time period (22.1%) whereas in Mid the prevalence was significantly higher than the provincial average in the last time period.

Trends by Age Group

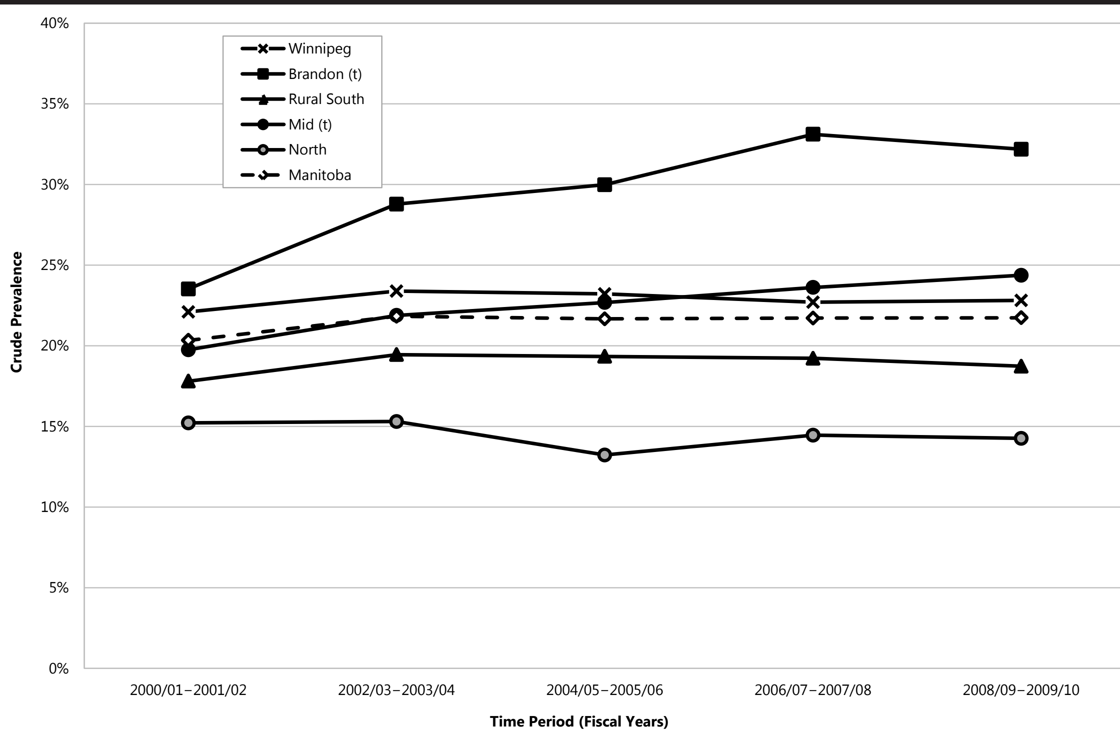
Figures 3.66 to 3.68 show the prevalence of children whose mothers had mood or anxiety disorders by different age groups. At the provincial level, the prevalence was stable for each age group over time; and it was also similar across age groups: 20.3% in the first time period and 21.7% in the last time period for the 0– to 5–year–olds; 20.1% in the first and 20.6% in the last time period for the 6– to 12–year–olds, and; 20.3% in the first and 20.9 in the last time period for the 13– to 19–year–olds. For the 0– to 5–year–olds, increases in prevalence over time were found for Brandon (23.5% to 32.2%) and Mid (19.7% to 24.4%). For the 13– to 19–year–olds, increases in prevalence over time were also found for Brandon (21.2% to 27.7%) and Mid (19.0% to 21.7%). No other changes were statistically significant.

Figure 3.65: Prevalence of Children with a Mother with a Mood and/or Anxiety Disorder by Aggregate Region, 2000/01–2001/02 to 2008/09–2009/10
Age– & sex–adjusted prevalence for children 0–19 years



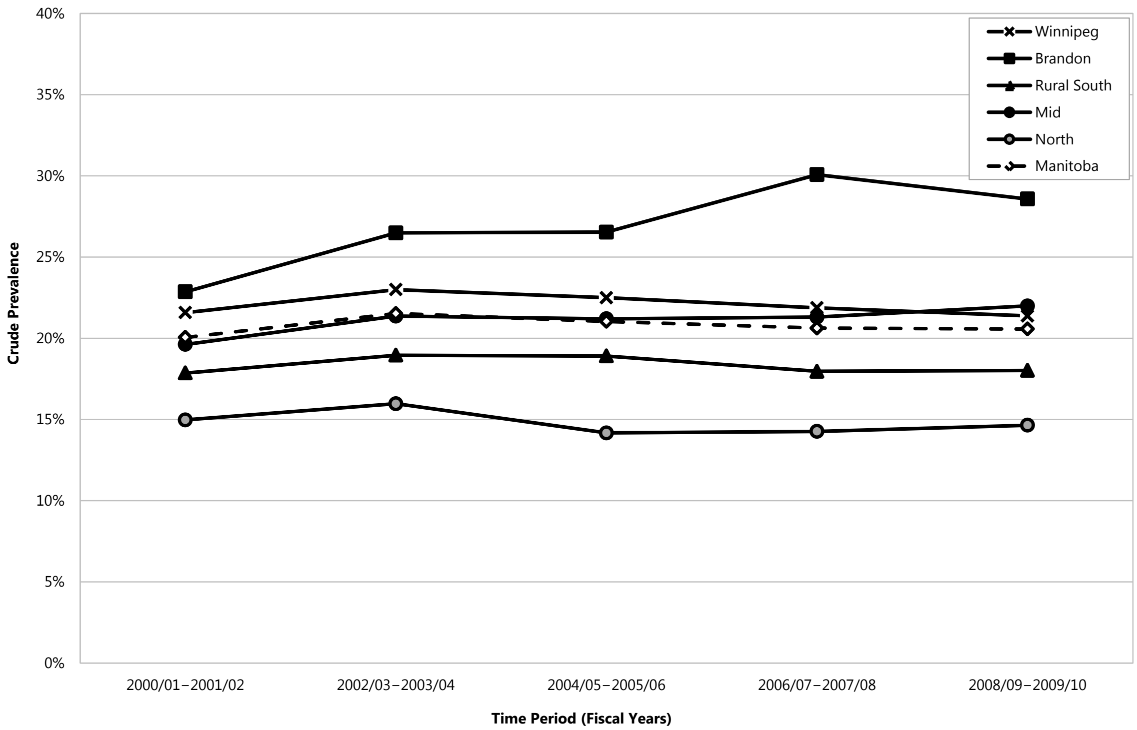
f indicates region's rate was statistically different from Manitoba average in the first time period at $p<0.01$
l indicates region's rate was statistically different from Manitoba average in the last time period at $p<0.01$
t indicates statistically significant difference between the first and last time periods for that region at $p<0.05$

Figure 3.66: Prevalence of Children with a Mother with a Mood and/or Anxiety Disorder by Aggregate Region and 0 to 5 Age Group, 2000/01–2001/02 to 2008/09–2009/10
Crude prevalence for children



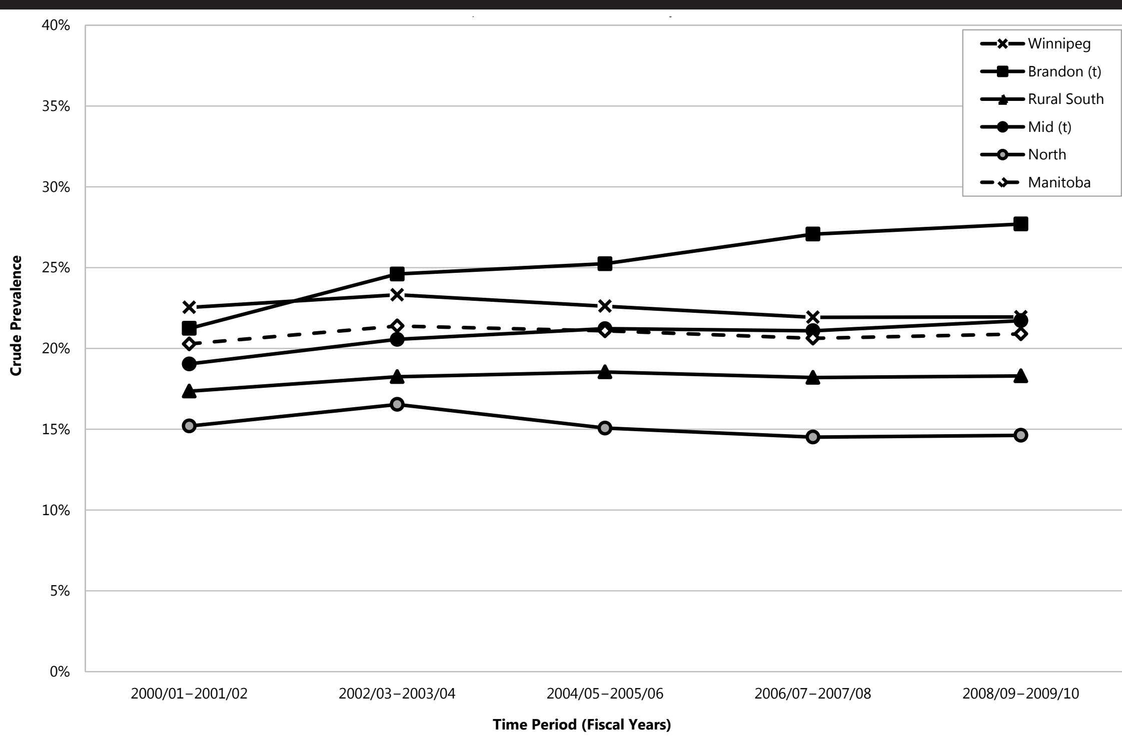
t indicates statistically significant difference between the first and last time periods for that region at $p<0.05$

Figure 3.67: Prevalence of Children with a Mother with a Mood and/or Anxiety Disorder by Aggregate Region and 6 to 12 Age Group, 2000/01–2001/02 to 2008/09–2009/10
Crude prevalence for children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 3.68: Prevalence of Children with a Mother with a Mood and/or Anxiety Disorder by Aggregate Region and 13 to 19 Age Group, 2000/01–2001/02 to 2008/09–2009/10
Crude prevalence for children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Trends by Socioeconomic Status

Figure 3.69 shows prevalence of children with mothers who had mood and/or anxiety disorder by rural income quintiles for 2000/01–2001/02 through 2008/09–2009/10. Prevalence of maternal mood and anxiety disorders is similar across rural income quintiles for the first, second, and fourth time periods. In the third and fifth time periods, there are significant differences in prevalence across income quintiles, however these differences are not due to a gradient across SES, rather, the middle income quintiles have higher prevalence than the lower and higher income areas. Statistically significant changes over time are evident in R2 (17.4% to 16.9%) and R3 (17.7% to 20.7%). Recall that this indicator measures treatment prevalence, which may not reflect the true prevalence of children whose mothers had mood and/or anxiety disorders.

Figure 3.70 shows prevalence of children with mothers who had mood and/or anxiety disorders by urban income quintiles for 2000/01–2001/02 through 2008/09–2009/10. Significant SES gradients are evident in all five time periods, with higher prevalence in the lowest income quintile and prevalence of children with mothers who had mood and/or anxiety disorders decreasing with each increase in income quintile. For example, in the last time period, 28.3% of children in U1 had a mother who had been diagnosed with a mood and/or anxiety disorder, compared to 18.5% of children in U5. Prevalence of children whose mothers had a mood and/or anxiety disorder increased significantly over time for children in U1 (26.0% to 28.3%).

Changes in Inequity Over Time

Figures 3.71 and 3.72 measure inequity in prevalence of children with mothers with a mood and/or anxiety disorder in the first and last time periods for rural areas. In the first time period, the percent of children whose mothers had a mood and/or anxiety disorder in R1 was as expected given the proportion of the population: 23.3% of the children with moms with these disorders were found in the 23.5% of the population comprising R1. The Gini coefficient was 0.004, indicating almost no disparity. In the last time period, again the prevalence of children whose mothers had a mood and/or anxiety disorder was as expected in R1: 23.1% of the children whose moms had this disorder were from the 23.5% of the population comprising R1. The Gini coefficient was 0.012 again indicating very little disparity. There was no significant change in the Gini coefficient over the study period in the rural areas, indicating no change in disparity over time.

Figures 3.73 and 3.74 show that there are some inequities in prevalence of children whose mothers had mood and/or anxiety disorders in both time periods for urban areas. In time 1, 22.0% of children whose moms had these disorders were found in the 18.7% of the population in the lowest income quintile group, with a Gini coefficient of 0.065, indicating moderate disparity. In the last time period, 24.9% of the children whose moms had these disorders were found in the 19.8% of the population in the lowest income quintile group, with a Gini coefficient of 0.082, indicating a moderate degree of disparity. There was a significant increase in the Gini coefficient over time in urban areas, indicating a significant increase in inequity. A comparison of the Gini coefficients in the last time period indicated that the inequity in urban areas was greater than in rural income areas.

Updated February 18, 2015

Figure 3.69: Prevalence of Children with a Mother with a Mood and/or Anxiety Disorder by Rural Income Quintile, 2000/01–2001/02 to 2008/09–2009/10

Age– & sex–adjusted prevalence for children 0–19 years

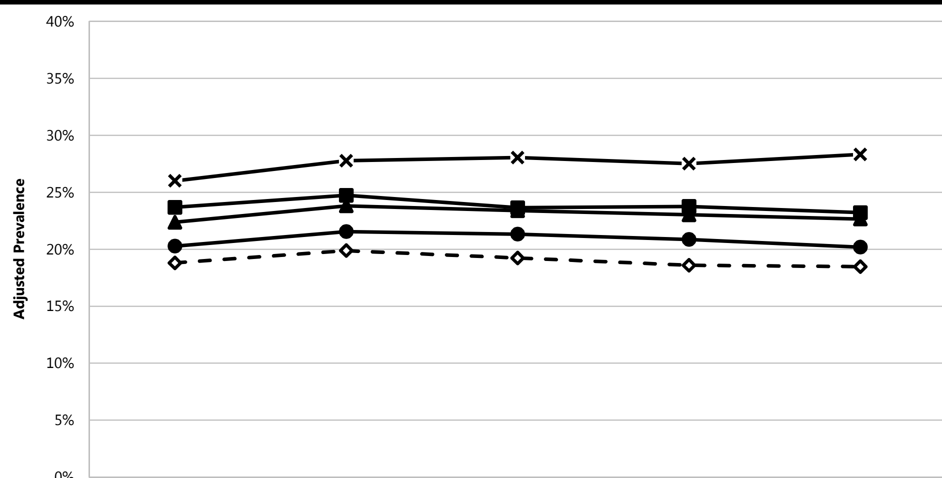
	2000/01–2001/02	2002/03–2003/04	2004/05–2005/06	2006/07–2007/08	2008/09–2009/10
Income Unknown	33.16%	37.49%	31.48%	29.95%	35.74%
R1 – Lowest Income	17.55%	18.99%	17.97%	18.59%	18.48%
R2 (t)	17.35%	18.61%	16.99%	17.22%	16.88%
R3 (t)	17.71%	18.97%	19.98%	19.65%	20.67%
R4	18.45%	19.68%	20.30%	19.61%	19.61%
R5 – Highest Income	17.49%	18.56%	18.92%	18.12%	18.53%
Linear trend across R1–R5			*		*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Figure 3.70: Prevalence of Children with a Mother with a Mood and/or Anxiety Disorder by Urban Income Quintile, 2000/01–2001/02 to 2008/09–2009/10

Age– & sex–adjusted prevalence for children 0–19 years



	2000/01–2001/02	2002/03–2003/04	2004/05–2005/06	2006/07–2007/08	2008/09–2009/10
Income Unknown	33.16%	37.49%	31.48%	29.95%	35.74%
U1 – Lowest Income (t)	26.00%	27.77%	28.04%	27.52%	28.32%
U2	23.68%	24.73%	23.65%	23.76%	23.22%
U3	22.37%	23.81%	23.39%	23.03%	22.66%
U4	20.27%	21.55%	21.33%	20.86%	20.19%
U5 – Highest Income	18.80%	19.88%	19.23%	18.59%	18.48%
Linear trend across U1–U5	*	*	*	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Figure 3.71: Lorenz Curve for Children with a Mother with a Mood and/or Anxiety Disorder in Rural Areas, 2000/01–2001/02
Adjusted by age & sex for children 0–19 years

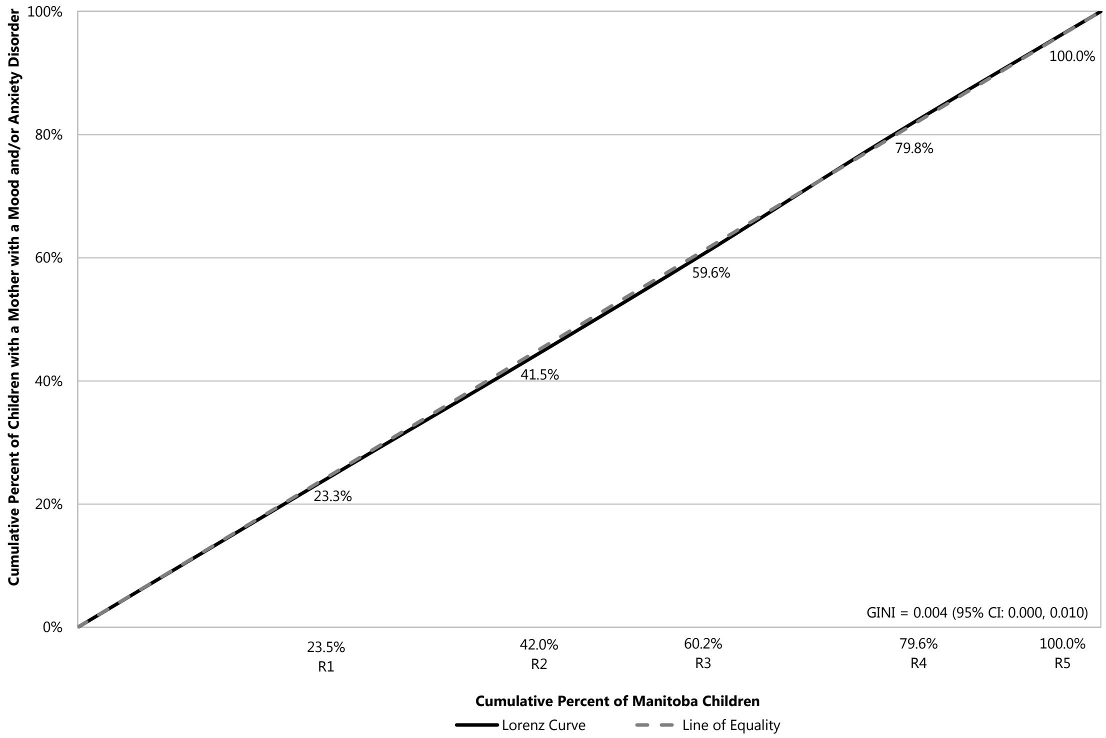


Figure 3.72: Lorenz Curve for Children with a Mother with a Mood and/or Anxiety Disorder in Rural Areas, 2008/09–2009/10
Adjusted by age & sex for children 0–19 years

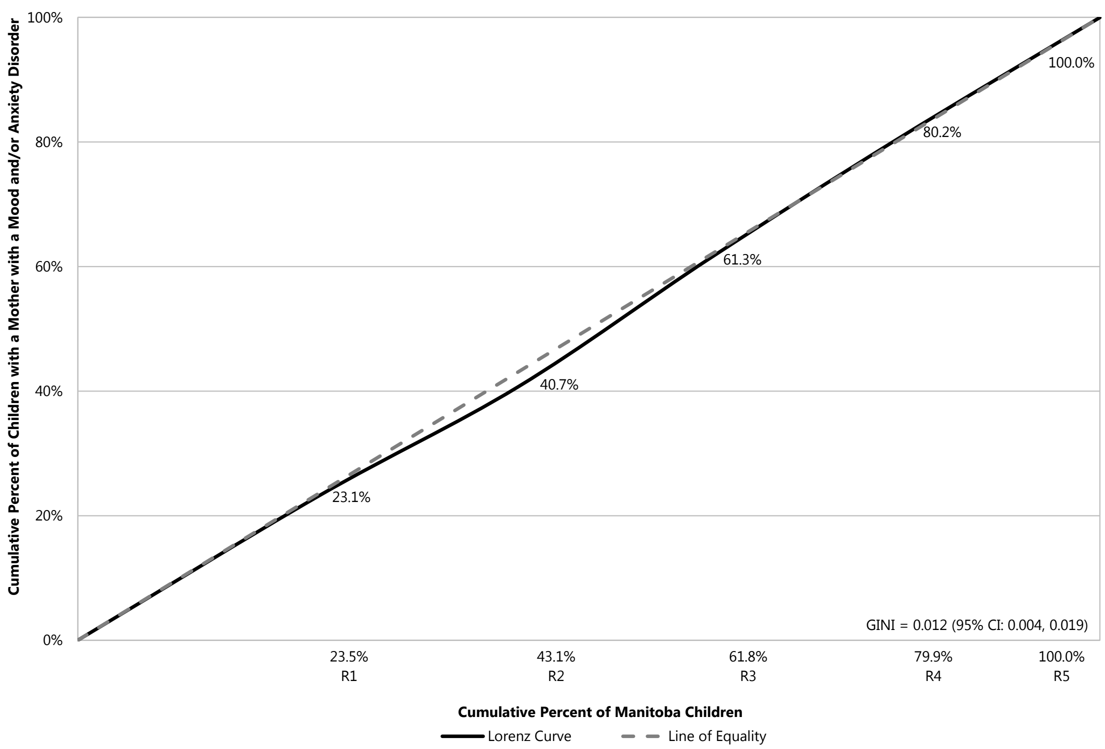


Figure 3.73: Lorenz Curve for Children with a Mother with a Mood and/or Anxiety Disorder in Urban Areas, 2000/01–2001/02
Adjusted by age & sex for children 0–19 years

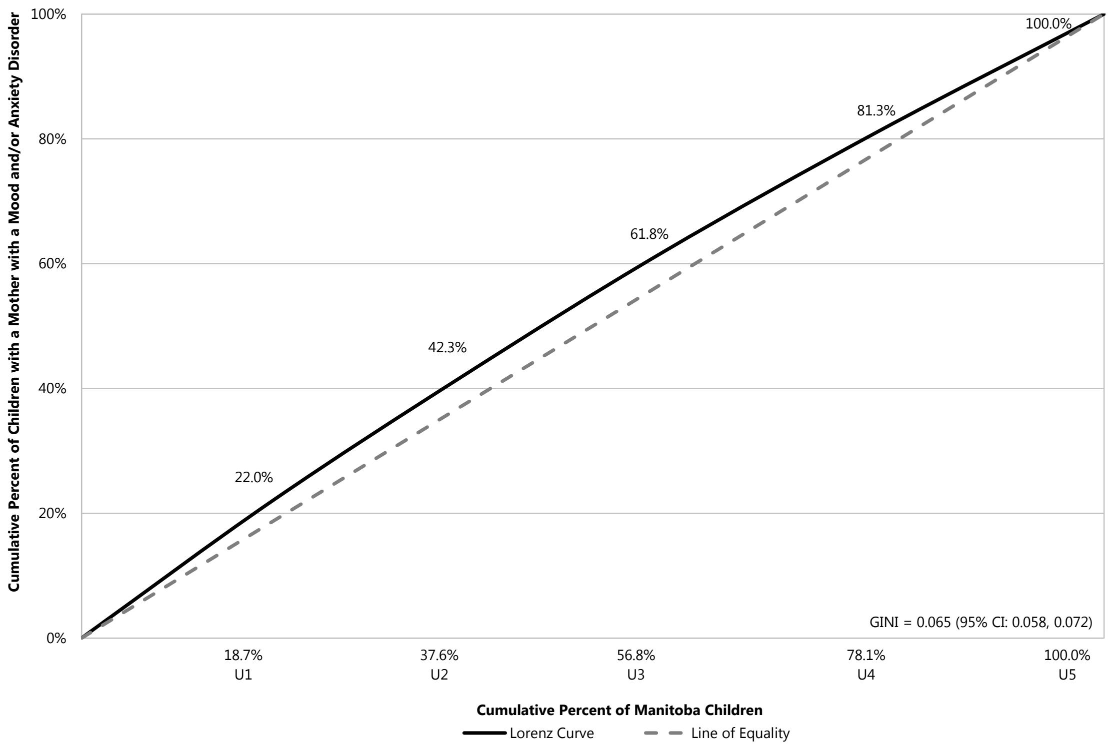
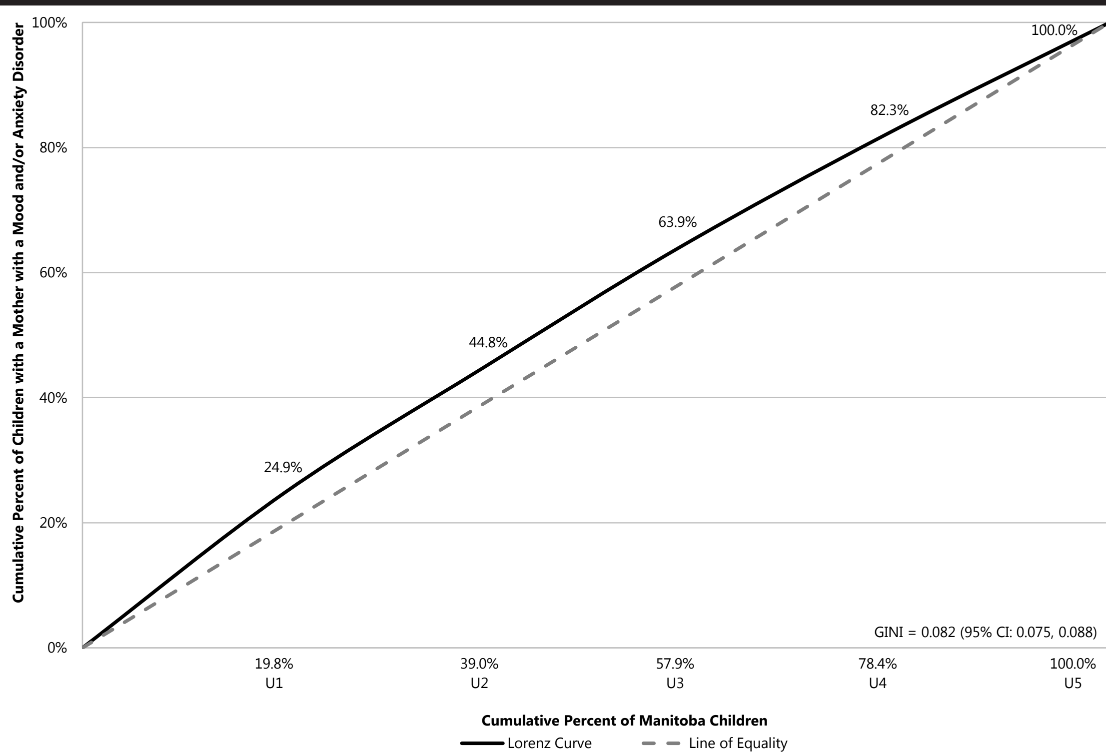


Figure 3.74: Lorenz Curve for Children with a Mother with a Mood and/or Anxiety Disorder in Urban Areas, 2008/09–2009/10
Adjusted by age & sex for children 0–19 years



Updated August 1, 2013

What do these results mean?

Fully one in five Manitoba children has a mother who experienced a mood or anxiety disorder over a two–year period. It is difficult to compare this finding to other jurisdictions; most studies focus on specific conditions or time periods, such as depression during the prenatal or early postnatal period, with rates varying considerably across studies and type of data collection (Bennett, Einarson, Taddio, Koren, & Einarson, 2004). Although many of the studies on maternal mental health focus on women with infants and young children, we found little difference across age groups of children in the percent living with a mother with a mood or anxiety disorder. Mental health strategies should be sure to include not only new mothers and mothers of young children, but mothers of school–aged children and teenagers. There was little inequity in percent of children living with a mother with mood or anxiety disorders in rural areas; however there was a moderate degree of inequity in urban areas; and this inequity increased over time, which suggests some targeting of mental health strategies to mothers in lower income areas may be warranted. It should be kept in mind that this indicator measures treatment for mood and anxiety disorders, not necessarily underlying prevalence in the population: those who do not seek treatment, receive a diagnosis, or are prescribed medications for these disorders would not be captured in this report.

Child Mood and/or Anxiety Disorders

Mood and anxiety disorders represent a broad spectrum of conditions that range from poor adjustment reactions and anxiety state to anxiety disorders, phobic disorders, obsessive–compulsive disorders, depressive disorders, affective psychoses, and neurotic depression (Doupe et al., 2008; Martens et al., 2004; Martens et al., 2010b). For more information on mood and anxiety disorders and how these are captured in administrative data, please see the preceding section on maternal mood and anxiety disorders.

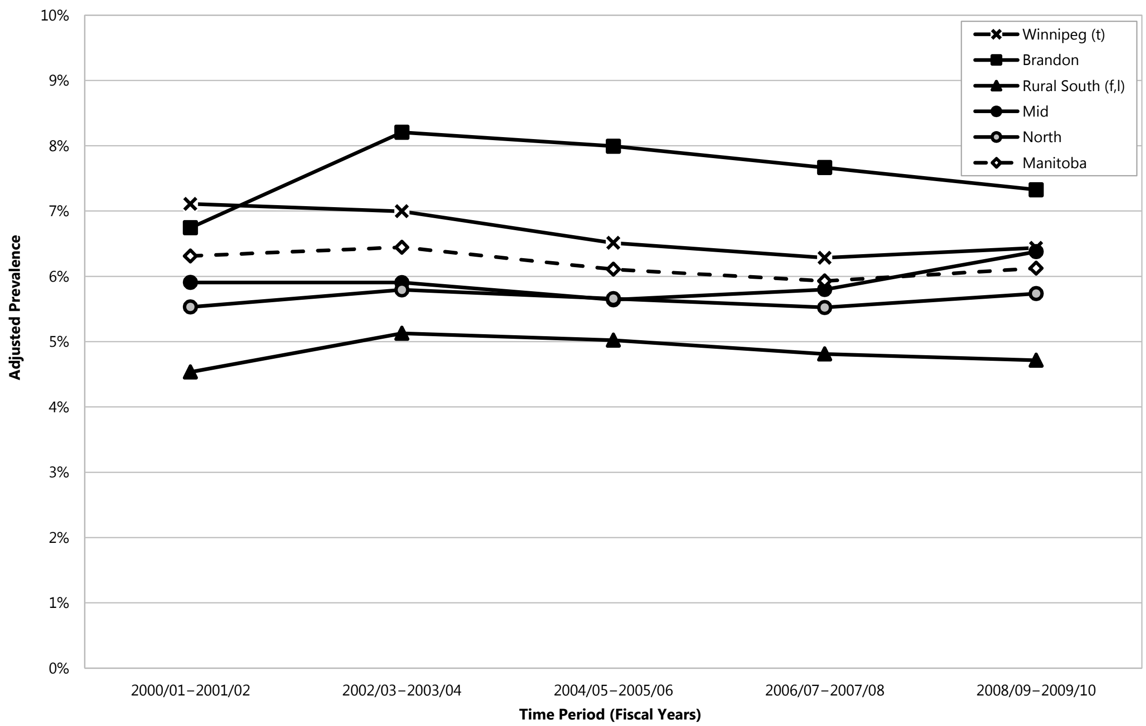
In this study, **child mood and anxiety disorder** prevalence was measured for children aged 13 to 19 years old between 2000/01 and 2009/10. The definition of mood and anxiety disorders has not been validated in children younger than 10 years of age (Martens et al., 2004). The diagnosis of depression and anxiety disorders in young children is not a well-established practice due to a history of developmental theories about cognitive and emotional immaturity (Digdon & Gotlib, 1985), lack of a clear self–concept (Cowan, 1978; Harter, 1986), or asymptomatic expression of depression in children (Lesse, 1983). Currently, there are no studies of sufficient sample size to establish the developmental expression of depression in children younger than 6 years of age on a population level (Luby et al., 2003). The episode length of clinical depression in preschool children has also not been established. Epidemiological research has established that 15–25% of children visiting a family physician have psychosocial problems and less than 7% might be diagnosed by the physician (Wildman, Kinsman, Logue, Dickey, & Smucker, 1997).

Updated August 1, 2013

Regional Trends Over Time

Figure 3.75 shows the prevalence of mood and anxiety disorders for children 13 to 19 years of age for aggregate regions of Manitoba for five 2–year time periods: 2000/01–2001/02 through 2008/09–2009/10. The provincial prevalence of mood and anxiety disorders was 6.3% in the first time period and 6.1% in the last time period, a change that was not statistically significant. Prevalence of mood and anxiety disorders was significantly higher than the Manitoba average in Brandon in the three middle periods (2002/03–2003/04, 2004/05–2005/06, and 2006/07–2007/08), but not during the first and last time period. The prevalence was lower than the provincial average in both the first and last time period in South Rural, at 4.5% in the first time period and 4.7% in the last time period. The prevalence in Winnipeg changed significantly over the study period, decreasing from 7.1% in the first time period to 6.4% in the final time period.

Figure 3.75: Prevalence of Child Mood and/or Anxiety Disorders by Aggregate Region, 2000/01–2001/02 to 2008/09–2009/10
Age– & sex–adjusted prevalence for children 13–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Trends by Socioeconomic Status

Figure 3.76 shows mood and anxiety disorder prevalence for 13– to 19–year–olds by rural income quintiles for 2000/01–2001/02 through 2008/09–2009/10. There was a significant SES gradient in the first time period, but not in any of the remaining four time periods. In the first time period, prevalence of mood and anxiety disorders increased as income quintiles increased. For example, in time 1, the prevalence of mood and anxiety disorders was 4.8% in R1 and 5.7% in R5. Only in R1 was there a significant change in mood and anxiety prevalence over time, increasing from 4.8% to 6.1%.

Figure 3.77 shows mood and anxiety prevalence for 13– to 19–year–olds by urban income quintiles. In all but the first time period the SES gradient was significant, with higher prevalence of mood and anxiety disorders associated with lower income quintiles. For example, in the last time period, the prevalence of mood and anxiety disorders was 7.8% in U1 compared to 5.8% in U5. U3, U4, and U5 showed significant changes in prevalence over time, with all decreasing between the first and last time periods (7.4% to 6.5% for U3, 6.8% to 6.0% for U4, and 6.6% to 5.8% for U5).

Changes in Inequity Over Time

Figures 3.78 and 3.79 measure inequity in mood and anxiety disorder prevalence in the first and last time periods for rural areas. In the first time period, there were fewer teens diagnosed with mood and anxiety disorders in R1 than would be expected given the population; 19.8% of the teens diagnosed were found in the 21.3% of the population in R1. The Gini coefficient was 0.029, indicating a low degree of disparity across rural income quintiles. In time 5, some disparity is also evident; however, it is in the opposite direction as the first time period. More teens in R1 are diagnosed with mood and anxiety disorders than expected given the population; 24.8% of the teens with these disorders were found in the 22.3% of the teen population in R1. The Gini coefficient was 0.022, also indicating low disparity. There was no significant change in the Gini coefficient over the study period in the rural areas, indicating no change in disparity over time.

Figures 3.80 and 3.81 show that there are inequities in mood and anxiety disorder prevalence in both time periods for urban areas. In time 1, 17.1% of teens with mood and anxiety disorders were found in the 16.3% of the teen population in the lowest income quintile group, with a Gini coefficient of 0.023, indicating a low degree of disparity. In time 5, 20.9% of the teens with mood and anxiety disorders were found in the 17.4% of the population in the lowest income quintile group, with a Gini coefficient of 0.055, indicating a low degree of disparity. There was a significant increase in the Gini coefficient over time in urban areas, indicating a significant increase in inequity. A comparison of the Gini coefficients in the last time period indicated that the inequity in urban areas was greater than in rural income areas.

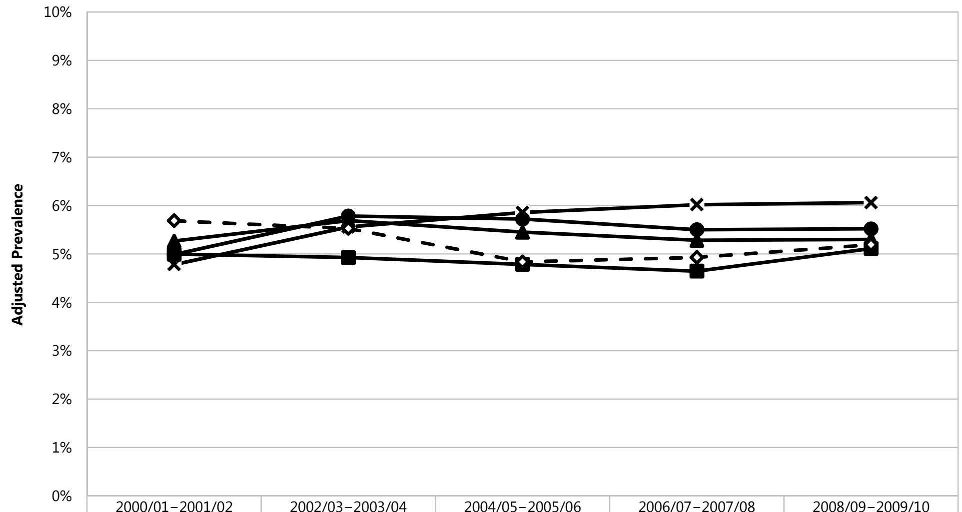
What do these results mean?

Statistics Canada publishes yearly prevalence of mood disorders for 12– to 19–year–olds; in years where data are not too unreliable to publish, Manitoba's prevalence is similar to the national prevalence. The Canadian prevalence in 2010 was 3.0%, considerably lower than the prevalence reported in this report, however, anxiety disorders are not included in the Statistics Canada estimates (Statistics Canada, 2012c). In a separate study, using a variety of sources, Waddell et al. (2005) estimated that 6.4% of Canadian children 5 to 17 years of age were affected by any anxiety disorder and 3.5% of Canadian children 5 to 17 years of age were affected by any depressive disorder. We found that the prevalence for mood and anxiety disorders for Manitoba teens was just over 6% across the study period. There was little evidence of inequity in rural areas; inequity was more evident in urban areas, and increased over time, but was still in the "low" range. It should be kept in mind that this indicator measures treatment for mood and anxiety disorders, not necessarily underlying prevalence in the population: teens who do not present to practitioners for treatment, who do not receive a diagnosis, or are not prescribed medications for these disorders would not be captured in this report.

Updated August 1, 2013

Figure 3.76: Prevalence of Child Mood and/or Anxiety Disorders by Rural Income Quintile, 2000/01–2001/02 to 2008/09–2009/10

Age– & sex–adjusted prevalence for children 13–19 years



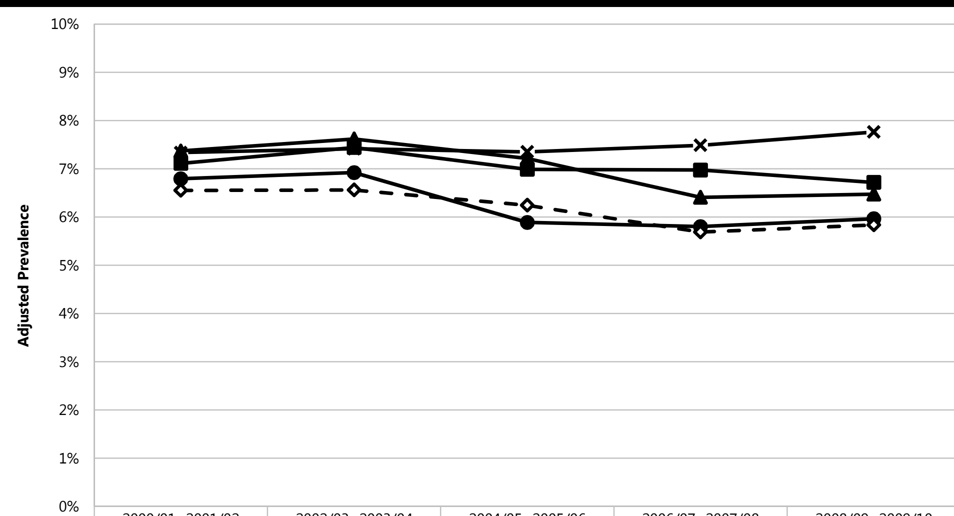
	2000/01–2001/02	2002/03–2003/04	2004/05–2005/06	2006/07–2007/08	2008/09–2009/10
Income Unknown	16.70%	15.45%	14.17%	14.34%	13.96%
R1 – Lowest Income (t)	4.78%	5.56%	5.86%	6.02%	6.06%
R2	4.99%	4.92%	4.78%	4.64%	5.11%
R3	5.26%	5.69%	5.45%	5.28%	5.30%
R4	4.98%	5.78%	5.72%	5.50%	5.52%
R5 – Highest Income	5.68%	5.53%	4.83%	4.93%	5.19%
Linear trend across R1–R5	*				

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 3.77: Prevalence of Child Mood and/or Anxiety Disorders by Urban Income Quintile, 2000/01–2001/02 to 2008/09–2009/10

Age– & sex–adjusted prevalence for children 13–19 years



	2000/01–2001/02	2002/03–2003/04	2004/05–2005/06	2006/07–2007/08	2008/09–2009/10
Income Unknown	16.70%	15.45%	14.17%	14.34%	13.96%
U1 – Lowest Income	7.34%	7.41%	7.35%	7.48%	7.76%
U2	7.11%	7.44%	6.99%	6.97%	6.72%
U3 (t)	7.37%	7.62%	7.21%	6.41%	6.47%
U4 (t)	6.79%	6.92%	5.89%	5.80%	5.96%
U5 – Highest Income (t)	6.55%	6.56%	6.24%	5.69%	5.84%
Linear trend across U1–U5		*	*	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Updated August 1, 2013

Figure 3.78: Lorenz Curve for Child Mood and/or Anxiety Disorders in Rural Areas, 2000/01–2001/02
Adjusted by age & sex for children 13–19 years

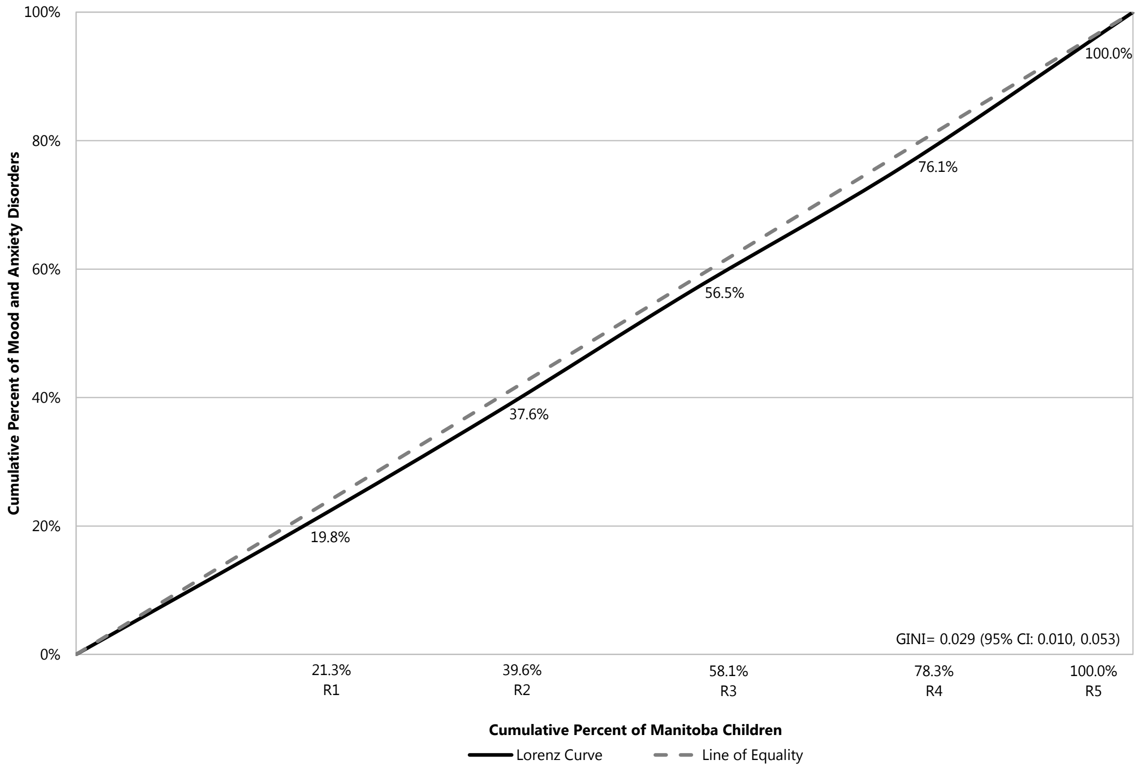
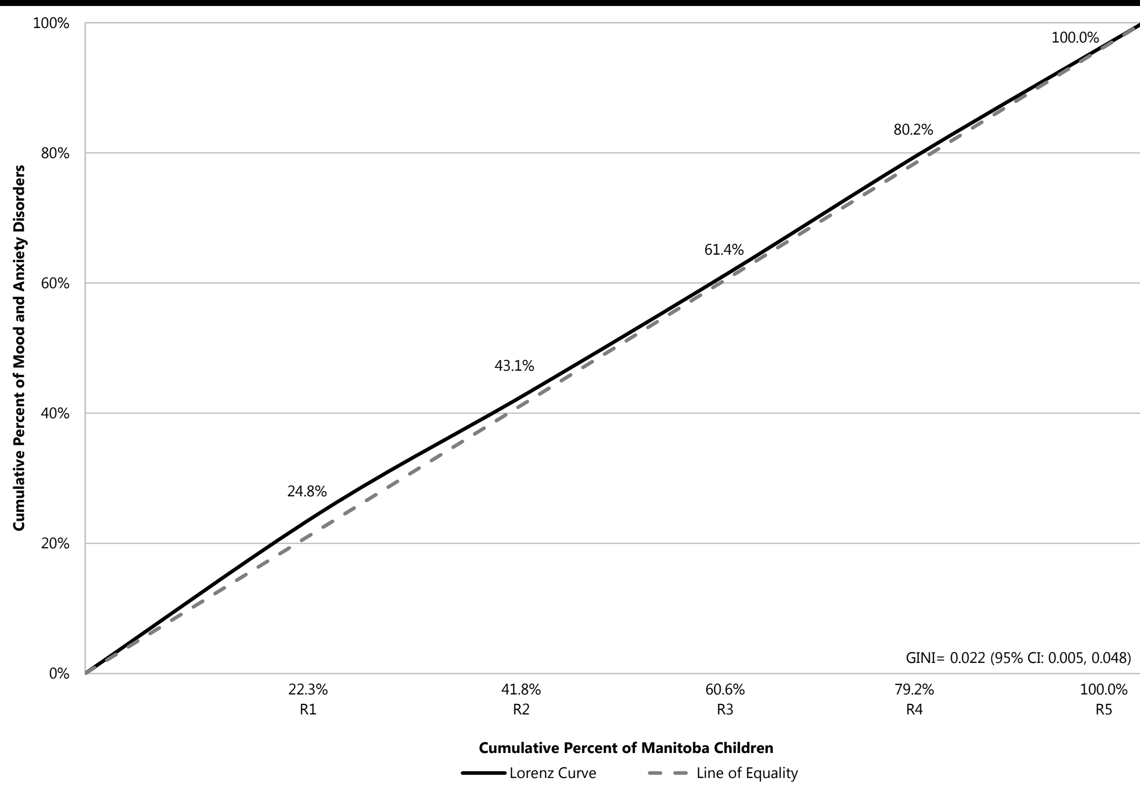


Figure 3.79: Lorenz Curve for Child Mood and/or Anxiety Disorders in Rural Areas, 2008/09–2009/10
Adjusted by age & sex for children 13–19 years



Updated August 1, 2013

Figure 3.80: Lorenz Curve for Child Mood and/or Anxiety Disorders in Urban Areas, 2000/01–2001/02
Adjusted by age & sex for children 13–19 years

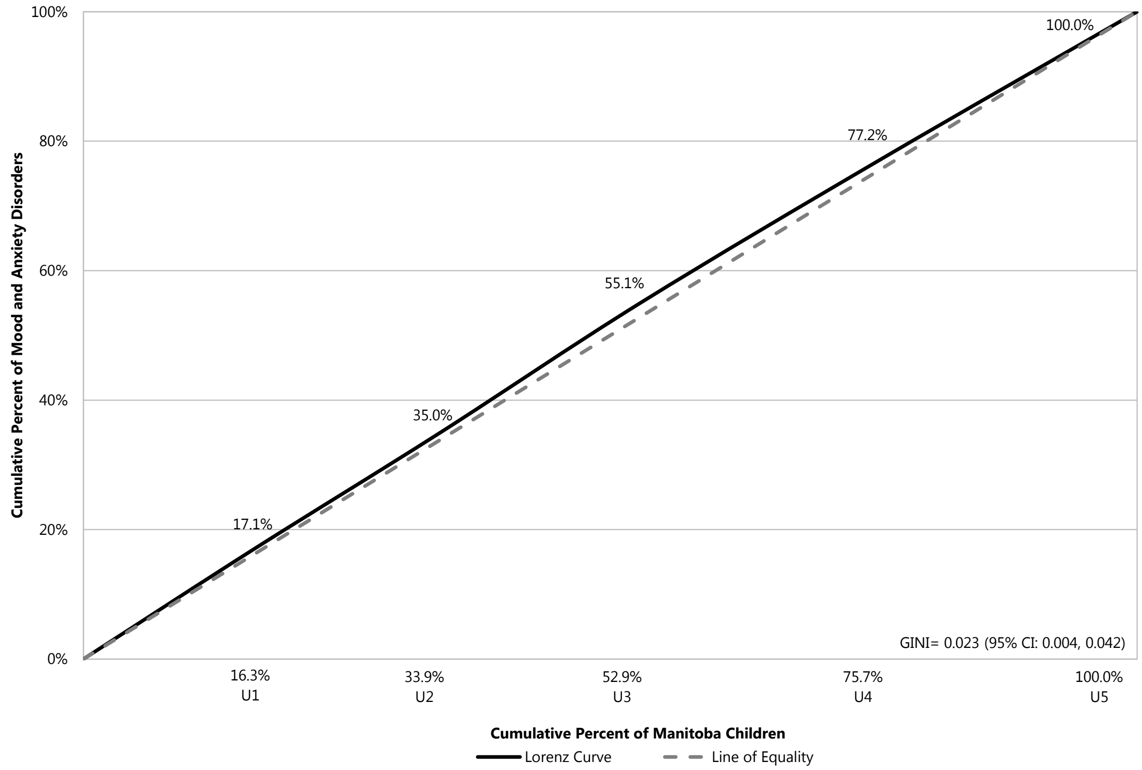
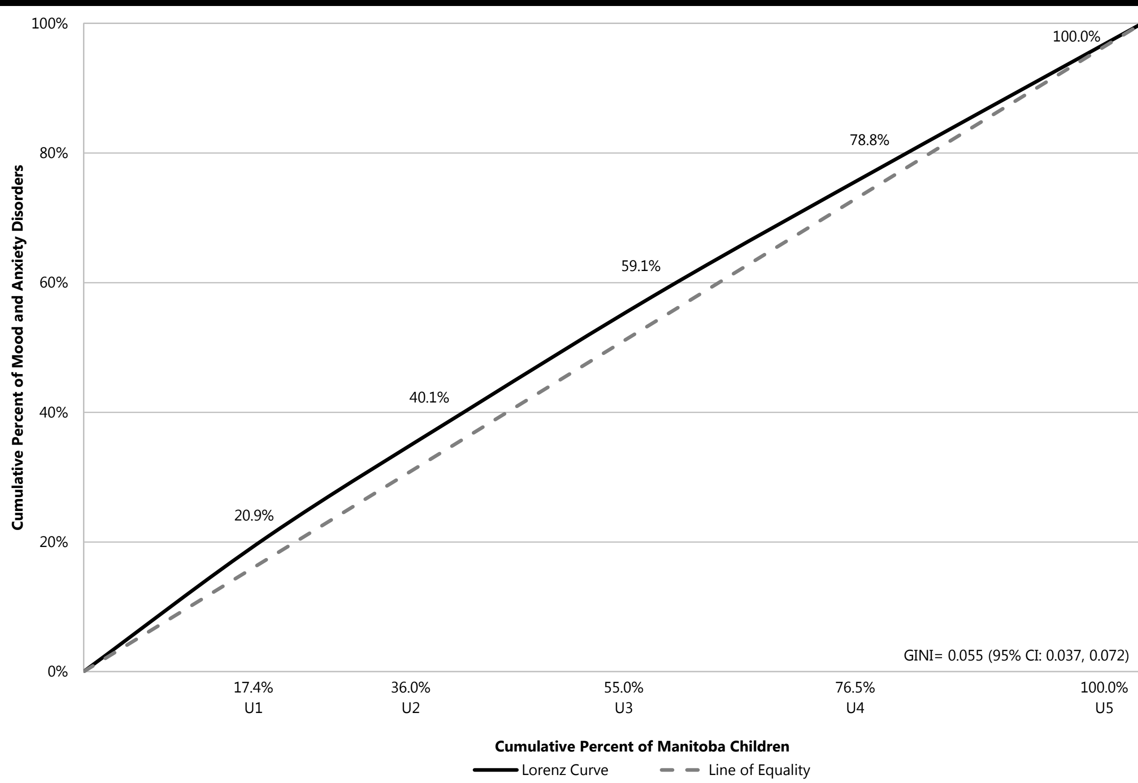


Figure 3.81: Lorenz Curve for Child Mood and/or Anxiety Disorders in Urban Areas, 2008/09–2009/10
Adjusted by age & sex for children 13–19 years



Attention–Deficit Hyperactivity Disorder (ADHD)

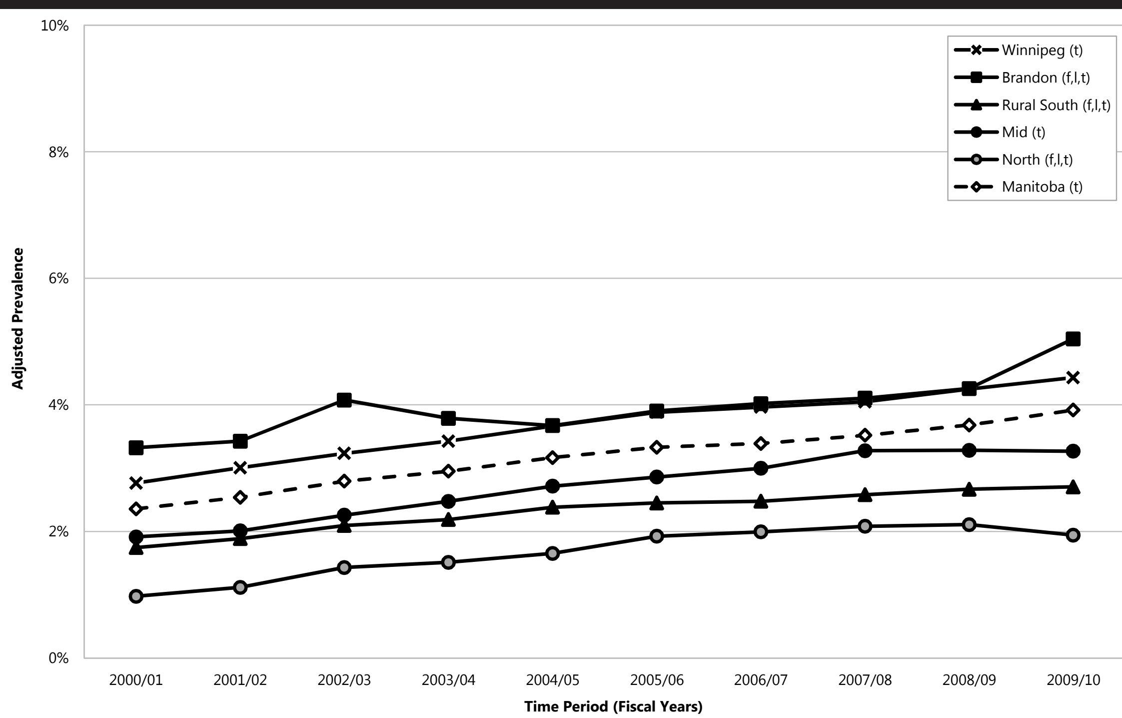
Attention–deficit hyperactivity disorder (ADHD) is considered the most common neurobehavioural developmental disorder in school–aged children (Richters et al., 1995; Wolraich et al., 1990). ADHD is characterized by a persistent pattern of impulsiveness, hyperactivity, and absence of attention (American Psychiatric, 2000). These symptoms often lead to learning difficulties, school failure, poor peer relationships, and family conflict (Barkley, DuPaul, & McMurray, 1990; Biederman et al., 1996; Klassen, Miller, & Fine, 2004; Lahey et al., 1998; National Institute of Mental Health, 2008)—complications that may continue into adulthood. Previous studies suggest that boys are affected by ADHD more often than girls (American Psychiatric, 2000).

In this study, ADHD prevalence was calculated for children 6–19 years old who were diagnosed with ADHD or who received prescriptions for psychostimulants medications.

Regional Trends Over Time

Figure 3.82 shows ADHD prevalence over time for the 10–year time period by aggregate regions of Manitoba. The provincial prevalence of ADHD went from 2.4% in 2000/01 to 3.9% in 2009/10, an increase that was statistically significant. All aggregate regions demonstrated statistically significant increases in ADHD prevalence over the study period. Brandon had the highest prevalence overall, going from 3.3% in 2000/01 to 5.0% in 2009/10. The lowest ADHD prevalence was found in the North (1.0% to 1.9% over the study period); Rural South also had significantly lower rates than the Manitoba average (1.7% to 2.7%).

Figure 3.82: Attention–Deficit Hyperactivity Disorder (ADHD) Prevalence by Aggregate Region, 2000/01–2009/10
Age– & sex–adjusted prevalence for children 6–19 years



f indicates region's prevalence was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's prevalence was statistically different from Manitoba average in the last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

Trends by Age Group

Figures 3.83 and 3.84 show ADHD prevalence for two age categories over the time period. The prevalence of ADHD for all Manitoba 6– to 12–year–olds was 3.2% in 2000/01 and 4.5% in 2009/10, a statistically significant increase. As was the case with both age groups combined, the pattern across regions for the 6 to 12 age group was for increasing prevalence over time. Again, Brandon had the highest prevalence, increasing from 4.1% in the first time period to 5.9% in the last time period. The North had the lowest prevalence, increasing from 1.5% in time 2000/01 to 2.5% in 2009/10.

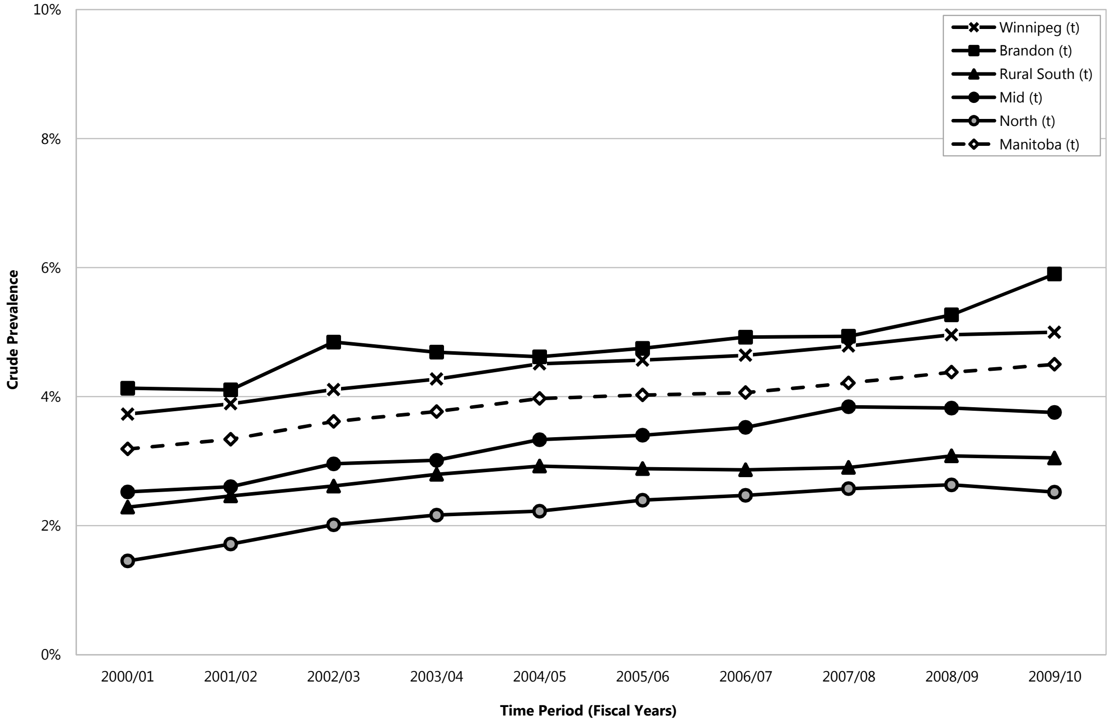
For the 13 to 19 age group, the Manitoba prevalence was 1.5% in the first time period and 2.7% in the last time period, a statistically significant increase. All aggregate regions showed statistically significant increases in ADHD prevalence over the study period. Again, the lowest prevalence was found in the North, which increased from 0.4% in 2000/01 to 1.2% in 2009/10.

Trends by Socioeconomic Status

Figure 3.85 shows ADHD prevalence by rural income quintiles over the study period. There was a significant SES gradient for ADHD for most years, with the lower income areas having lower prevalence compared to the higher income areas. All rural income quintiles showed increasing ADHD prevalence over time, and this was statistically significant for all.

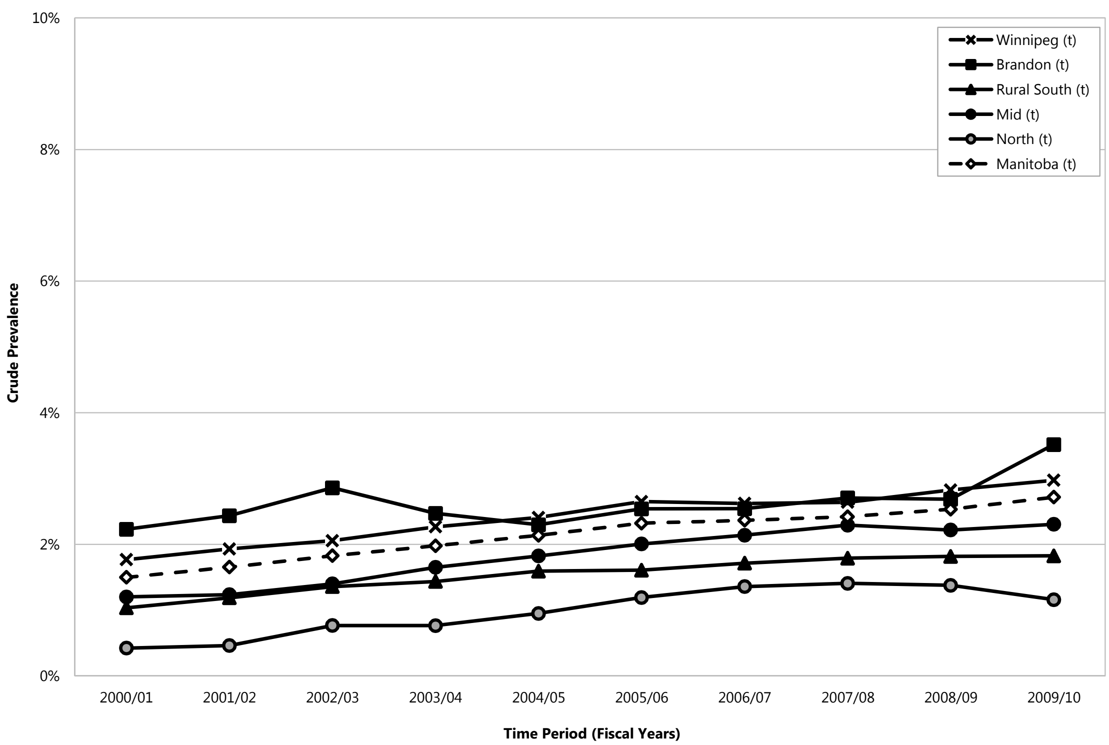
Figure 3.86 shows ADHD prevalence by urban income quintiles. It is evident that there is little disparity across income quintiles in urban areas; there was no significant SES gradient in any of the study years. Each of the urban income quintiles showed a statistically significant increase in ADHD prevalence over time.

Figure 3.83: Attention–Deficit Hyperactivity Disorder (ADHD) Prevalence by Aggregate Region and 6 to 12 Age Group, 2000/01–2009/10
Crude prevalence for children



t indicates change over time was statistically significant for that region at p<0.05

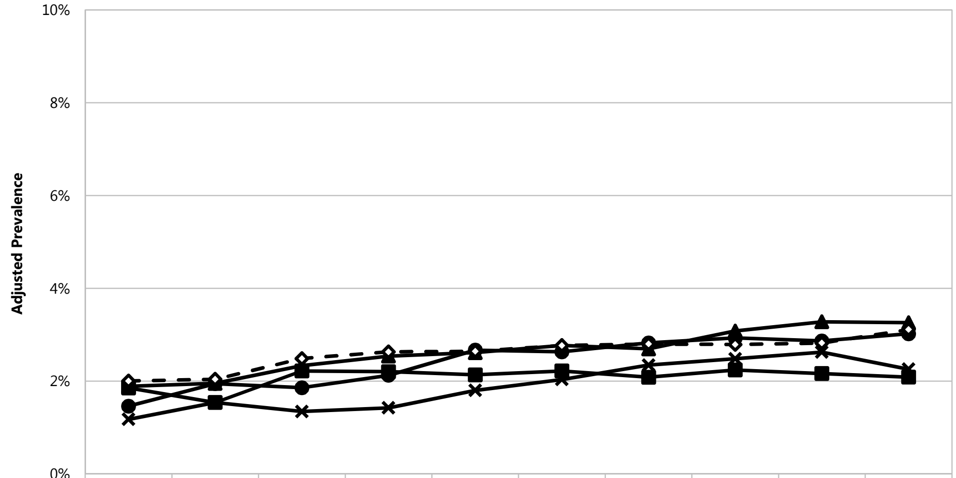
Figure 3.84: Attention–Deficit Hyperactivity Disorder (ADHD) Prevalence by Aggregate Region and 13 to 19 Age Group, 2000/01–2009/10
Crude prevalence for children



t indicates change over time was statistically significant for that region at p<0.05

Figure 3.85: Attention–Deficit Hyperactivity Disorder (ADHD) Prevalence by Rural Income Quintile, 2000/01–2009/10

Age– & sex–adjusted prevalence for children 6–19 years



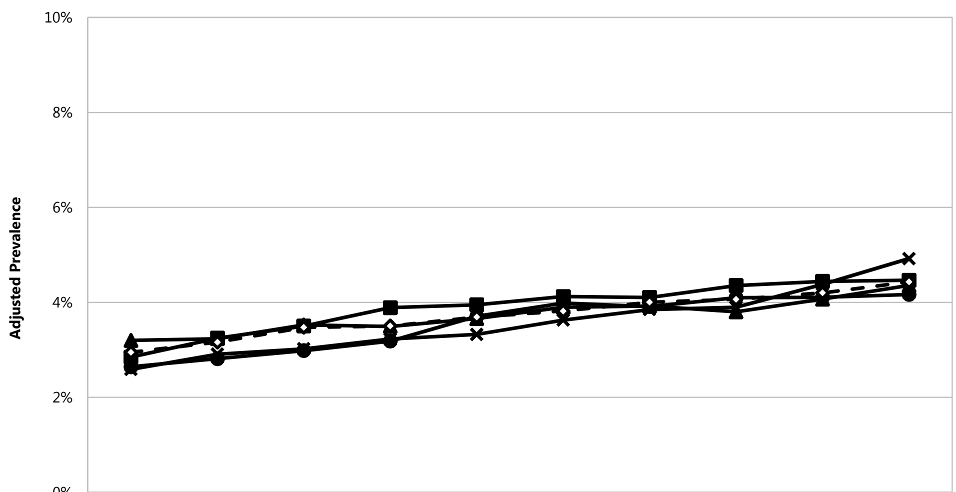
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	15.84%	12.53%	18.42%	19.49%	18.70%	21.92%	21.42%	22.32%	18.49%	20.73%
R1 – Lowest Income (t)	1.17%	1.54%	1.34%	1.42%	1.80%	2.03%	2.34%	2.48%	2.62%	2.26%
R2 (t)	1.85%	1.54%	2.22%	2.20%	2.13%	2.22%	2.08%	2.24%	2.16%	2.08%
R3 (t)	1.89%	1.95%	2.33%	2.54%	2.61%	2.77%	2.69%	3.08%	3.28%	3.26%
R4 (t)	1.46%	1.94%	1.86%	2.12%	2.67%	2.63%	2.82%	2.93%	2.86%	3.02%
R5 – Highest Income (t)	2.00%	2.04%	2.48%	2.63%	2.64%	2.77%	2.80%	2.79%	2.82%	3.11%
Linear trend across R1–R5	*	*	*	*	*	*	*			*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 3.86: Attention–Deficit Hyperactivity Disorder (ADHD) Prevalence by Urban Income Quintile, 2000/01–2009/10

Age– & sex–adjusted prevalence for children 6–19 years



	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	15.84%	12.53%	18.42%	19.49%	18.70%	21.92%	21.42%	22.32%	18.49%	20.73%
U1 – Lowest Income (t)	2.59%	2.91%	3.02%	3.23%	3.33%	3.63%	3.85%	3.90%	4.38%	4.92%
U2 (t)	2.85%	3.25%	3.50%	3.89%	3.95%	4.12%	4.10%	4.36%	4.44%	4.47%
U3 (t)	3.20%	3.24%	3.53%	3.49%	3.66%	3.90%	3.92%	3.80%	4.07%	4.36%
U4 (t)	2.65%	2.81%	2.98%	3.19%	3.71%	3.99%	3.91%	4.10%	4.11%	4.17%
U5 – Highest Income (t)	2.95%	3.16%	3.47%	3.50%	3.69%	3.82%	4.00%	4.07%	4.20%	4.43%
Linear trend across U1–U5										

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 3.87 and 3.88 show the inequities in ADHD prevalence in 2000/01 and 2009/10, respectively, for rural areas. In both time periods, the lowest income quintile (R1) had lower ADHD prevalence than expected given the proportion of the population. In the first time period, 16.1% of the ADHD prevalence was found in the 22.7% of the population in R1. The Gini coefficient was 0.069, indicating a moderate degree of disparity across rural income quintiles, with lower prevalence in lower income areas. In the last time period, 18.9% of the ADHD prevalence was found in the 22.9% of the child population in R1. The Gini coefficient 0.079, also indicating moderate disparity. The change in the Gini coefficient over the study period in the rural areas was not statistically significant, indicating no change in disparity over time.

Figures 3.89 and 3.90 show that in urban areas there was almost no inequity in ADHD prevalence in the first time period and slightly more disparity in the last time period, but in a different direction. In 2000/01, the prevalence in U1 was slightly lower than expected, with 15.8% of ADHD prevalence found in the 17.3% of the population in this lowest income quintile group. The Gini coefficient of 0.012 indicated very little disparity. In 2009/10, there was slightly higher ADHD prevalence than expected in U1, with 20.5% of the ADHD prevalence occurring in the 18.6% of the population in the lowest income quintile group. The Gini coefficient was 0.021, indicating little disparity. The change in the Gini Coefficient was not statistically significant in urban areas. A comparison of the Gini coefficients in the last time period indicated that inequity in rural areas was significantly greater than in urban areas.

What do these results mean?

Waddell et al., (2005) estimated that 4.8% of Canadian children aged 4 to 17 years had ADHD which is somewhat higher than the Manitoba average in 2009/10 of 3.9% for 6– to 19–year–olds found in this report. In another study using the National Longitudinal Survey of Children and Youth to determine the prevalence of ADHD diagnoses, Brault and Lacourse (2012) found an increase from 2.2% in 2000–2001 to 4.1% in 2006–2007 for 6– to 9–year–old children. In our report, for the 6 to 12 year group, we found ADHD prevalence at 3.2% in 2000/01 (higher than Brault and Lacourse's starting prevalence) and at 4.1% in 2006/07 (the same as their prevalence for 2006–2007). It is not possible from our report to determine whether ADHD prevalence is actually increasing in the child population in Manitoba, or whether the substantial increase in prevalence observed here is due to other factors, such as improved access to treatment, greater awareness and recognition of ADHD symptoms by physicians, or some other factors. Inequity in rural areas was moderate, but in an unexpected direction, with children from lower income areas have lower prevalence than children from higher income areas. Whether this gradient reflects true differences in prevalence, differences in access to treatment, or missing data for children in rural areas treated by salaried physicians is unknown.

Figure 3.87: Lorenz Curve for Attention–Deficit Hyperactivity Disorder (ADHD) in Rural Areas, 2000/01

Adjusted by age & sex for children 6–19 years

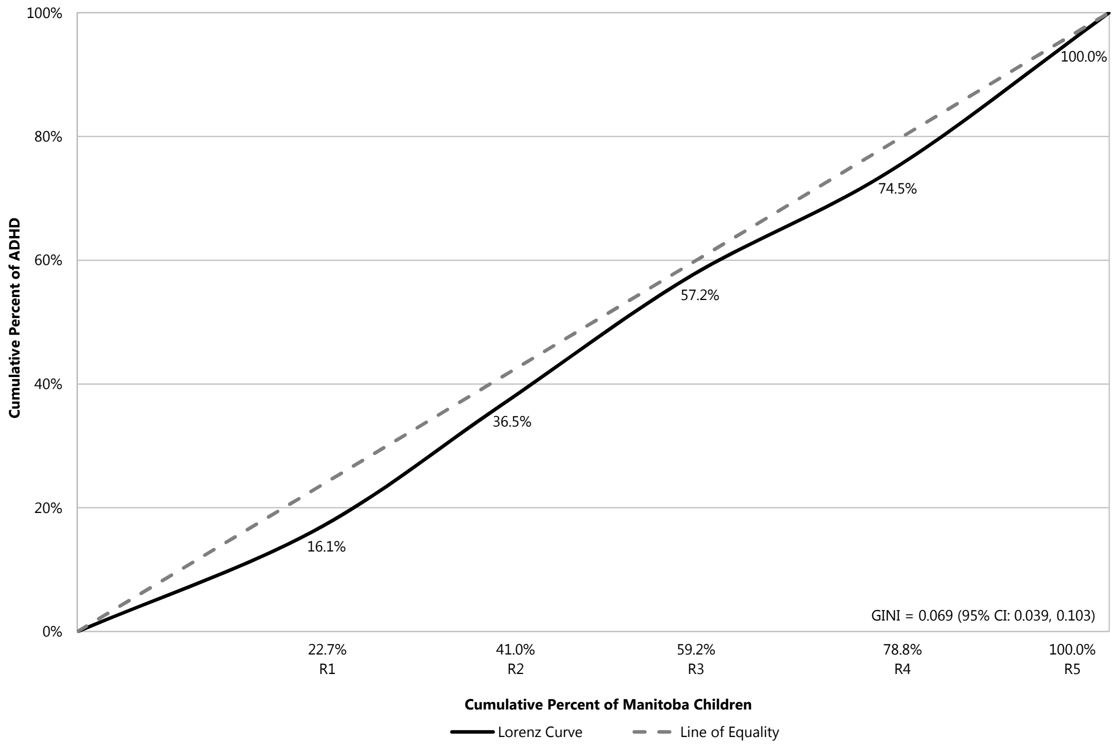


Figure 3.88: Lorenz Curve for Attention–Deficit Hyperactivity Disorder (ADHD) in Rural Areas, 2009/10

Adjusted by age & sex for children 6–19 years

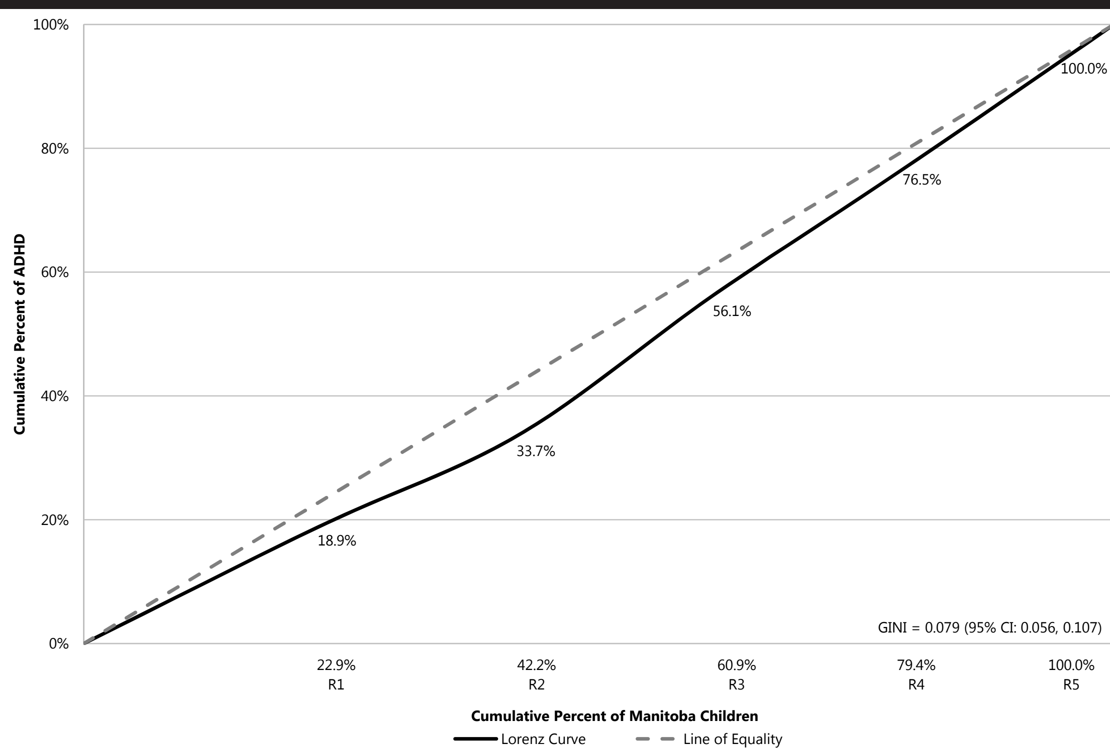


Figure 3.89: Lorenz Curve for Attention–Deficit Hyperactivity Disorder (ADHD) in Urban Areas, 2000/01

Adjusted by age & sex for children 6–19 years

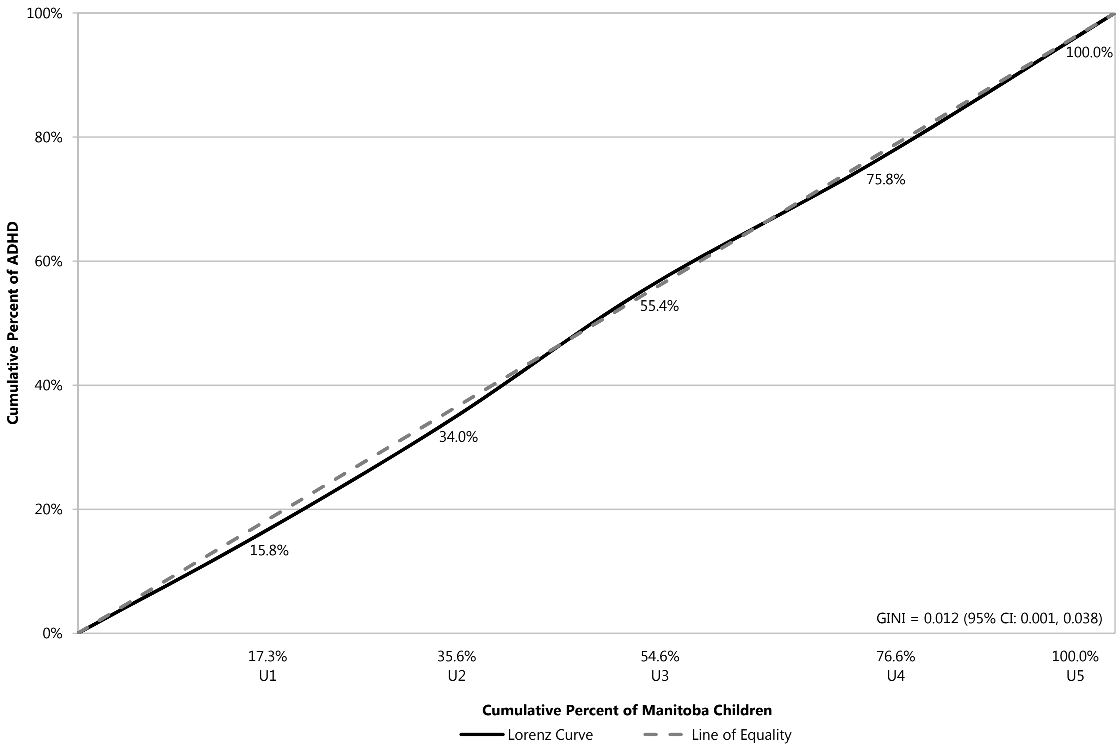
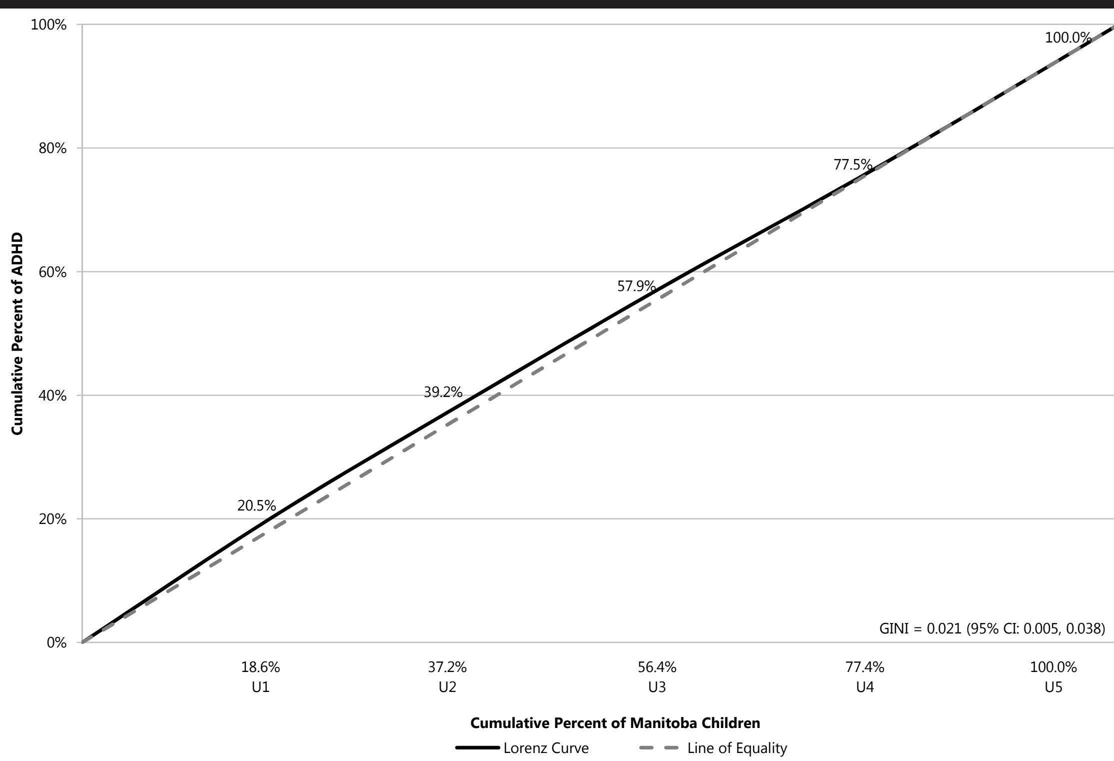


Figure 3.90: Lorenz Curve for Attention–Deficit Hyperactivity Disorder (ADHD) in Urban Areas, 2009/10

Adjusted by age & sex for children 6–19 years



Fetal Alcohol Spectrum Disorder

Fetal Alcohol Spectrum Disorder (FASD) is an umbrella term comprising the range of effects associated with all levels of prenatal exposure to alcohol (Sokol, Delaney-Black, & Nordstrom, 2003). Prenatal alcohol exposure has been identified as the leading cause of mental retardation in the western world (Chudley et al., 2005). Children with FASD often develop secondary disabilities, such as depression, anxiety, substance abuse, and premature death, and experience poor social outcomes including judicial system involvement and educational failure (Streissguth et al., 2004; Fast & Conry, 2004).

A conservative estimate of the prevalence of FASD suggests that almost one in every 100 births is affected by this condition (Sampson et al., 1997; May & Gossage, 2001) and estimates from other countries and small populations within Canada suggest much higher rates (May et al., 2009; Stade, Ungar, Stevens, Beyen, & Koren, 2007; Square, 1997; Popova, Stade, Bekmuradov, Lange, & Rehm, 2011). Unfortunately, the current diagnostic capacity of FASD clinics in Canada is lower than the number of referred patients (Chudley et al., 2005). Without population–based data on FASD, we were unable to calculate a prevalence of the disorder in Manitoba. We did run an analysis of the percent of children in Manitoba (and by region and income quintile) who had been assessed and diagnosed at the Manitoba FASD Centre. These analyses can be found in Appendix 5 at the end of this report.

Suicide

Suicide is the act of intentionally killing oneself, characterized by irrational mental states, which are induced by a crisis in mental health (Health Canada, 1994). Suicides not only result in life lost, but also cause distress in family and friends and even in the community (Sànchez, 2001). Suicides are identified from the Vital Statistics mortality data where the cause of death includes poisoning,[19] any self–inflicted injury, or late effects from a self–inflicted injury.

In this report, we look at completed suicide but not at attempted suicide rates. Our preliminary analyses showed that rates of hospitalized suicide attempts had decreased substantially between 2000/01–2004/05 and 2005/06–2009/10; however discussions with specialists in adolescent psychiatry and Emergency Room medicine suggested that this was probably not a real decline in suicide attempts, but a change in the way these are treated, with fewer inpatient admissions for attempted suicide in the second compared to the first time period and more teens treated on an outpatient basis.[20] Because we do not have Emergency Room data for all areas of the province, we could not accurately report on the rate of suicide attempts in Manitoba over the study period. For suicide completions, we focus on our 13– to 19–year–old age group, as suicides are rare in younger children.[21] Even though very few younger children commit suicide, it is worthwhile to note that by the time they reach Grade 5, most children understand what suicide is and a small percent have had suicidal thoughts or minor attempts (Normand & Mishara, 1992). However, such reports were more prevalent among children who were hospitalized for psychiatric disturbances (Marciano & Kazdin, 1994; Milling, Campbell, Laughlin, & Bush, 1994).

19 The inclusion of accidental poisonings may over–estimate the number of suicides.

20 During the period of this report, a service designed to allow for urgent treatment of suicidal youth on an outpatient basis was introduced in Winnipeg. Count data from this service suggests that increases in numbers of patients seen through this service corresponded to decreases in **inpatient hospitalizations** for suicide attempts.

21 Over the 10–year period, there were 13 suicides for children in the 6– to 12–year age group and fewer than six suicides in the 0– to 5–year age group (the actual number is suppressed because it is between one and five).

Regional Trends Over Time

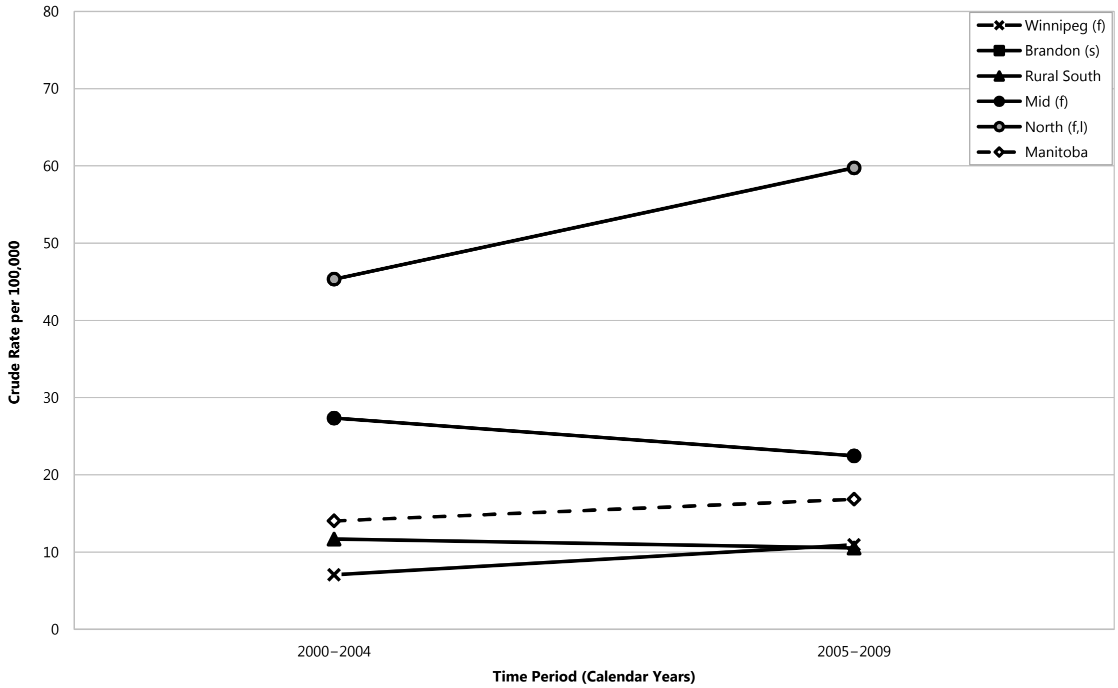
Figure 3.91 shows the suicide rates for children 13 to 19 years of age in two time periods (2000–2004 and 2005–2009) for aggregate regions of Manitoba. The provincial rate of suicide went from 14.0/100,000 in the first time period to 16.8/100,000 in the last time period, a change that was not statistically significant. The North had the highest rates overall, significantly higher than the Manitoba average in both time periods, at 45.3/100,000 in the first time period and 59.7/100,000 in the last time period. This change over time in the North was not statistically significant. The suicide rate in the Mid aggregate region was significantly higher than the provincial average in the first time period (27.4/100,000) but not significantly different from the average in the second time period (22.5/100,000). The rate in Winnipeg was significantly lower than the provincial average in the first (7.1/100,000) but not the second (10.9/100,000) time period. The rate for Brandon is suppressed in both time periods due to small numbers.

Differences by Sex

Suicide rates are generally higher in males compared to females, which could at least partly be due to the lethality of methods used. For example, males are more likely to use firearms or hanging to commit suicide whereas females are more likely to use poisoning (Health Canada, 1994; Martens et al., 2004). Over the 10–year period of this report, we also found a higher rate of suicide in males compared to females, with 60.9% of the suicides being male and 39.1% female. However, Figure 3.92 shows that this ratio has shifted dramatically over the course of the study period, with the values being 72.0% males compared to 28% females for suicide in the first time period; but the difference almost disappears in the second time period, with 52% of the suicides being for males and 48% for females.

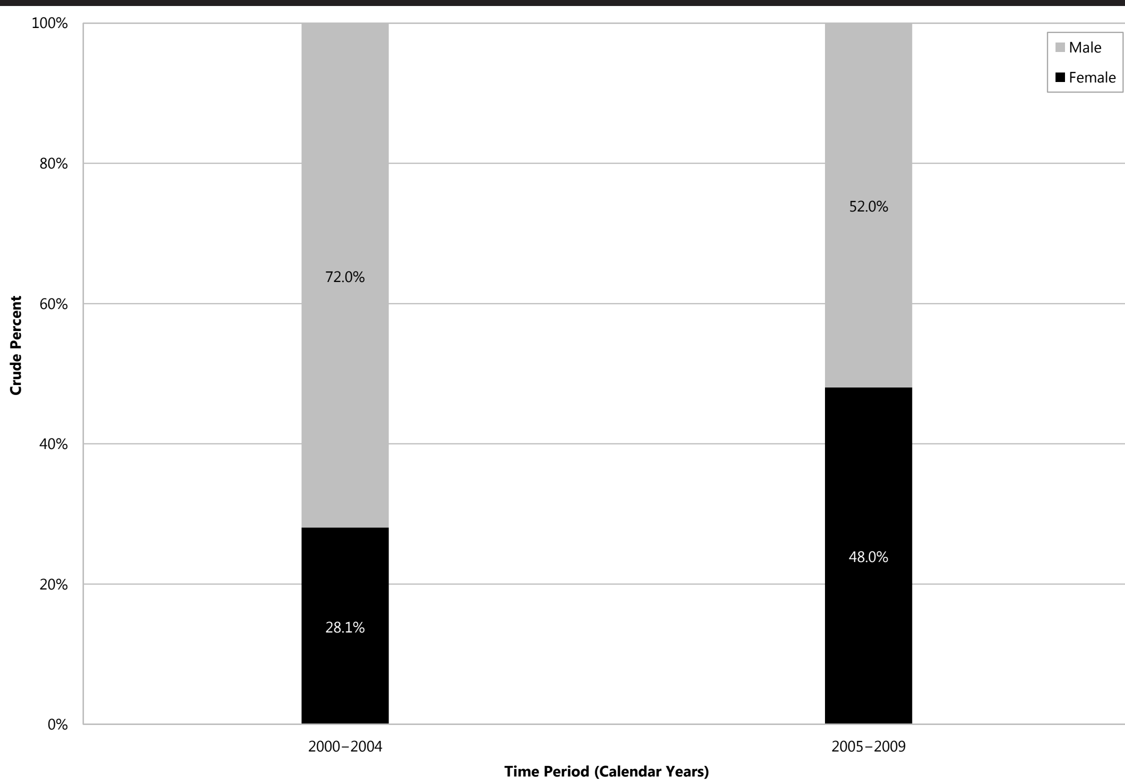
For the majority of suicides for both males and females, the method involved hanging, strangulation, or suffocation; this method accounted for 76% of the suicides in the first time period and 80% in the second time period. It also accounted for over 95% of the female suicides and about 65% of the male suicides in both time periods. The remaining male suicides were fairly equally split among poisoning and firearms.

Figure 3.91: Suicide Rates by Aggregate Region, 2000–2004 to 2005–2009
Crude rates per 100,000 children 13–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates statistically significant difference between the first and last time periods for that region at p<0.05
s indicates data suppressed due to small numbers

Figure 3.92: Percent of Suicides by Sex, 2000–2004 and 2005–2009
Crude percent of children 13–19 years



Trends by Socioeconomic Status

Because of small numbers in some income quintiles, we cannot display the trends over time by income quintile. The numbers in the lowest income quintiles were not too low to display and suggest that there would be an SES gradient with higher rates in lower income areas. For example, the suicide rate in R1 was 62.9/100,000 in the first time period and 69.2/100,000 in the last time period; in both time periods, the numbers were too low in R5 to display the rates. Likewise, in U1, the suicide rate was 18.8/100,000 in time 1 and 38.2/100,000 in time 2; rates in both time periods were suppressed due to small numbers in U5.

Changes in Inequity Over Time

Graphs showing the Lorenz curves could also not be shown due to suppression because of small numbers for some of the income quintiles. We can report on the Gini coefficients and the results for the lowest income quintiles, which provides a sense of the disparity in suicide rates across income quintiles. For the rural areas, in the first time period, 59.6% of the suicides occurred in the 21.8% of the population in R1, with a Gini of 0.465, indicating substantial disparity. In the second time period, 67.4% of the suicides occurred in the 22.4% of the population in R1, with a Gini of 0.552, also indicating substantial disparity. In urban areas, 45.5% of the suicides occurred in the 16.6% of the population in U1. The Gini coefficient was 0.324, indicating a high degree of disparity. In the second time period, 63.0% of the suicides occurred in the 17.3% of the population in U1, with a Gini of 0.493, also indicating high disparity.

What do these results mean?

The suicide rate in Manitoba is higher than the national average. According to Statistics Canada, the rate of suicides for 15– to 19–year–olds in 2009 was 9.0/100,000, whereas the rate reported here for 13– to 19–year–olds in 2005–2009 was 14.0/100,000 (2012b). The rate in the North is of particular concern at almost 60/100,000 in 2005–2009. There was a high degree of inequity in both rural and urban Manitoba, with over half of the teen suicides in the province occurring to teens in the lowest rural and urban income areas. Strategies to reduce teen suicide should be targeted to teens in low income areas and in Northern Manitoba.

Chapter 4: Safety and Security

Injury Hospitalizations

As we demonstrated in Chapter 3, injuries represent one of the top five leading causes of hospitalization for children. Injuries also represent the leading cause of child mortality (see section on Causes of Child Mortality in Chapter 3) and pose a risk for long–term or short–term disabilities (SmartRisk & Insurance Bureau of Canada, 2005). Fortunately, many injuries can be prevented (Scholer, Mitchel, Jr., & Ray, 1997), and injury prevention strategies have demonstrated success in reducing injury–related deaths and disabilities (SmartRisk & Insurance Bureau of Canada, 2005). Manitoba has initiated several injury prevention strategies and a summary of the overall strategy and provincial priorities can be found at http://www.gov.mb.ca/healthyliving/hlp/docs/injury/injury_free.pdf.

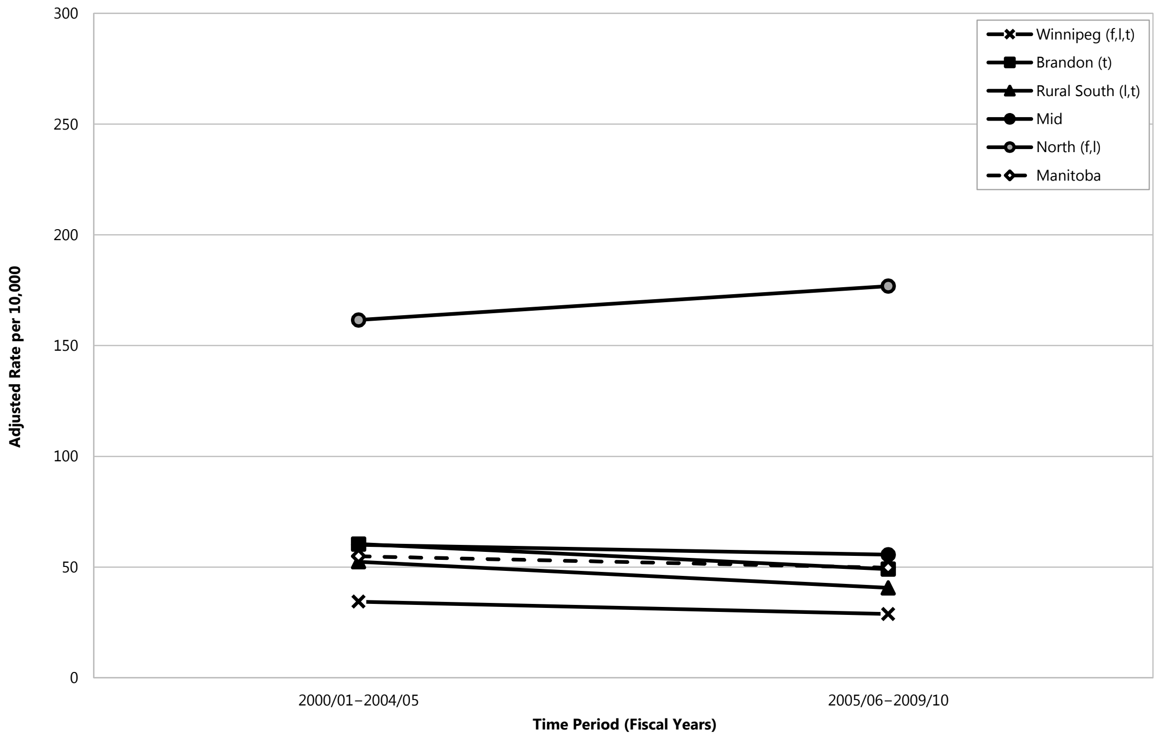
This injury hospitalization section focuses on children who were hospitalized due to injury but did not die from their injuries. In this section, we present age– and sex–adjusted rates for children aged 0 to 19 years and crude rates for children aged 0 to 5, 6 to12 and 13 to 19 years. Lorenz curves and Gini coefficients for hospital episodes were adjusted for age and sex. Transfers between hospitals were tracked and hospital episodes rather than individual separations are included, in order to reduce double–counting. All Manitoba hospitals are included; personal care homes (nursing homes) were excluded. Injuries associated with newborn birth injuries, stillbirths, and brain deaths are excluded, as are out of province hospitalizations. Additional exclusions are injuries in hospital due to surgical or medical misadventures or adverse drug reactions (see footnote 22 in the next section on **causes of injury hospitalizations**).

Regional Trends Over Time

Figure 4.1 shows the injury hospitalization rates over time for aggregate regions of Manitoba. The provincial rate of injury hospitalizations went from 54.9/10,000 in 2000/01–2004/05 to 49.8/10,000 in 2005/06–2009/10, a decrease that was not statistically significant. Winnipeg had significantly lower rates than the Manitoba average in both time periods, at 34.4/10,000 in time 1 and 28.8/10,000 in time 2. This decrease over time in Winnipeg was statistically significant. In the second time period, the rate in the Rural South was also significantly lower than the Manitoba average at 40.6/10,000. This rate had dropped from 52.4/10,000 in Rural South, a statistically significant decrease. Injury hospitalization rates in the North were higher than the Manitoba average in both time periods, at 161.5/10,000 in time 1 and 176.8/10,000 in time 2. The rates in the North did not change significantly over the study period. The rates in Brandon were not statistically different from the Manitoba average in either time period, but showed a significant decrease over the study period, from 60.4/10,000 to 49.1/10,000.

The next section provides details regarding causes of injury hospitalizations.

Figure 4.1: Injury Hospitalization Rates by Aggregate Region, 2000/01–2004/05 to 2005/06–2009/10
Age– & sex–adjusted rates per 10,000 children 0–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at $p<0.01$
l indicates region's rate was statistically different from Manitoba average in the last time period at $p<0.01$
t indicates statistically significant difference between the first and last time periods for that region at $p<0.05$

Trends by Age Group

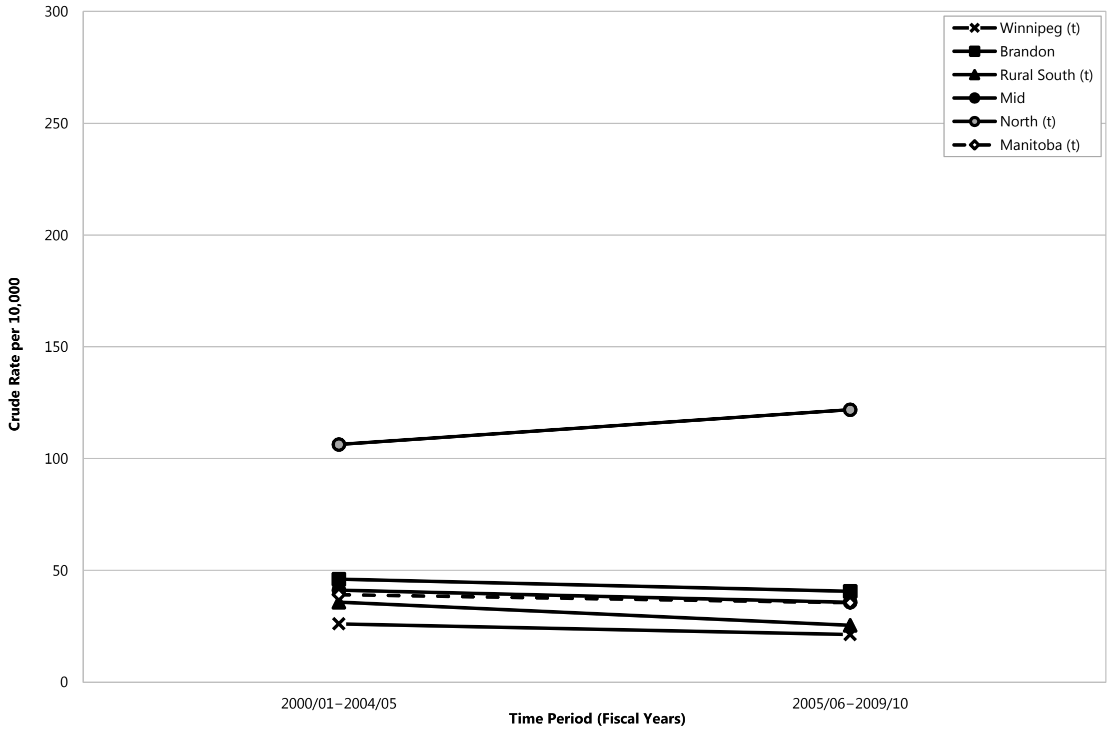
Figures 4.2 to 4.4 show the crude injury hospitalizations for each of the three age categories. The oldest age group, 13 to 19 years, had the highest rates of injury hospitalizations, followed by the youngest (0 to 5 years) group, with the lowest injury hospitalization rates found for the 6 to 12 age group. This pattern was repeated in each of the regions with the exception of Rural South and Brandon, where the 6 to 12 age group had injury hospitalization rates that were similar or slightly higher than the 0 to 5 age group.

For the 0 to 5 age group, the Manitoba injury hospitalization rate decreased from 39.1/10,000 to 35.5/10,000 over the study period, a statistically significant decrease. Significant decreases were also found for Winnipeg (26.1/10,000 to 21.3/10,000) and Rural South (35.8/10,000 to 25.4/10,000), whereas a significant increase was found for the North (106.3/10,000 to 121.9/10,000). The rates in Brandon and Mid did not change significantly over the study period.

For the 6 to 12 age group, the Manitoba rate decreased significantly from 35.8/10.000 to 31.2/10,000; and significant decreases over time were also found for Rural South (37.6/10,000 to 30.2/10,000), Brandon (47.2/10,000 to 34.6/10,000), and Winnipeg (21.8/10,000 to 17.9/10,000). No significant changes were found for the North and Mid in this age group.

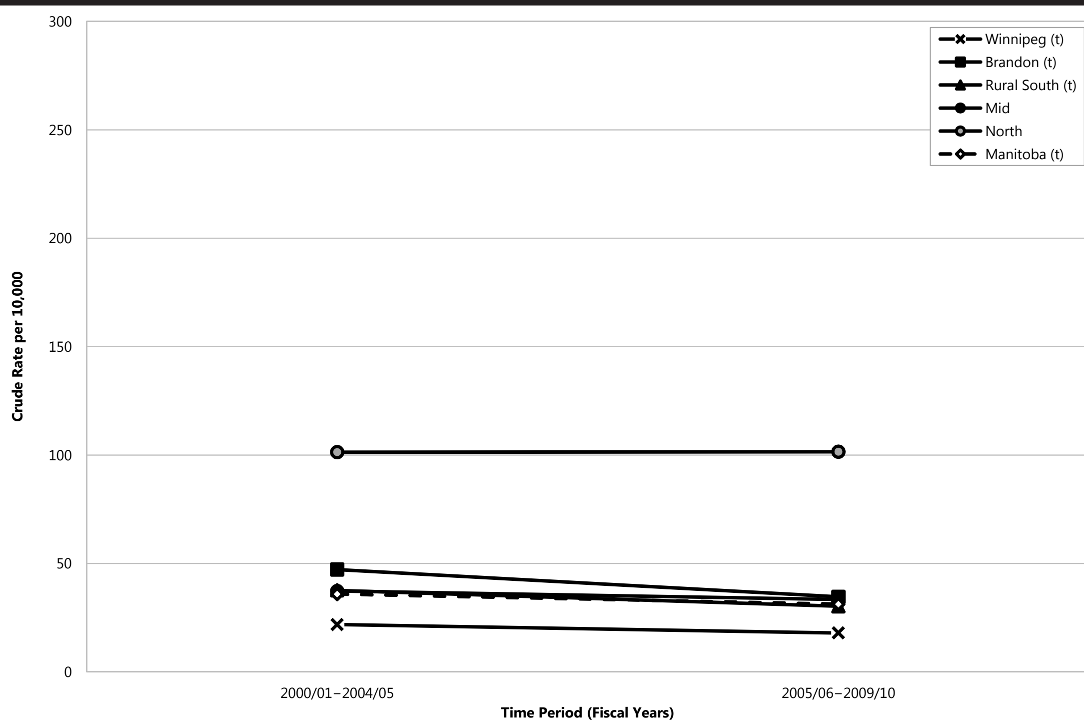
For the 13 to 19 age group, the Manitoba rate of injury hospitalizations decreased significantly from 85.6/10,000 to 80.4/10,000 over the study period. All of the aggregate regions also showed significant changes in hospitalizations over time, except for Mid. Brandon (82.9/10,000 to 67.1/10,000), Rural South (85.9/10,000 to 68.5/10,000), and Winnipeg (52.4/10,000 to 46.7/10,000) showed decreases in rates whereas in the North there was a significant increase (263.6/10,000 to 292.8/10,000).

Figure 4.2: Injury Hospitalization Rates by Aggregate Region and 0–5 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



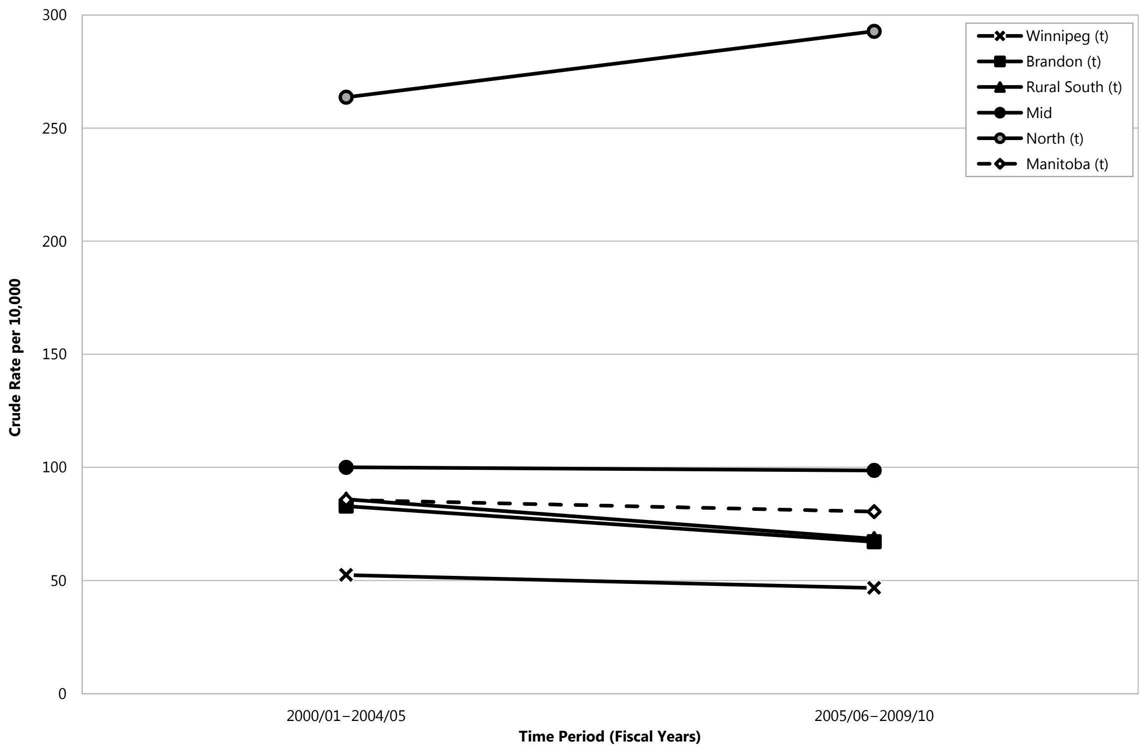
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 4.3: Injury Hospitalization Rates by Aggregate Region and 6–12 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 4.4: Injury Hospitalization Rates by Aggregate Region and 13–19 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05

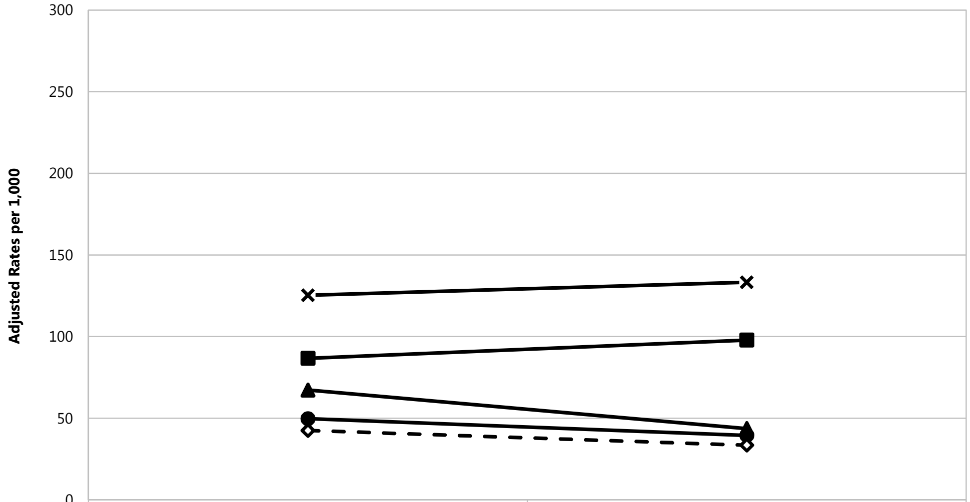
Trends by Socioeconomic Status

Figure 4.5 shows injury hospitalization rates by rural income quintiles over the two time periods of the 10–year study period. There are statistically significant SES gradients in injury hospitalization rates in each of the time periods examined. The highest rates of injury hospitalization were found in R1, the area with the lowest SES; and the lowest rates of hospitalization were found in R5, the area with the highest SES. For example, in time 2, the injury hospitalization rate in R1 was 133.3/10,000 compared to 33.4/10,000 in R5. Injury hospitalizations did not change significantly for R1 and R2 over the study period, whereas they decreased significantly for R3 (67.3/10,000 to 43.7/10,000), R4 (49.7/10,000 to 39.5/10,000), and R5 (42.5/10,000 to 33.4/10,000) over time.

Figure 4.6 shows injury hospitalization rates by urban income quintiles. The rates in the urban areas are lower than those found in the rural areas; however, there are still statistically significant SES gradients in injury hospitalization rates for children living in urban areas in both time periods. The highest rates of hospitalization were found for children in U1, the area with the lowest SES; and the lowest rates of hospitalization were found in U5, the area with the highest SES. For example, in time 2, the injury hospitalization rate was 54.3/10,000 in U1 compared to 18.3/10,000 in U5. Injury hospitalization rates decreased significantly over time for U2 (39.3/10,000 to 32.2/10,000) and U3 (31.7/10,000 to 25.4/10,000).

Figure 4.5: Injury Hospitalization Rates by Rural Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Age– & sex–adjusted rates per 10,000 children 0–19 years



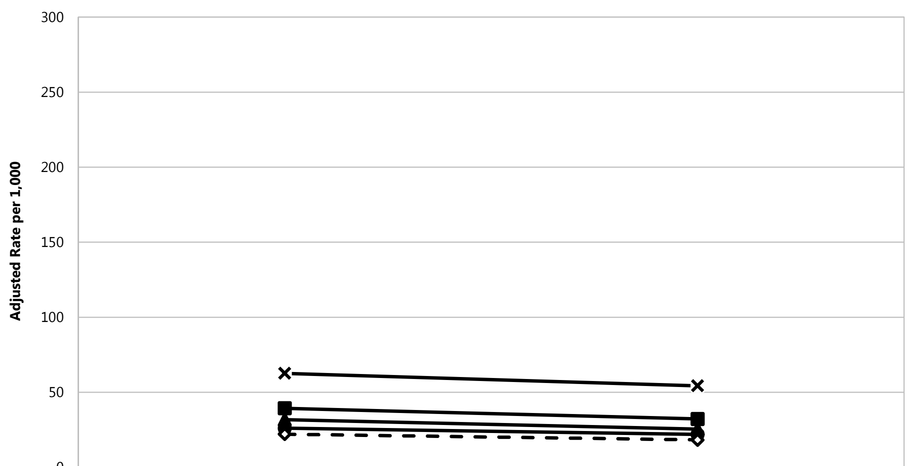
	2000/01–2004/05	2005/06–2009/10
Income Unknown (t)	114.72	77.96
R1 – Lowest Income	125.26	133.27
R2	86.68	97.85
R3 (t)	67.26	43.66
R4 (t)	49.74	39.52
R5 – Highest Income (t)	42.49	33.45
Linear trend across R1–R5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 4.6: Injury Hospitalization Rates by Urban Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Age– & sex–adjusted rates per 10,000 children 0–19 years



	2000/01–2004/05	2005/06–2009/10
Income Unknown (t)	114.72	77.96
U1 – Lowest Income	62.61	54.30
U2 (t)	39.29	32.19
U3 (t)	31.74	25.37
U4	26.01	21.95
U5 – Highest Income (t)	22.08	18.25
Linear trend across U1–U5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 4.7 and 4.8 show the inequities in injury hospitalization rates in 2000/01–2004/05 and 2005/06–2009/10, respectively, for rural areas. In the first time period, 38.9% of the injury hospitalizations occurred in the 23.7% of the population in the lowest income quintile group (R1), with a Gini coefficient of 0.223, indicating a high degree of disparity. In the final time period, 43.6% of the injury hospitalizations occurred in the 23.9% of the population in the lowest income quintile group, with a Gini coefficient of 0.298, also indicating high disparity. The Gini coefficient increased significantly from the first to the last time period, indicating a statistically significant increase in inequity in injury hospitalization rates in rural areas over the study period.

Figures 4.9 and 4.10 show the inequities in injury hospitalization rates in the first and last time period for urban areas. In 2000/01–2004/05, 33.6% of the injury hospitalizations occurred in the 19.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.209, also indicating a high degree of disparity. In 2005/06–2009/10, 35.8% of the injury hospitalizations occurred in the 19.9% of the population in the lowest income quintile group, with a Gini coefficient of 0.219, indicating high disparity. The Gini coefficient did not change significantly between time periods, indicating that inequity in injury hospitalization rates in urban areas did not change over the study period. The Gini in the rural areas in the final time period was significantly larger than the Gini in the urban areas, indicating more inequity in injury hospitalizations in the rural compared to urban areas.

What do these results mean?

A CIHI report (2008) on injury hospitalizations found that the rate for 0– to 19–year–olds in Manitoba was only slightly higher than the national rate of 36.7/10,000 in 2005–2006. Our results show the Manitoba injury hospitalization rate for this age group as 49.8/10,000 in 2005/06–2009/10. The injury hospitalization rate decreased in Manitoba for each of the age groups, although not all regions experienced this decrease. In fact, in the North, where injury hospitalizations are substantially higher than other areas of the province, injury hospitalizations increased significantly for the 0 to 5 and the 13 to 19 age groups. Injury hospitalizations are higher in rural compared to urban areas; but for both areas, there was a high degree of inequity in injuries, with higher rates associated with lower income areas. Inequities increased over the study period in rural areas.

The main causes of injury remained fairly stable over the study period. In the North where the rates are high for all age groups, the youngest children were hospitalized for other, falls and poisoning injuries, the 6– to 12–year–olds were hospitalized for other, falls, and vehicle (motor and other) injuries, and the teens were hospitalized for other, violence (to self and by others) and poisoning injuries. Targeting these types of injuries may be necessary. The "other" category is dominated by "exposure to unspecified factor causing other and unspecified injury". There were over 500 such hospitalized injuries for teens in the North in the second time period, as well as relatively high numbers of these injuries for younger children in the North. Further exploration into whether these are truly injuries of undetermined cause or whether data extraction or charting issues are contributing to these high numbers is warranted.

Figure 4.7: Lorenz Curve for Injury Hospitalization in Rural Areas, 2000/01–2004/05
Adjusted by age & sex for children 0–19 years

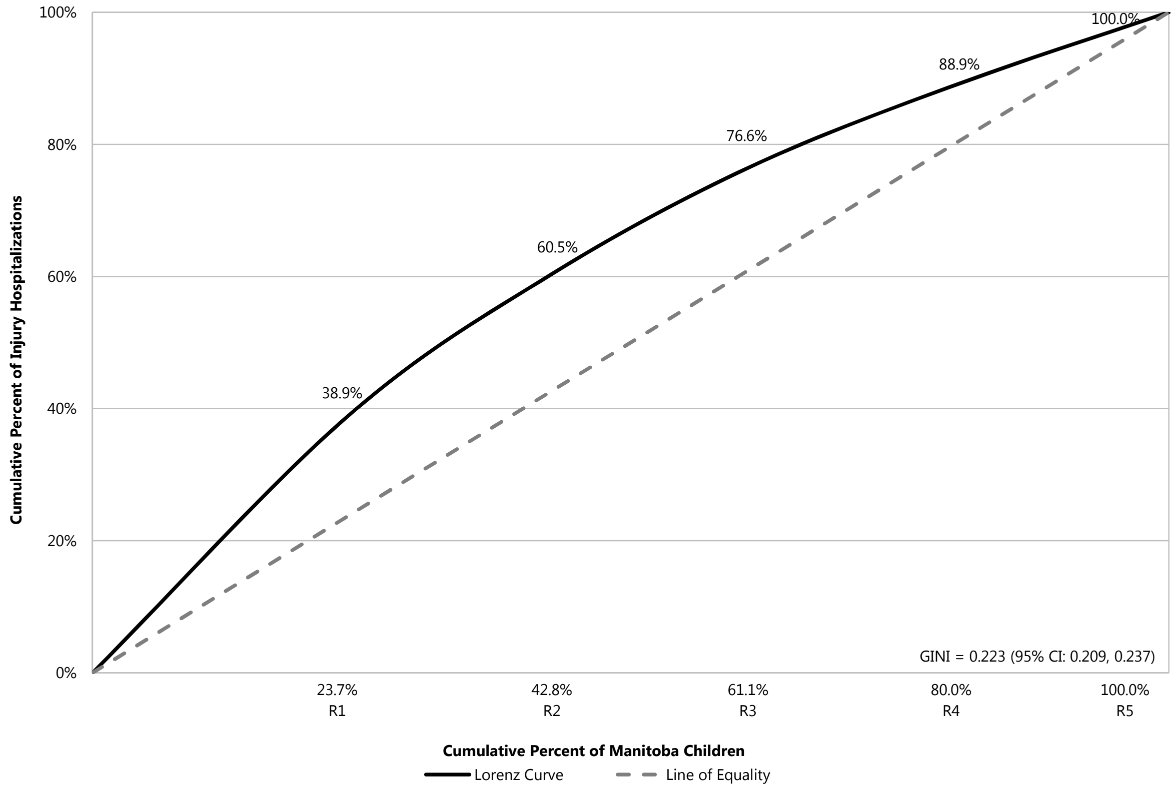


Figure 4.8: Lorenz Curve for Injury Hospitalization in Rural Areas, 2005/06–2009/10
Adjusted by age & sex for children 0–19 years

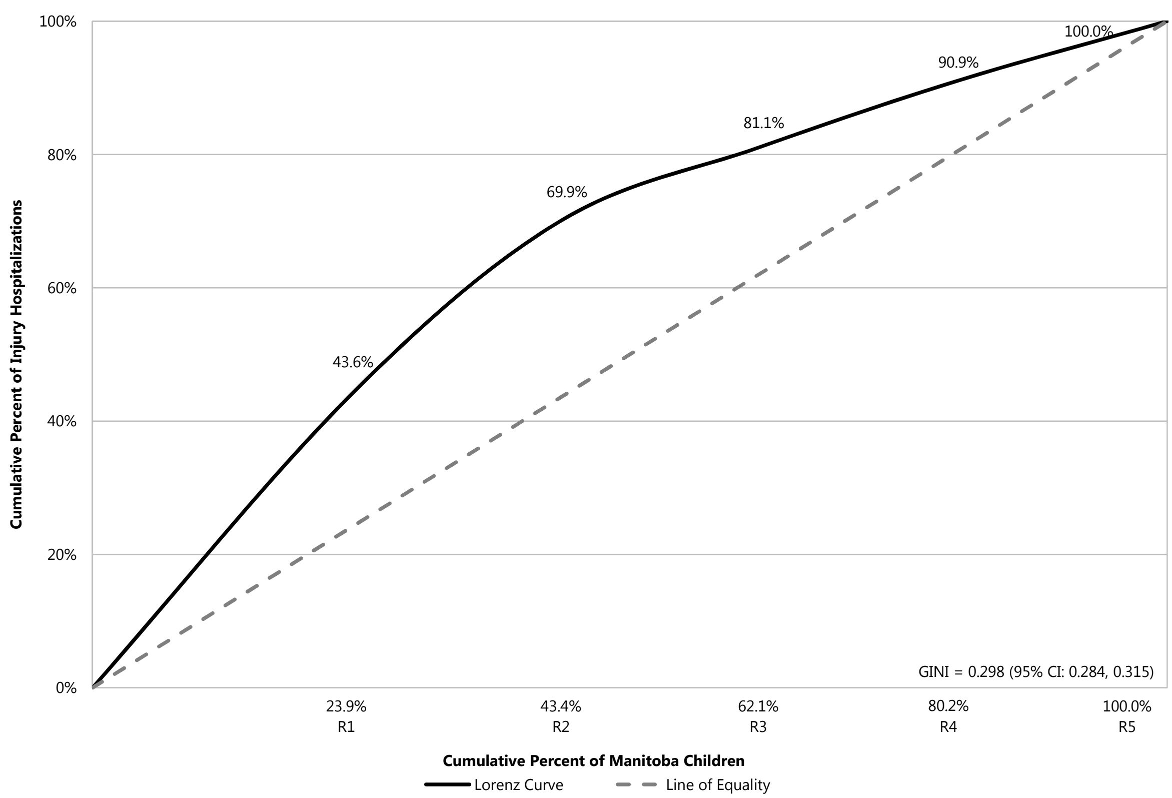


Figure 4.9: Lorenz Curve for Injury Hospitalization in Urban Areas, 2000/01–2004/05
Adjusted by age & sex for children 0–19 years

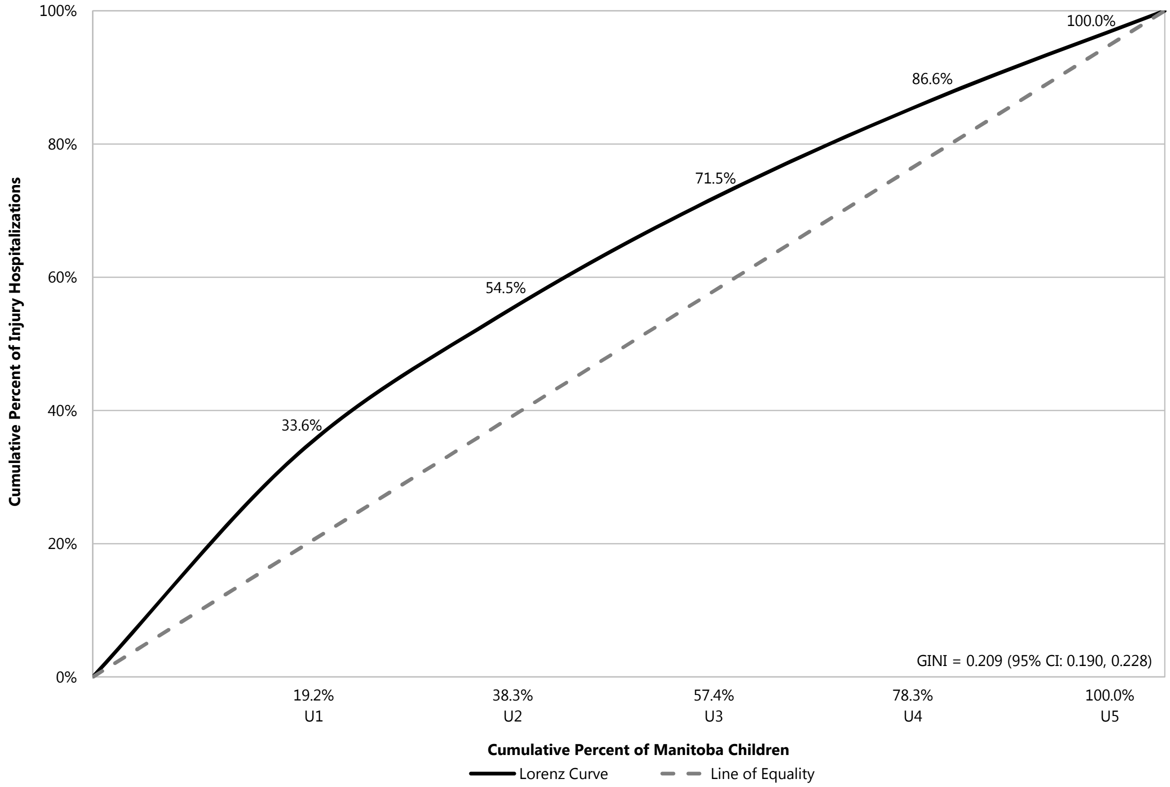
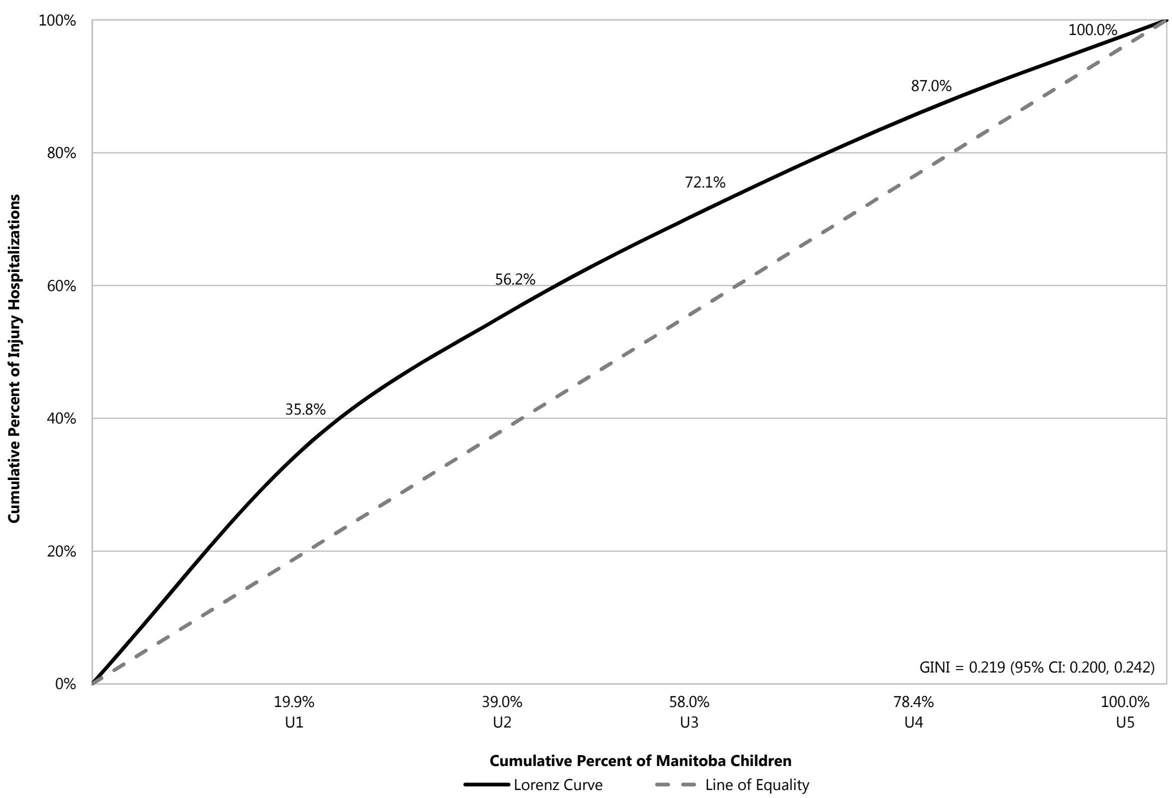


Figure 4.10: Lorenz Curve for Injury Hospitalization in Urban Areas, 2005/06–2009/10
Adjusted by age & sex for children 0–19 years



Causes of Injury Hospitalization

With injuries playing such a prominent role in child hospitalizations, it is important to investigate why these children have been injured in the first place. Injury hospitalizations can be categorized according to the causes of injury, using the "external cause" of injury code attributed during the hospital stay. The injury cause codes, such as falls, motor vehicle collisions, and violence to self, are used to define environmental events, circumstances, and conditions as the cause of injury related to the hospitalization. For this report, injury hospitalizations that were relatively rare, or where the cause of injury was unspecified, were grouped into an "other" category. This category includes such injuries as those due to foreign body entering into/through the eye or other natural orifice, being struck by an object, overexertion, unspecified fractures, and machinery. It should be noted that the change in coding, from ICD–9–CM to ICD–10–CA, that occurred at the start of the second time period, resulted in a large increase in the number of injuries categorized as "other", particularly those coded as "exposure to unspecified factor causing other and unspecified injury." As stated previously in the injury hospitalization section, we have excluded injuries associated with newborn birth injuries or deaths, stillbirths, brain deaths, surgical or medical misadventures, or adverse drug reactions[22]

Figure 4.13 shows the top 5 causes of injury hospitalizations for each of the three age groups in time 1 and time 2. The top causes of injury hospitalizations differ across age groups. For the 0 to 5, the top 3 causes were: Other (12.9% in time 1 and 16.5% in time 2), Falls (12.4% in time 1 and 9.3% in time 2), and Poisoning (4.4% in time 1 and 3.3% in time 2). The fourth leading cause in time 1 was Natural and Environmental factors (at 2.0%) and in time 2 it was Motor Vehicle Collisions (at 1.7%); the fifth leading cause in time 1 was Motor Vehicle Collisions (at 1.9%) and in time 2 it was Violence by Others (at 1.3%).

For the 6 to 12 age group, the top 4 causes of injury hospitalizations were the same across time although the ordering changed slightly, and the fifth top cause was different in the two time periods. In time 1, the top 5 causes were: Falls (12.4%), Other (9.8%), Other Vehicle (4.4%), Motor Vehicle (3.2%), and Sports (1.4%). In time 2 the top 5 causes were: Other (11.7%), Falls (9.7%), Other Vehicle (3.0%), Motor Vehicle (2.8%), and Natural and Environmental Factors (0.7%).

For the 13 to 19 age group, the top 5 causes were the same in both time periods, although the ordering of the categories differed across time. In time 1, the top 5 causes were: Other (17.3%), Violence to Self (14.9%), Motor Vehicle (12.2%), Violence by Others (10.5%), and Falls (9.5%). In time 2 the top 5 causes were: Other (27.1%), Violence by Others (10.7%), Motor Vehicle (9.9%), Falls (9.2%), and Violence to Self (8.6%).

Detailed information about causes of injury hospitalization by region, age, and income quintiles can be found in the online Appendix.

22 When analyzing injury hospitalizations, we exclude injuries that were due to surgical or medical "misadventures" or adverse drug reactions – in other words, injuries that occurred as the result of the hospitalization rather than being the cause of the hospitalization. In the first time period, such injuries accounted for almost 8% of all injury hospitalization, whereas in the second time period they accounted for almost 20% of all injury hospitalizations. The change over the study period was not necessarily due to changes in these events, but in the way they were coded. In the first time period, when ICD–9–CM codes were used, external cause codes (which are used to select injury hospitalizations) were not required for hospitalizations with ICD–9–CM codes 996–999, which are "complications of surgical and medical care, not elsewhere classified." Thus these complications would not have had an external cause code associated with them and would not have been included in the injury hospitalizations. Coding requirements changed after that to require an external cause code with all complications (now referred to as post intervention conditions).

Figure 4.11: Causes of Injury Hospitalization, 2000/01-2004/05
Crude percent of children 0–19 years

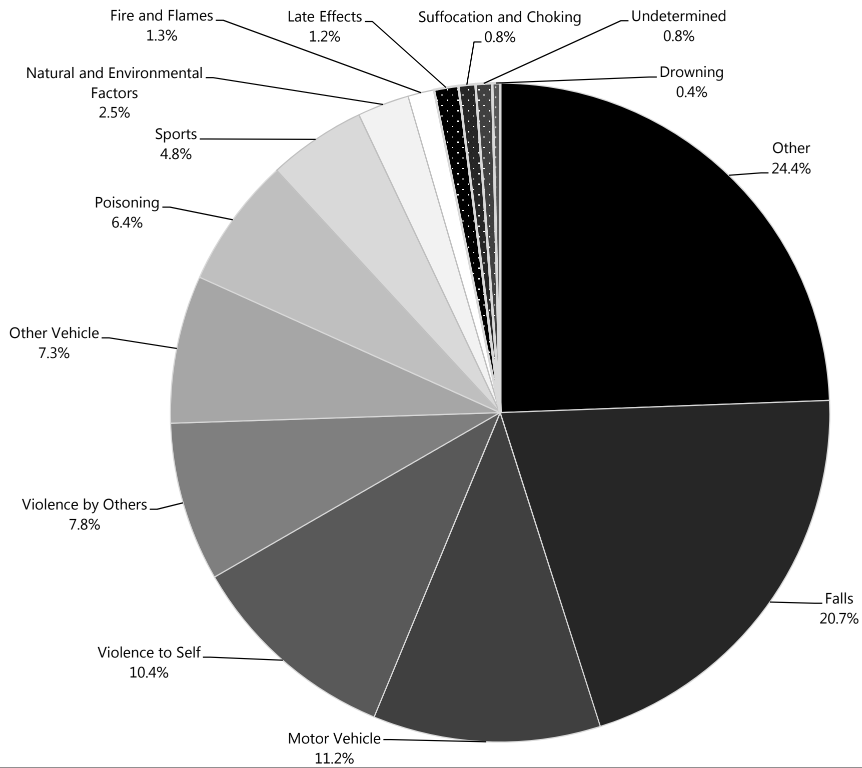


Figure 4.12: Causes of Injury Hospitalization, 2005/06-2009/10
Crude percent of children 0–19 years

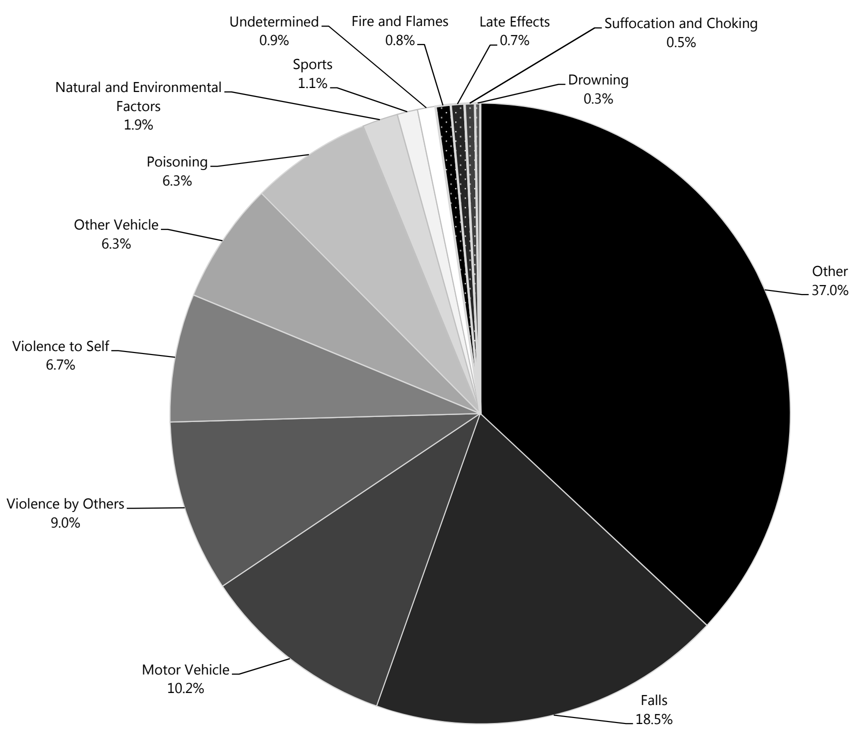
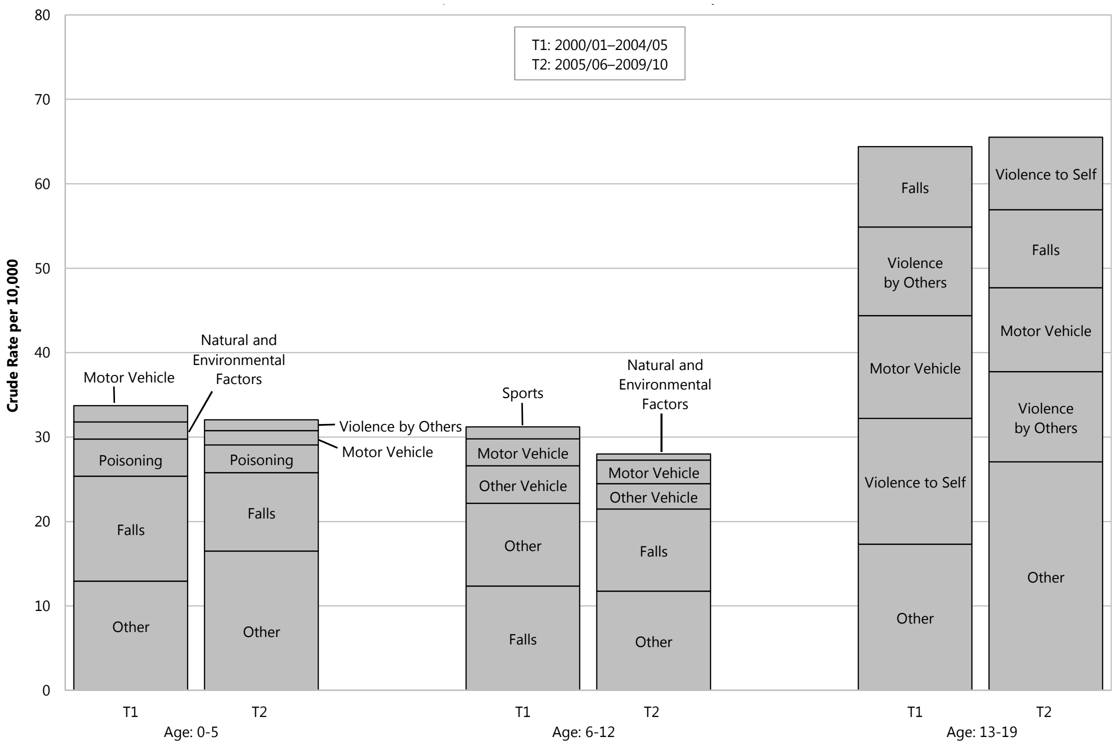


Figure 4.13: Top 5 Causes of Injury Hospitalization* by Age Group, 2000/01–2004/05 and 2005/06–2009/10
Crude rate per 10,000 children 0–5, 6–12, and 13–19 years



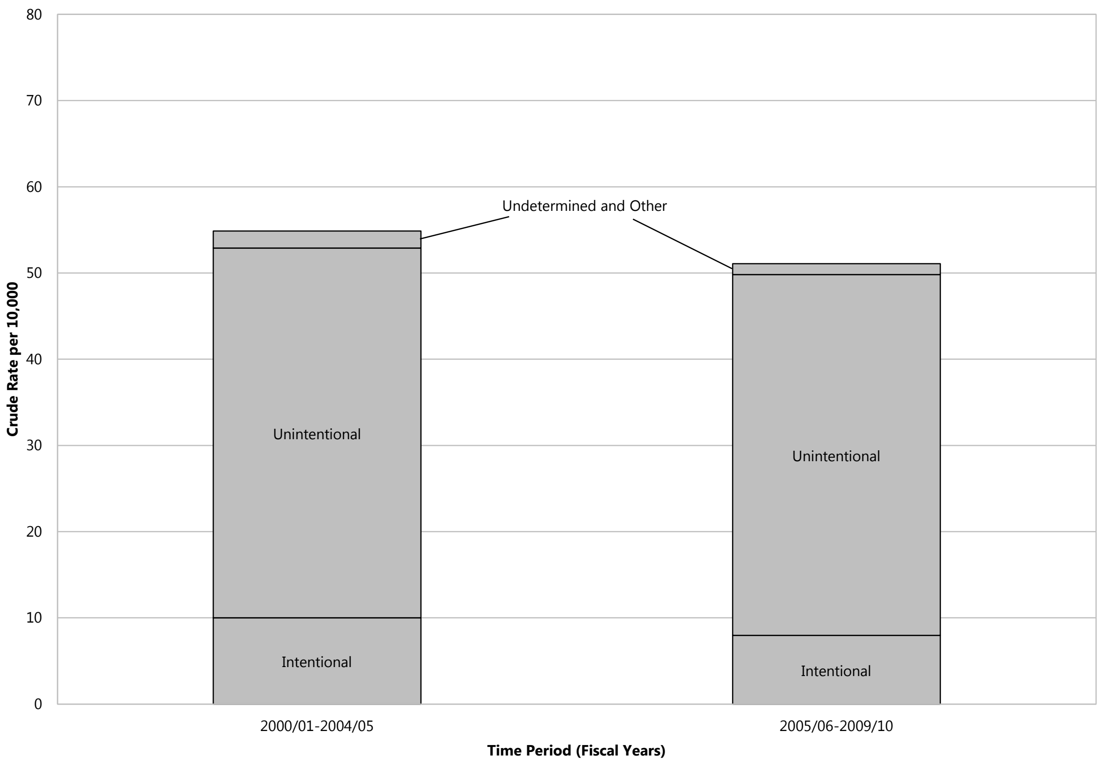
* Medical and Surgical Misadventures or Drug Effects account for 7.74% of hospital injuries in 2000/01-2004/05 and 19.77% of hospital injuries in 2005/06-2009/10

Intentional Versus Unintentional Injury Hospitalizations

Besides examining the causes of injury hospitalizations, another important aspect to examine is the intent of injury. Injuries are often categorized as being Intentional (i.e., self–inflicted), Unintentional (i.e., accidental), Undetermined (difficult to determine intent), and Other. The latter includes injuries due to alcohol use, legal intervention (e.g., incurred by law–enforcing agents), war operations, and terrorism. In this section, we compare intentional and unintentional injury hospitalizations.

In the first time period (2000/01–2004/05), the proportion of injury hospitalizations that was intentional was 18.2% compared to 78.2% unintentional. The remaining 3.6% were for undetermined and "other". In the second time period (2005/06–2009/10), 15.6% of the injuries were intentional compared to 81.9% unintentional and 2.5% undetermined or other. Figure 4.14 shows crude rates by intent.

Figure 4.14: Injury Hospitalization Rates by Injury Type, 2000/01–2004/05 to 2005/06–2009/10
Crude rate per 10,000 children 0–19 years



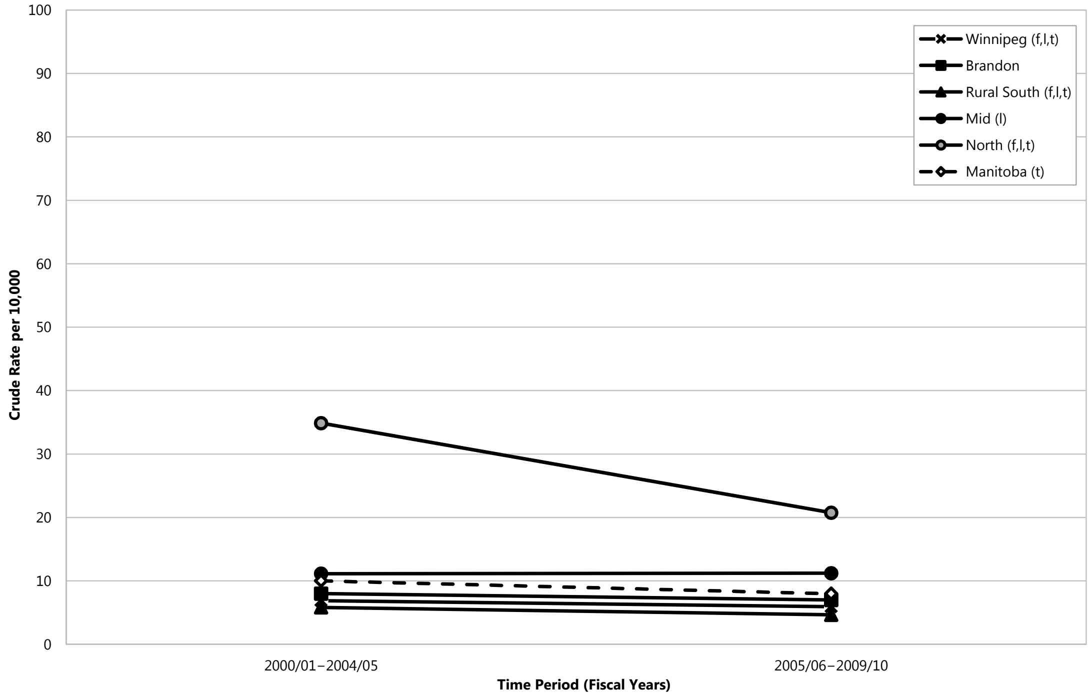
Regional Trends Over Time

Figure 4.15 shows that the rate of intentional injury hospitalizations for Manitoba children 0 to 19 years decreased significantly over the time period, from 10.0/10,000 to 8.0/10,000 in Manitoba. Significant decreases were also observed in Winnipeg (6.9/10,000 to 5.9/10,000), Rural South (5.8/10,000 to 4.6/10,000), and the North (34.9/10,000 to 20.7/10,000). The dramatic drop in hospitalizations for intentional injury in the North was driven by the large decrease in self–inflicted injury. As discussed in the section on Suicide in Chapter 3, this may be more likely due to changes in admitting practices for suicide attempts as opposed to actual decreases in self–inflicted injuries.

Figure 4.16 shows that the rate of unintentional injury hospitalizations for Manitoba children 0 to 19 years remained stable over the time period, 42.9/10,000 and 41.4/10,000. Rates for Winnipeg (26.3/10,000 to 22.8/10,000), Rural South (46.2/10,000 to 35.7/10,000), and Brandon (51.7/10,000 to 40.9/10,000) decreased significantly over the time period; whereas rates of unintentional injury increased significantly in the North (114.5/10,000 to 154.7/10,000). The North had significantly higher rates than the Manitoba average in both time periods, whereas the rates in Winnipeg were significantly lower than the Manitoba average in both time periods.

Figure 4.15: Intentional Injury Hospitalization Rates by Aggregate Region, 2000/01–2004/05 to 2005/06–2009/10

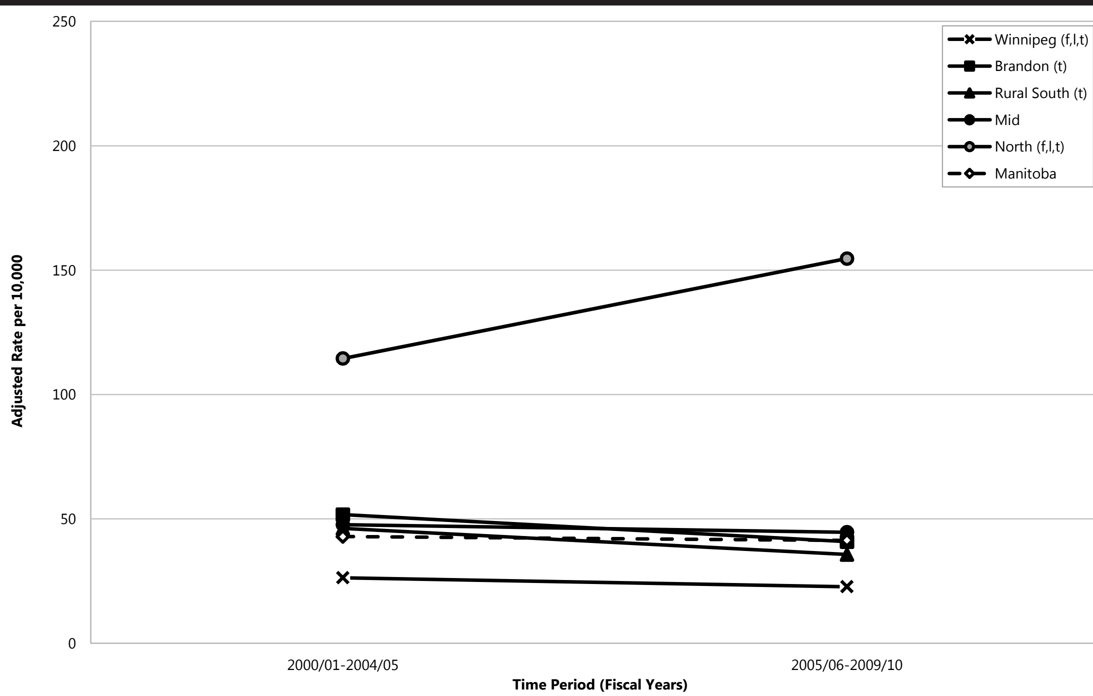
Crude rates per 10,000 children 0–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 4.16: Unintentional Injury Hospitalization Rates by Aggregate Region, 2000/01–2004/05 to 2005/06–2009/10

Age– & sex–adjusted rates per 10,000 children 0–19 years



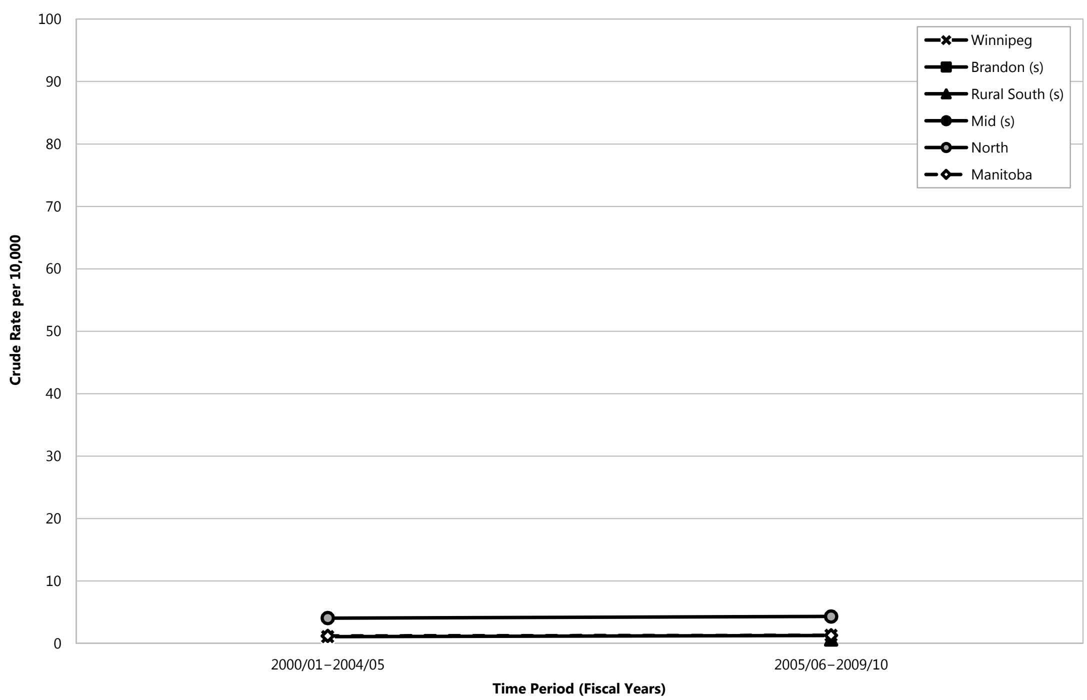
f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Trends by Age Group

The pattern of intentional and unintentional injuries differs by age (Figures 4.17 to 4.22). For the 0 to 5 and the 6 to 12 age groups, there were very few intentional injuries in Manitoba, at 1.2/10,000 and 1.3/10,000 in time 1 and time 2 for 0– to 5–year–olds respectively, and 1.2/10,000 and 0.9/10,000 in time 1 and time 2 for 6– to 12–year–olds respectively. There was a significant decrease in hospitalizations for intentional injuries in the North for 6– to 12–year–olds over the study period, going from 5.7/10,000 to 2.8/10,000. The rates for intentional injuries are dramatically higher for the teens, at 25.4/10,000 and 19.2/10,000 for Manitoba in times 1 and 2, a statistically significant decrease over time. Hospitalizations for intentional injuries for teens decreased significantly for Rural South (14.9/10,000 to 11.4/10,000), Winnipeg (17.6/10,000 to 14.0/10,000), and of particular note in the North (dropping from 97.6/10,000 in time 1 to 54.6/10,000 in time 2). As mentioned previously, this decrease is at least partially driven by changes in admitting practices over the study period.

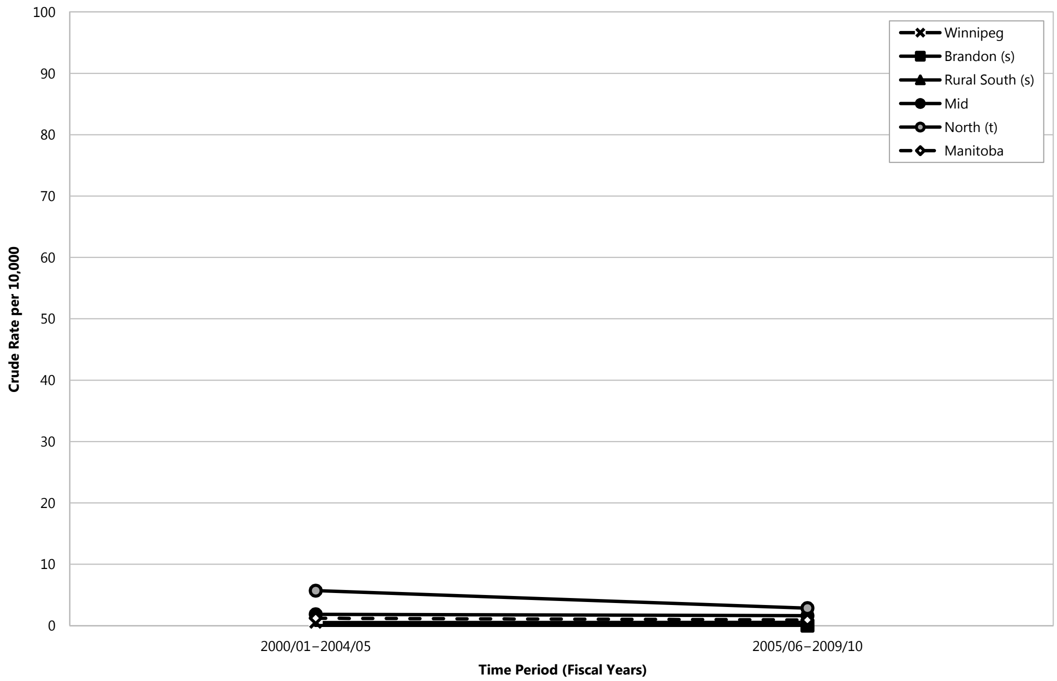
The pattern for unintentional injuries is similar to the pattern for all injury hospitalizations discussed in the beginning of this chapter generally decreasing rates for most regions for each of the age groups, with the exception of the North, where rates for 0– to 5–year–olds (99.6/10,000 to 116.9/10,000) and 13– to 19–year–olds (139.3/10,000 to 229.1/10,000) increased significantly over time.

Figure 4.17: Intentional Injury Hospitalization Rates by Aggregate Region and 0 to 5 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



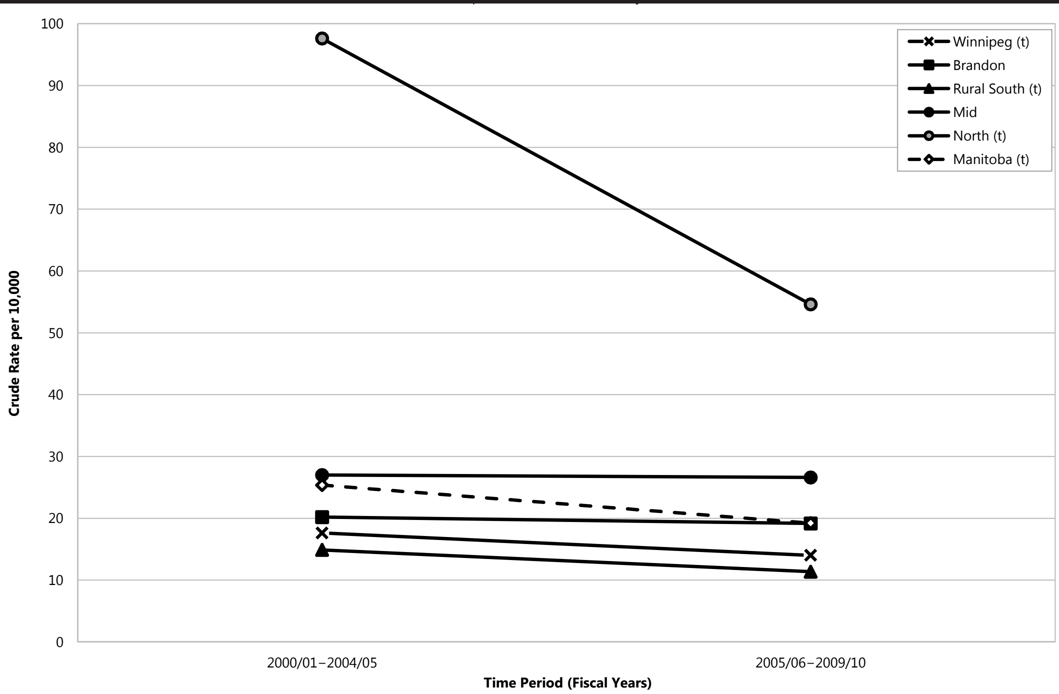
t indicates statistically significant difference between the first and last time periods for that region at p<0.05
s indicates data suppressed due to small numbers

Figure 4.18: Intentional Injury Hospitalization Rates by Aggregate Region and 6 to 12 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



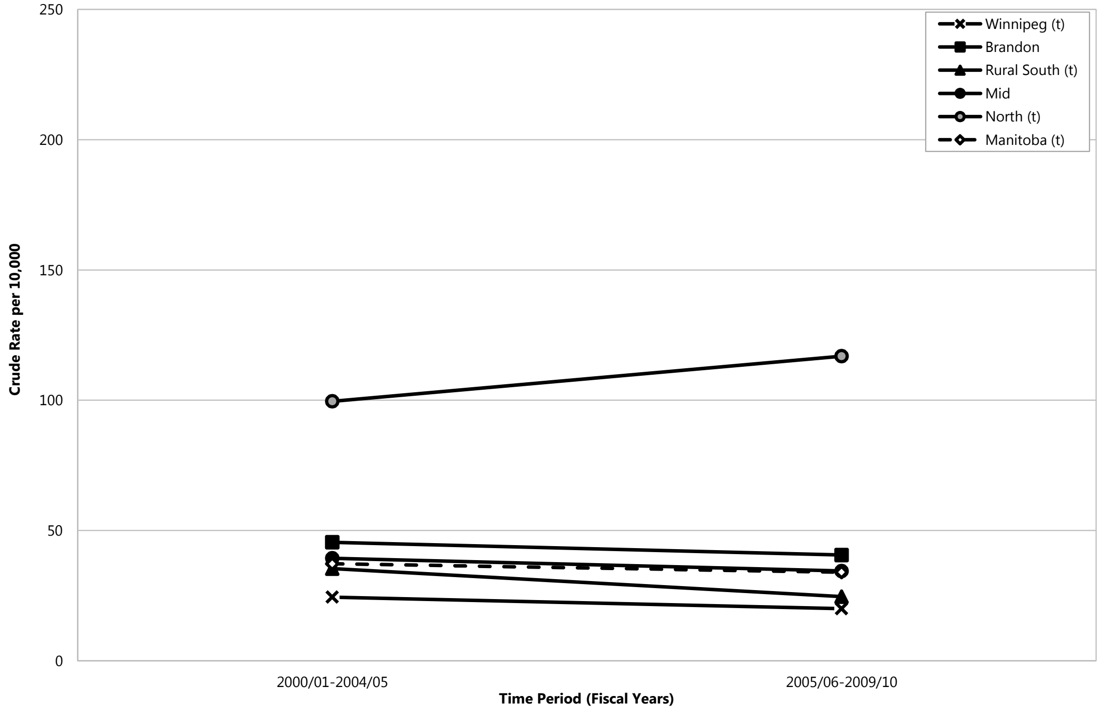
t indicates statistically significant difference between the first and last time periods for that region at p<0.05
s indicates data suppressed due to small numbers

Figure 4.19: Intentional Injury Hospitalization Rates by Aggregate Region and 13 to 19 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



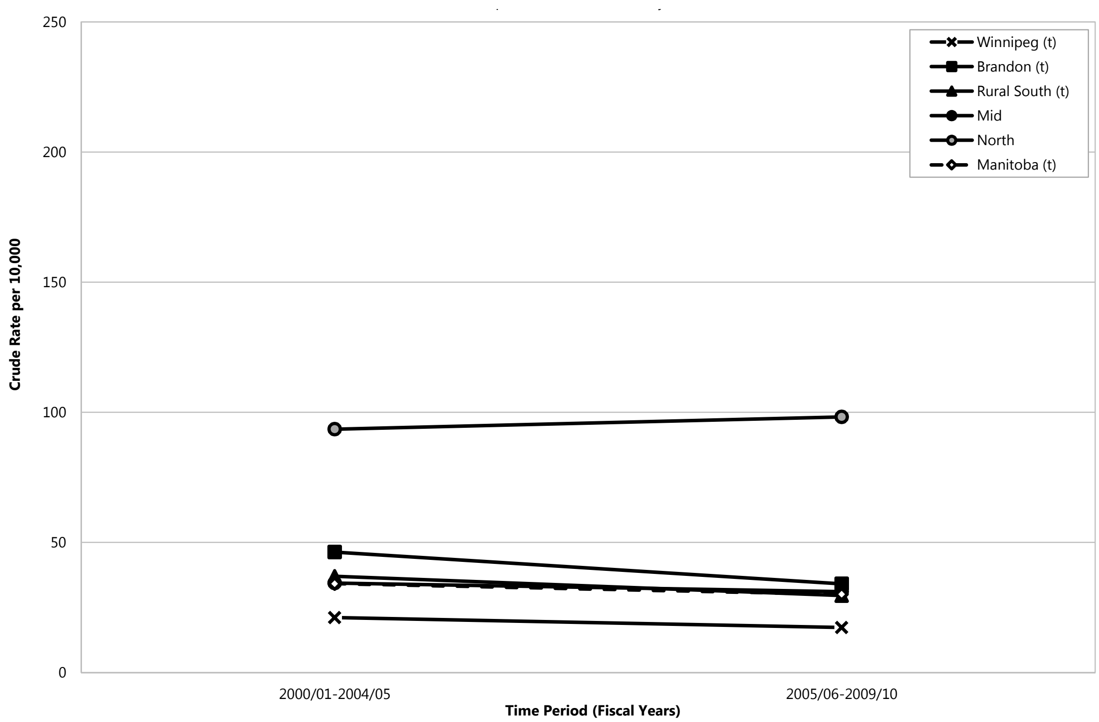
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 4.20: Unintentional Injury Hospitalization Rates by Aggregate Region and 0 to 5 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



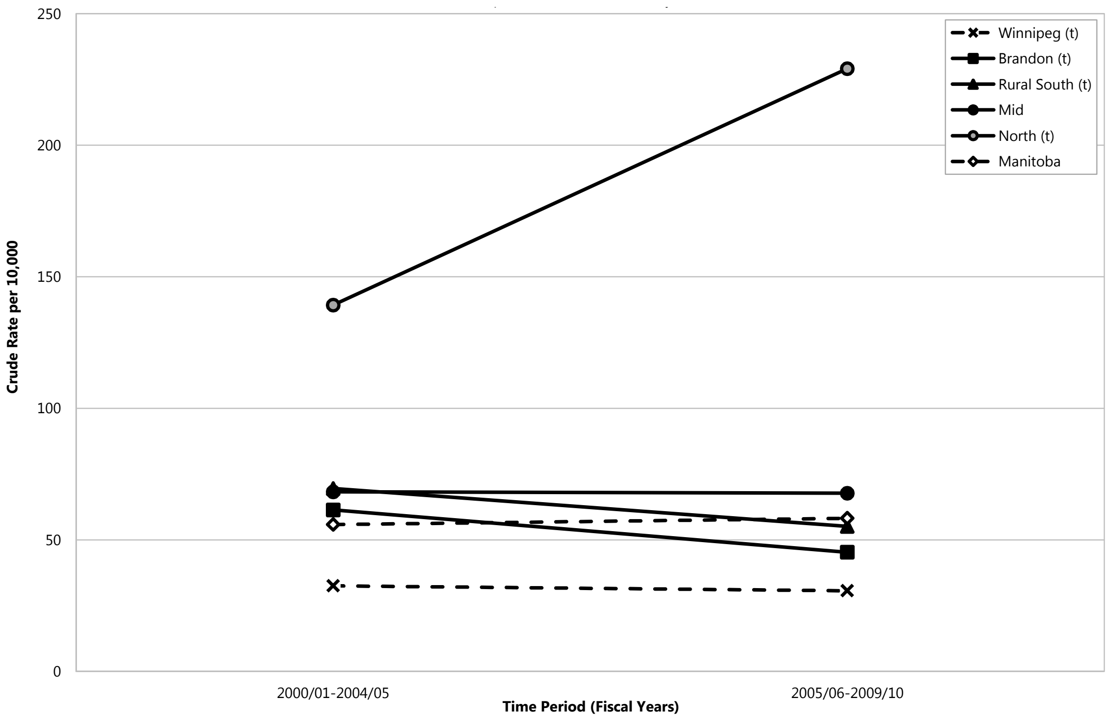
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 4.21: Unintentional Injury Hospitalization Rates by Aggregate Region and 6 to 12 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 4.22: Unintentional Injury Hospitalization Rates by Aggregate Region and 13 to 19 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 10,000 children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Trends by Socioeconomic Status

Figure 4.23 shows intentional injury hospitalization rates by rural income quintiles over the two time periods of the 10–year study period. There are statistically significant SES gradients in intentional injury hospitalization rates in each of the time periods examined with the highest rates found in R1, the area with the lowest SES, and the lowest rates found in R5, the area with the highest SES. For example, in time 2, the rate of intentional injury hospitalizations in R1 was 23.8/10,000 compared to only 3.7/10,000 in R5.

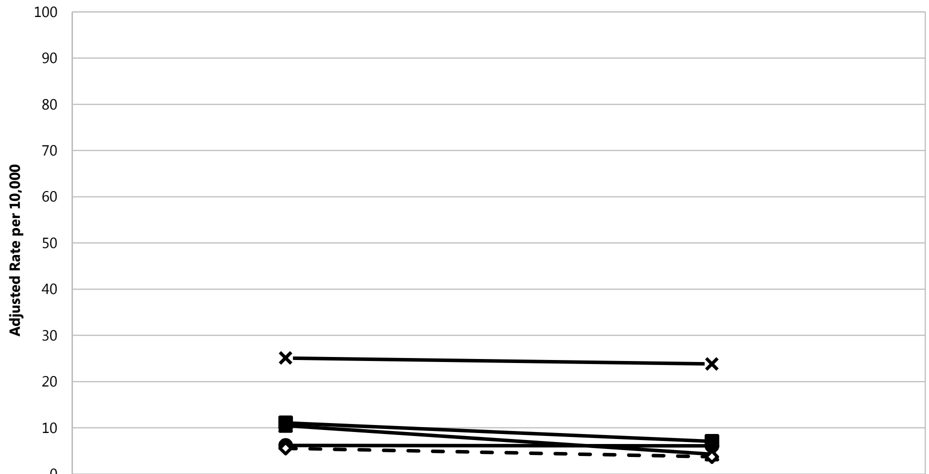
The same pattern is found for unintentional injury hospitalizations, with statistically significant gradients across the rural income quintiles (Figure 4.24). For example, in time 2, the rate of unintentional injury hospitalizations was 110.2/10,000 in R1 compared to 29.0/10,000 in R5. The gradient across income quintiles increased significantly over time in the rural areas for unintentional but not for intentional injuries.

Figure 4.25 shows intentional injury hospitalization rates by urban income quintiles. The rates of intentional injury hospitalizations are lower in the urban areas than in the rural areas. As was found in the rural areas, there are statistically significant SES gradients with the highest rates of hospitalization found for children in U1, the area with the lowest SES, and rates decreasing as income increases. For example, in time 2, the rate of intentional injury hospitalizations in U1 was 14.9/10,000 compared to 2.4/10,000 in U5.

Similar patterns were found for unintentional injury hospitalizations, with statistically significant gradients across income quintiles (Figure 4.26). For example, in time 2, the rate of unintentional injury hospitalizations was 39.9/10,000 in U1 compared to 15.7/10,000 in U5.

Figure 4.23: Intentional Injury Hospitalization Rates by Rural Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Age– & sex–adjusted rates per 10,000 children 0–19 years



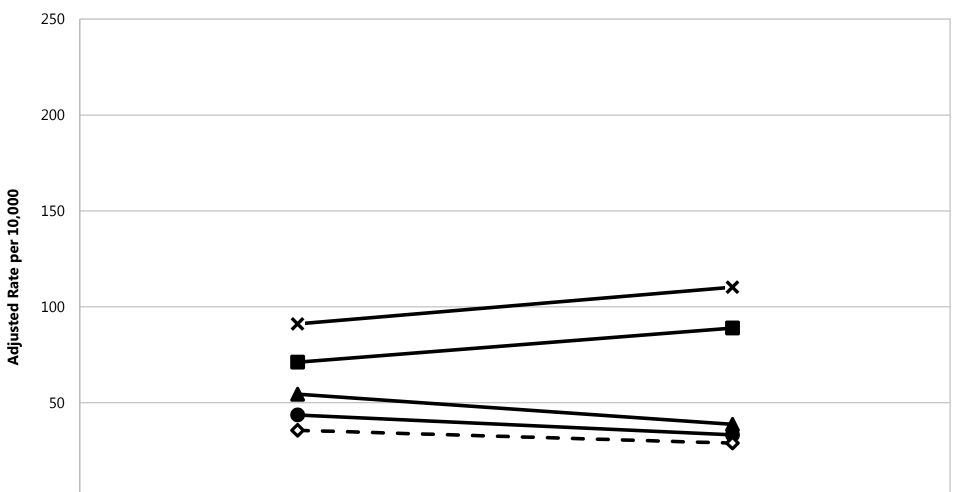
	2000/01–2004/05	2005/06–2009/10
Income Unknown	40.30	25.83
R1 – Lowest Income	25.09	23.80
R2	11.07	7.07
R3 (t)	10.47	4.30
R4	6.19	6.08
R5 – Highest Income	5.54	3.73
Linear trend across R1–R5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Figure 4.24: Unintentional Injury Hospitalization Rates by Rural Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Age– & sex–adjusted rates per 10,000 children 0–19 years



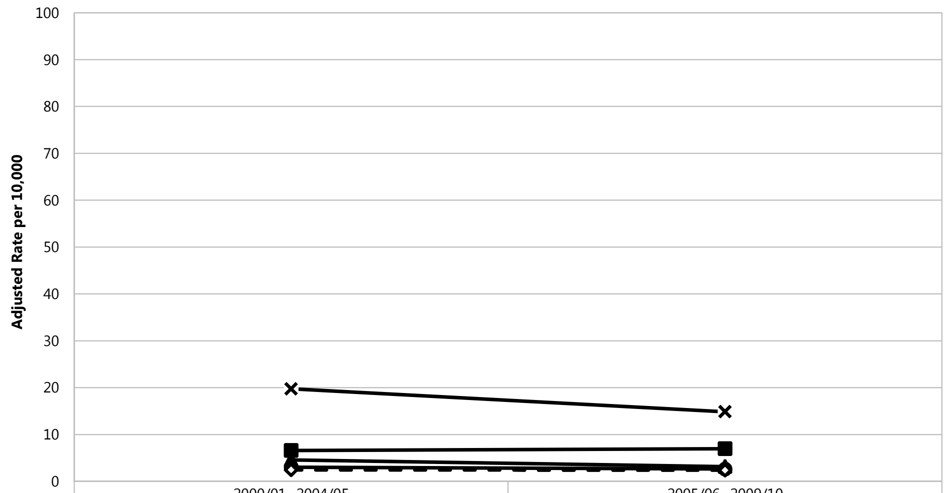
	2000/01–2004/05	2005/06–2009/10
Income Unknown	67.05	48.89
R1 – Lowest Income (t)	91.06	110.24
R2 (t)	71.18	88.96
R3 (t)	54.46	38.72
R4 (t)	43.64	33.25
R5 – Highest Income (t)	35.63	28.97
Linear trend across R1–R5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Figure 4.25: Intentional Injury Hospitalization Rates by Urban Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Age– & sex–adjusted rates per 10,000 children 0–19 years



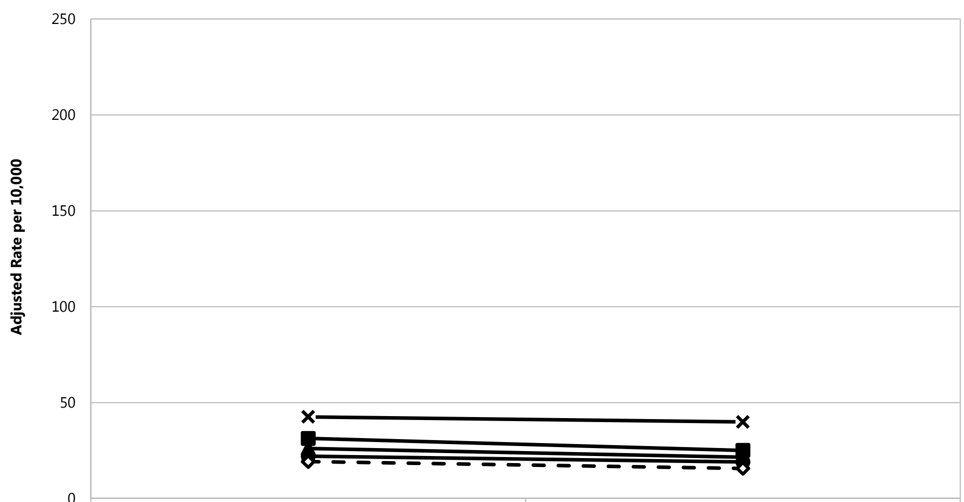
	2000/01–2004/05	2005/06–2009/10
Income Unknown	40.30	25.83
U1 – Lowest Income	19.74	14.86
U2	6.60	6.97
U3	4.59	3.15
U4	3.02	2.62
U5 – Highest Income	2.44	2.37
Linear trend across U1–U5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 4.26: Unintentional Injury Hospitalization Rates by Urban Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Age– & sex–adjusted per 10,000 children 0–19 years



	2000/01–2004/05	2005/06–2009/10
Income Unknown	67.05	48.89
U1 – Lowest Income	42.56	39.89
U2 (t)	31.35	25.07
U3 (t)	26.12	21.55
U4	22.00	19.05
U5 – Highest Income (t)	19.22	15.65
Linear trend across U1–U5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 4.27 and 4.28 show the inequities in intentional injury hospitalization rates in 2000/01–2004/05 and 2005/06–2009/10, respectively, for rural areas. In the first time period, 48.6% of the hospitalizations for intentional injuries occurred in the 23.7% of the population in the lowest income quintile group (R1), with a Gini coefficient of 0.310, indicating a high degree of disparity. In the final time period, 58.5% of the hospitalizations for intentional injury occurred in the 23.9% of the population in the lowest income quintile group, with a Gini coefficient of 0.379, also indicating high disparity. The Gini coefficient did not change significantly from the first to the last time period, indicating that inequity in intentional injury hospitalization rates in rural areas did not change over the study period.

A similar pattern, but with less disparity, can be found for unintentional injury hospitalizations in rural areas, where in the first time period 35.7% of the hospitalizations occurred in the 23.7% of the population in R1 (Figure 4.29). The Gini coefficient was 0.191, indicating a moderate degree of disparity in rates across income areas. In the final time period, 42.0% of unintentional injury hospitalizations occurred in the 23.9% of the population in R1 (Figure 4.30), with a Gini coefficient of 0.290, indicating high disparity. The increase in Ginis over time was statistically significant, indicating a significant increase in disparity over time.

Figures 4.31 and 4.32 show the inequities in intentional injury hospitalization rates in the first and last time period for urban areas. In 2000/01–2004/05, 53.5% of the hospitalizations occurred in the 19.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.423, also indicating considerable disparity. In 2005/06–2009/10, 49.9% of the hospitalizations occurred in the 19.9% of the population in the lowest income quintile group, with a Gini coefficient of 0.394, also indicating considerable disparity. There was no statistically significant change in the Gini coefficient from the first to the last time period, indicating that inequity in intentional injury hospitalization rates in urban areas did not change over the study period. There was no statistically significant difference in Gini coefficients between rural and urban areas for intentional injury.

A similar pattern, but with less disparity, can be found for unintentional injury hospitalizations in urban areas, where 29.3% of hospitalizations occurred in the 19.2% of the population in U1 (Figure 4.33). The Gini coefficient was 0.160, indicating a moderate degree of disparity across income in unintentional injury rates. In the final time period, 33.0% of the unintentional injury hospitalizations occurred in the 19.9% of the population in U1. The Gini coefficient was 0.182, which was not significantly different from the first time period. This indicates that there was no change in inequity in unintentional injury hospitalizations in urban areas. The Gini for unintentional injury hospitalizations in the rural areas in the final time period was significantly larger than the Gini in the urban areas, indicating more inequity in unintentional injury hospitalizations in the rural compared to urban areas.

Figure 4.27: Lorenz Curve for Intentional Injury Hospitalization in Rural Areas, 2000/01–2004/05
Adjusted by age & sex for children 0–19 years

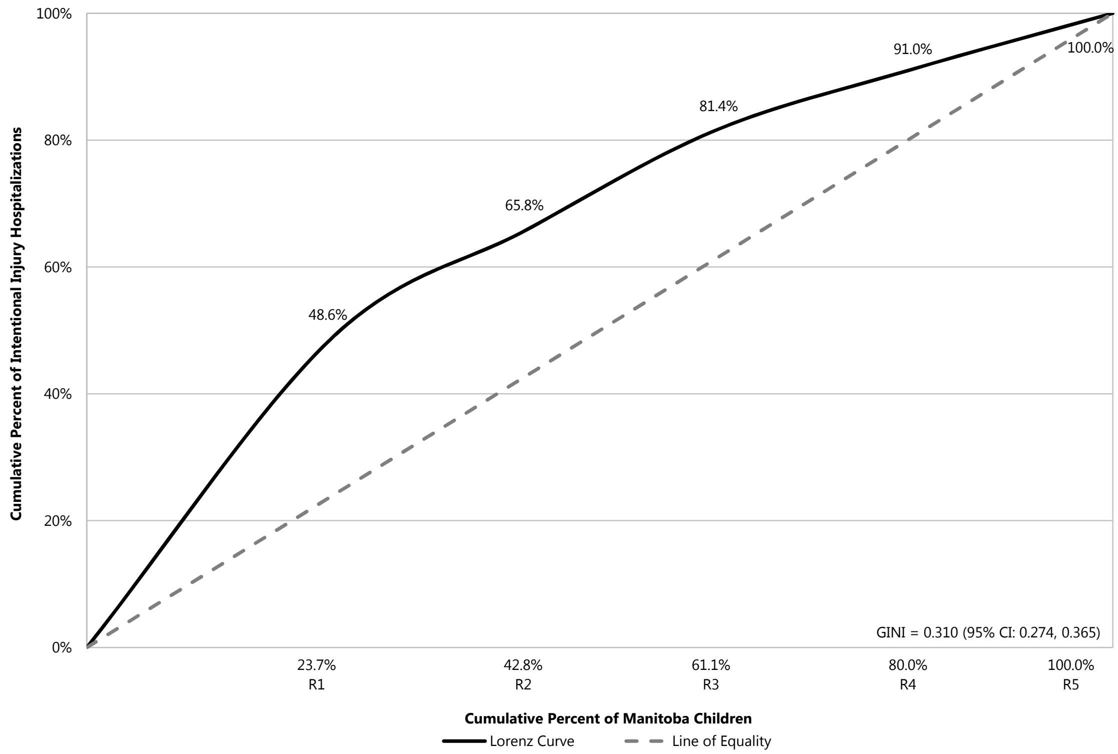


Figure 4.28: Lorenz Curve for Intentional Injury Hospitalization in Rural Areas, 2005/06–2009/10
Adjusted by age & sex for children 0–19 years

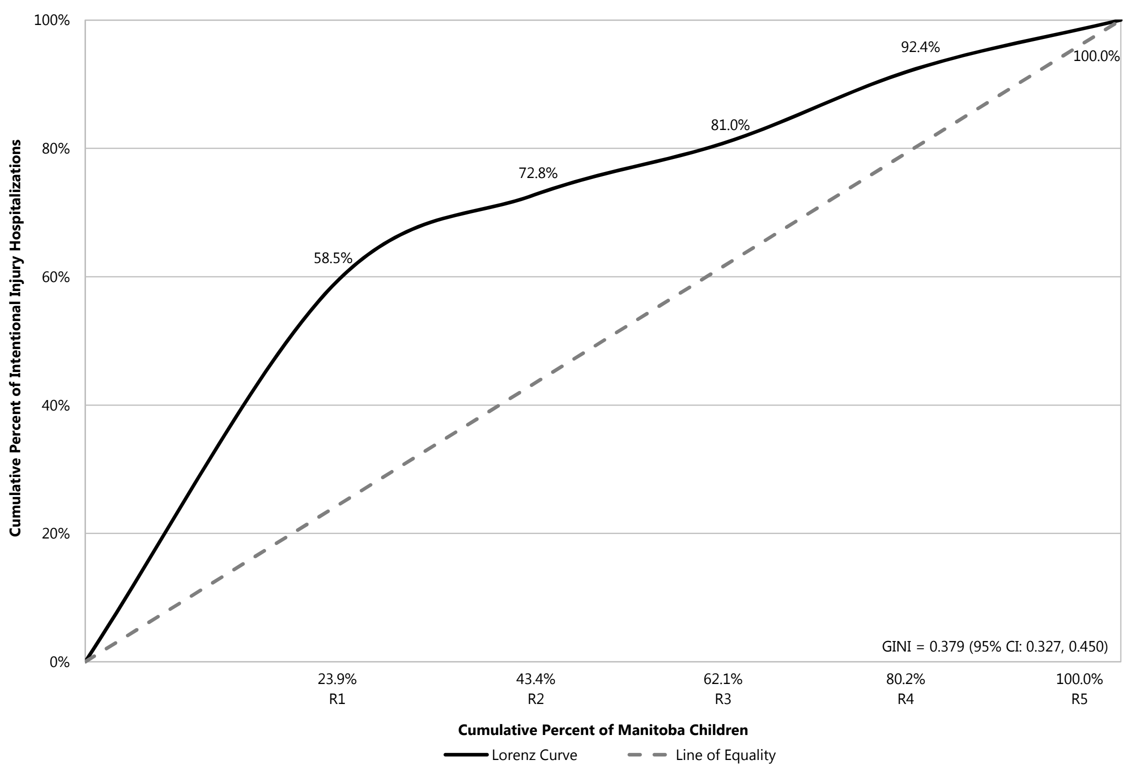


Figure 4.29: Lorenz Curve for Unintentional Injury Hospitalization in Rural Areas, 2000/01–2004/05
Adjusted by age & sex for children 0–19 years

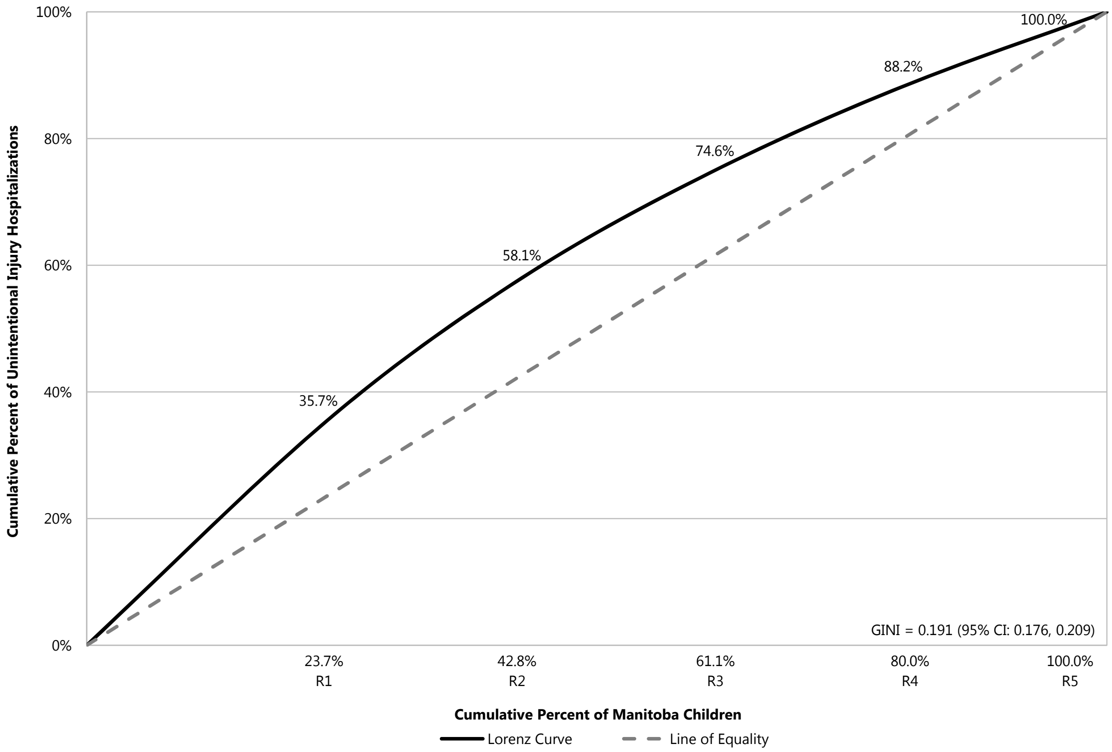


Figure 4.30: Lorenz Curve for Unintentional Injury Hospitalization in Rural Areas, 2005/06–2009/10
Adjusted by age & sex for children 0–19 years

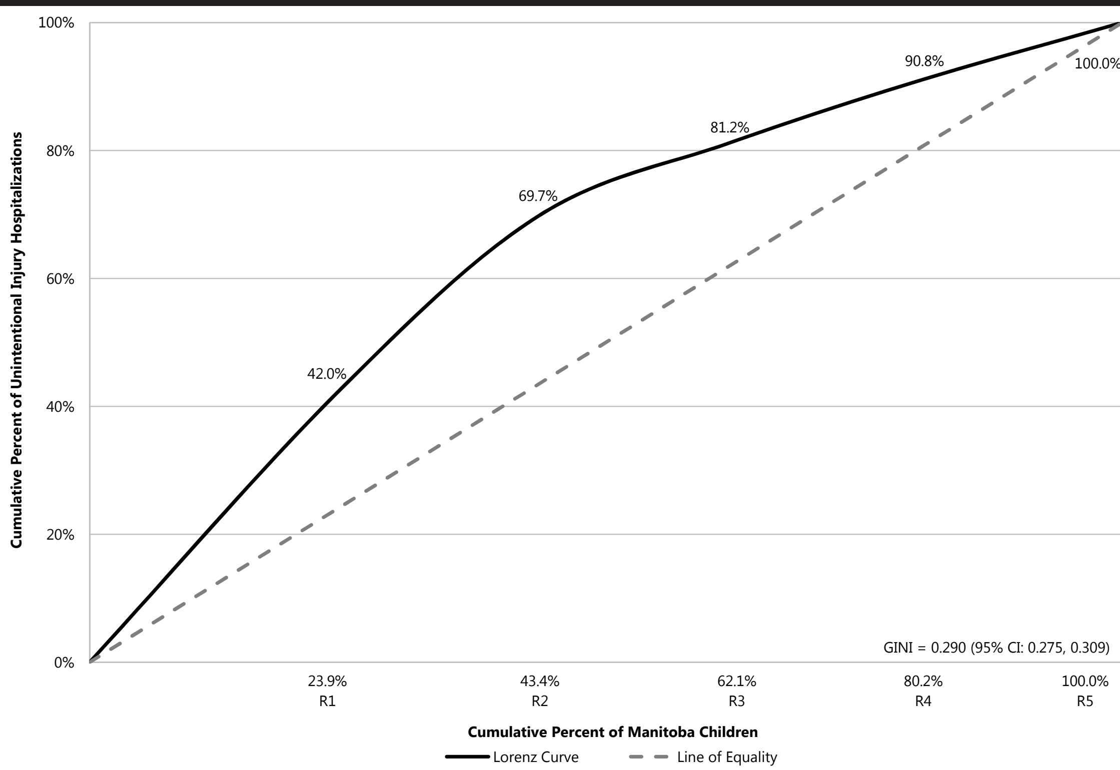


Figure 4.31: Lorenz Curve for Intentional Injury Hospitalization in Urban Areas, 2000/01–2004/05
Adjusted by age & sex for children 0–19 years

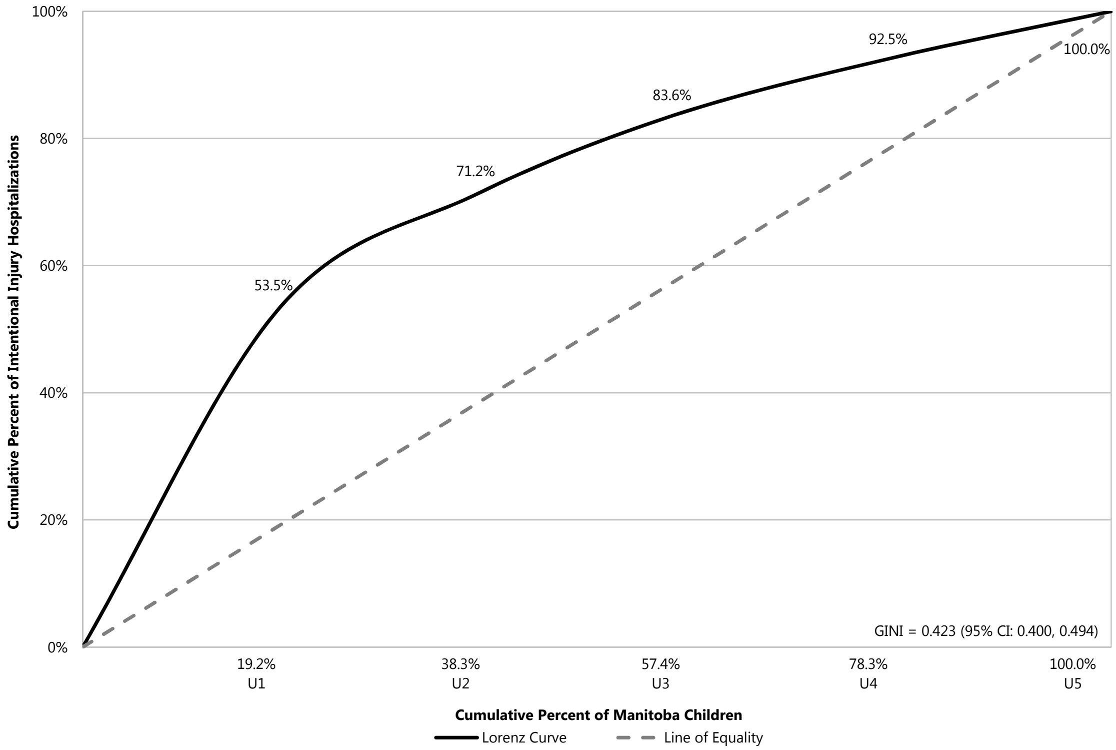


Figure 4.32: Lorenz Curve for Intentional Injury Hospitalization in Urban Areas, 2005/06–2009/10
Adjusted by age & sex for children 0–19 years

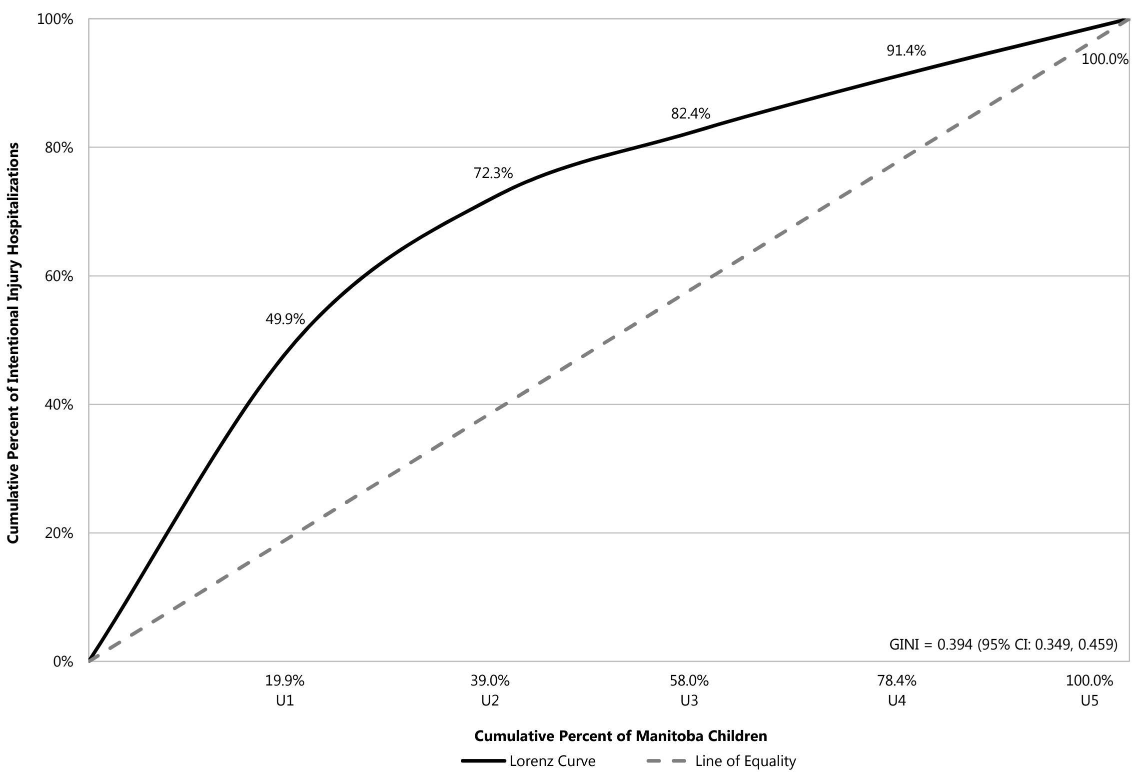


Figure 4.33: Lorenz Curve for Unintentional Injury Hospitalization in Urban Areas, 2000/01–2004/05
Adjusted by age & sex for children 0–19 years

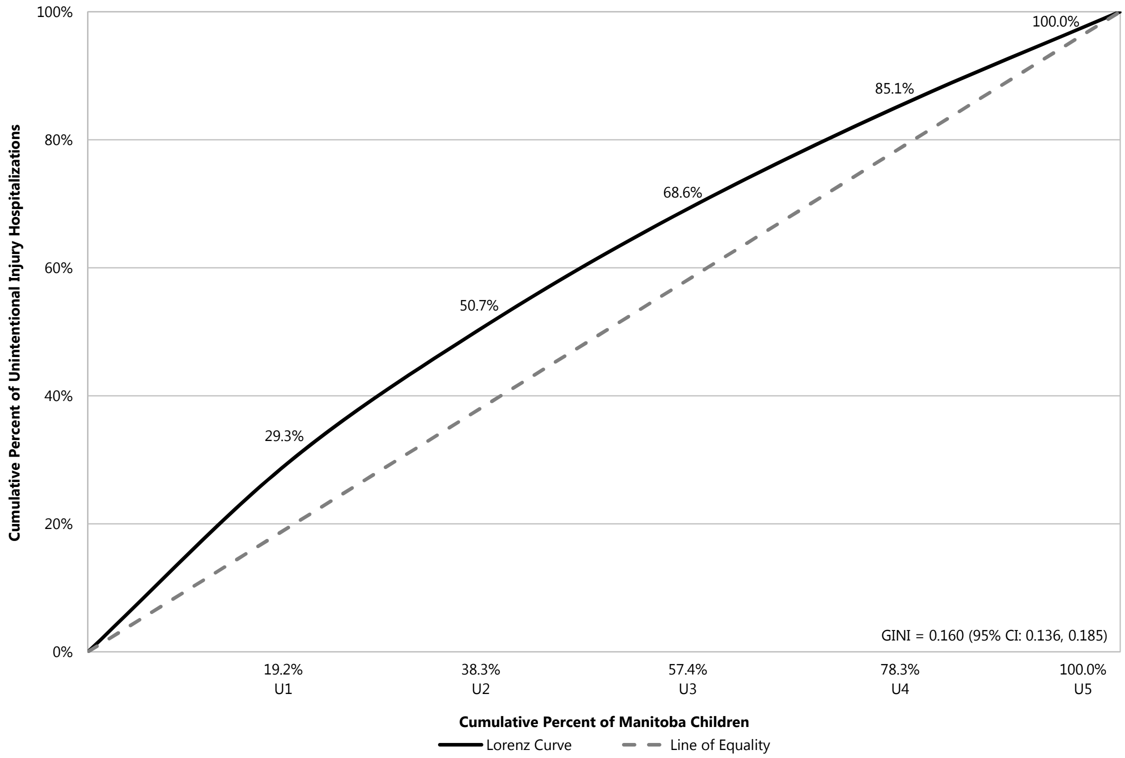
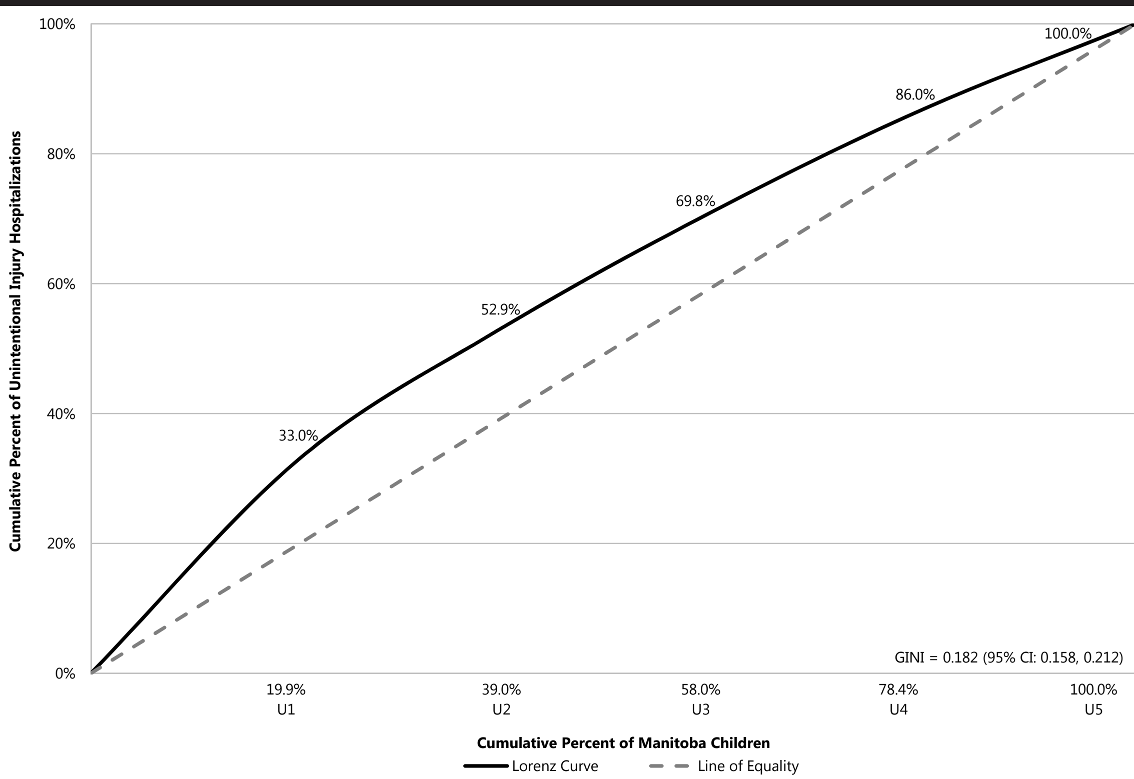


Figure 4.34: Lorenz Curve for Unintentional Injury Hospitalization in Urban Areas, 2005/06–2009/10
Adjusted by age & sex for children 0–19 years



Children in Care

There are situations where a family is unable or unfit to properly look after their child(ren); and in these cases, the child(ren) may be placed into out–of–home (foster) care. Children in care are children who are removed from their families of origin and placed in the care of another adult(s) due to concerns about the proper provision of care in the family of origin. Children can be placed into care for a variety of reasons including abuse, neglect, death or conflict in the family, disability, or emotional difficulties.

In this report, information on children in care was taken from the Child and Family Services Information System (CFSIS) dataset held at MCHP. Prevalence of children in care was examined for three 3–year time periods: 2000/01–2002/03, 2003/04–2005/06, and 2006/07–2008/09. In 2003, the child welfare system in Manitoba began re–structuring after the passing of The Child and Family Services Authorities Act (Aboriginal Affairs and Nothern Development Canada, 2010; Hardy, Schibler, & Hamilton, 2006). Four Authorities were established, two of which were First Nations, and one Metis, and one General Authority. The re–structuring continued in 2004 and 2005. It should be noted that overall, CFSIS use by Aboriginal agencies improved substantially over the time period. However, it is evident that there continues to be undercounting of children served by Aboriginal Agencies. From our analyses, this seems to be particularly apparent during the second and third time period for children living in the North, where numbers of children in care recorded in CFSIS dropped by half between the first and last time period. According to Child and Family Services, one issue may be problems with internet connections in the North, which may affect up to 15% of cases, making it difficult to enter information into CFSIS. Results from the North should be interpreted with this undercounting in mind.

The prevalence of children in care was determined at regional levels using the postal code available from the MCHP Research Registry (Research Registry) to place children into regions of residence. As such, these postal codes represent the current location of the registered family head rather than the current location of the child and likely reflect the child's residence prior to being taken into care. Because child welfare services generally end when a child turns 18 years of age, we examined prevalence for children 0 to 17 years of age.

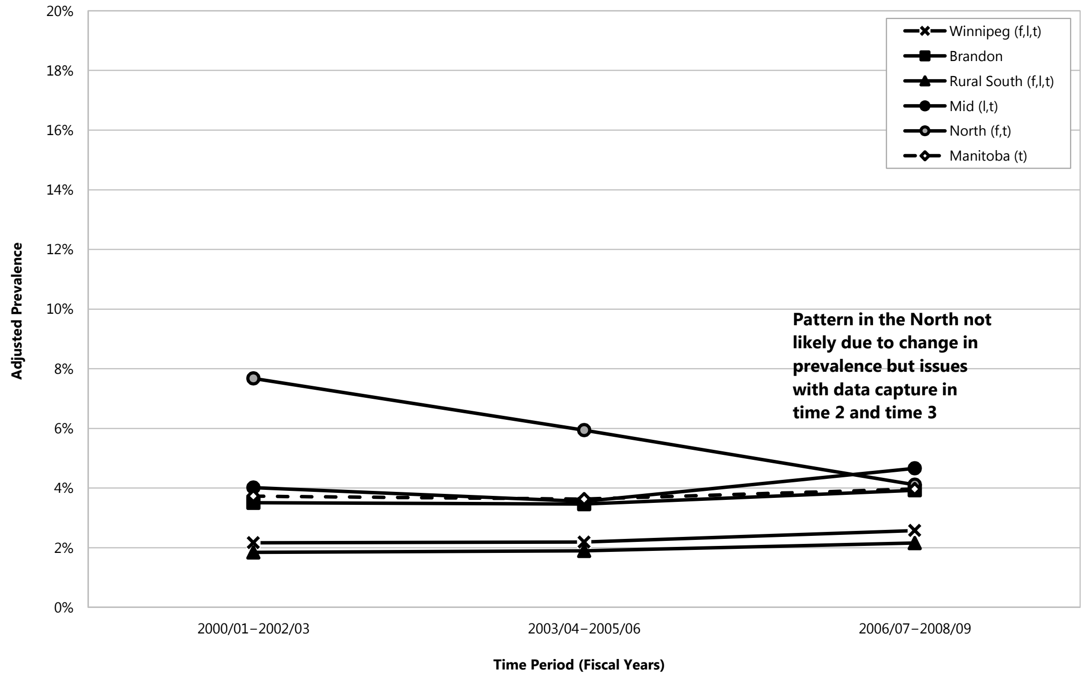
Regional Trends Over Time

Figure 4.35 shows that the prevalence of children in care increased significantly in Manitoba over the study period, from 3.7% in 2000/01–2002/03 to 4.0% in 2006/07–2008/09. This is likely an underestimate of the increase given the undercounting in the North in the second and third time periods. Prevalence for Winnipeg (2.2% to 2.6%), Rural South (1.8% to 2.2%), and Mid (4.0% to 4.7%) increased significantly over the time period. Prevalence in the North appeared to decrease over the study period; again, this is likely not a reflection of real changes in the prevalence of children in care from the North, but due to issues with undercounting children in this area in the second and third time period. The prevalence in the North was significantly higher than the Manitoba average in the first time period (at 7.7%), whereas the prevalence in Winnipeg and Rural South was significantly lower than the Manitoba average in both time periods. The prevalence in Mid was significantly higher than the Manitoba average in the final time period.

Trends by Age Group

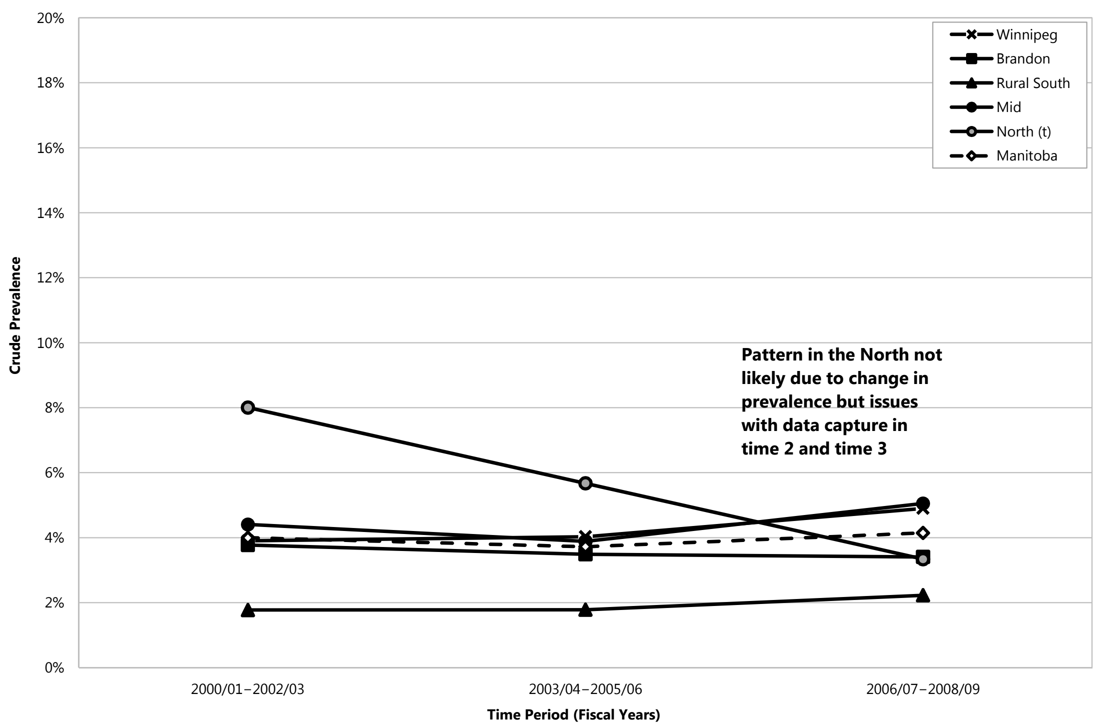
Figures 4.36 to 4.38 show the **crude prevalence** of children in care by age group for the three time periods. Prevalence tends to be higher for the youngest and oldest age groups. These patterns differ somewhat when broken down by both age and sex. The highest prevalence is found for females 13 to 17 years of age, and the lowest prevalence is for males in this age group. Results disaggregated by age and sex can be found in the online Appendix.

Figure 4.35: Prevalence of Children in Care by Aggregate Region, 2000/01–2002/03 to 2006/07–2008/09
Age– & sex–adjusted prevalence for children 0–17 years



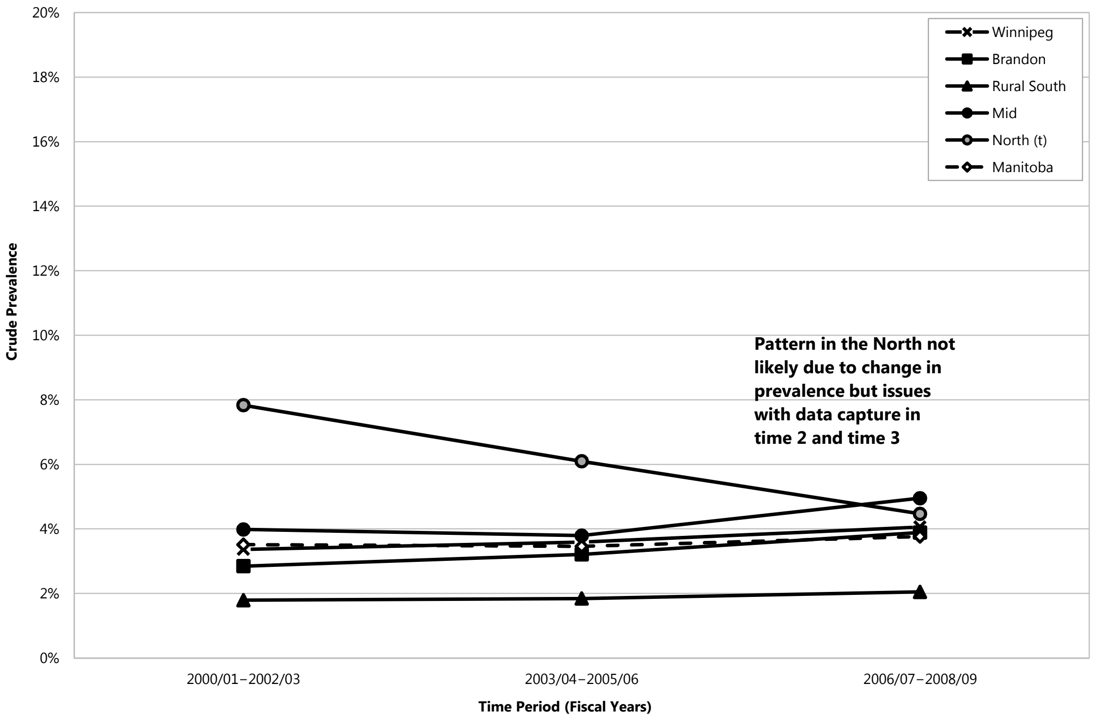
f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

Figure 4.36: Prevalence of Children in Care by Aggregate Region and 0 to 5 Age Group, 2000/01–2002/03 to 2006/07–2008/09
Crude prevalence for children



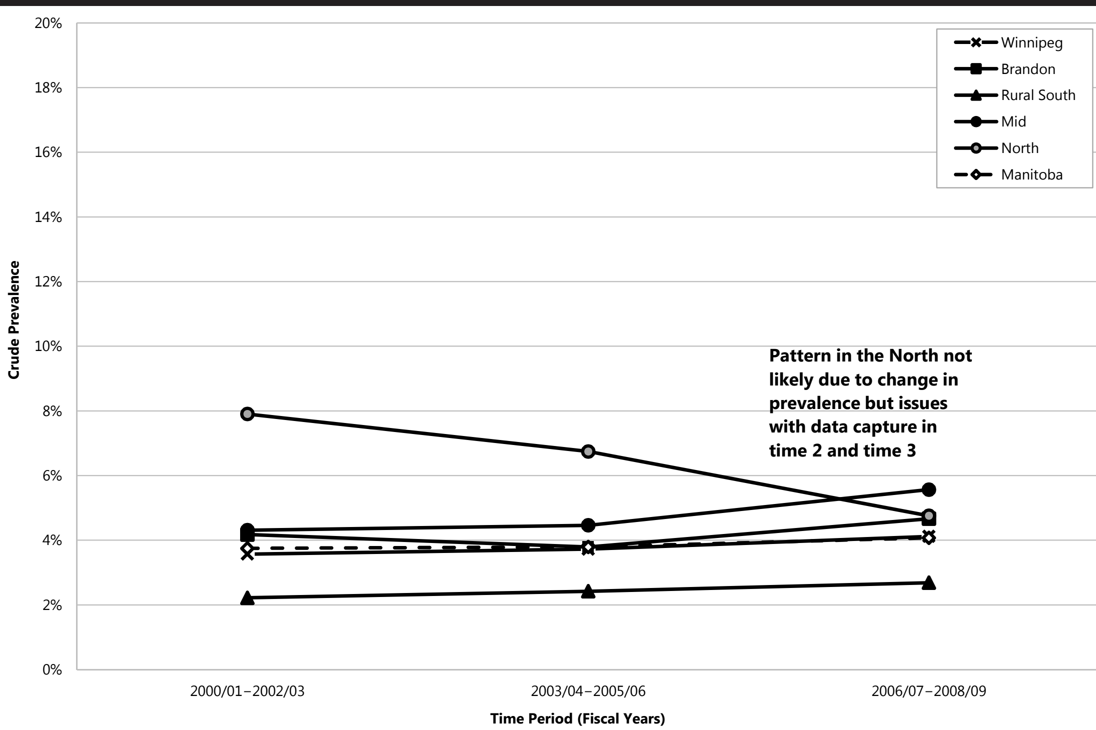
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 4.37: Prevalence of Children in Care by Aggregate Region and 6 to 12 Age Group, 2000/01–2002/03 to 2006/07–2008/09
Crude prevalence for children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Figure 4.38: Prevalence of Children in Care by Aggregate Region and 13 to 17 Age Group, 2000/01–2002/03 to 2006/07–2008/09
Crude prevalence for children



t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Trends by Socioeconomic Status

Figure 4.39 shows prevalence of children in care by rural income quintiles over the three time periods. There are statistically significant SES gradients in prevalence of children in care in each of the time periods examined with the highest prevalence found in R1, the area with the lowest SES, and the lowest prevalence found in R5, the area with the highest SES. For example, in time 1, the prevalence of children in care in R1 was 7.8% compared to only 1.8% in R5. Keep in mind that missing data in the North for time 2 and 3 may affect the trends shown in the figure.

Figure 4.40 shows prevalence of children in care by urban income quintiles. There are statistically significant SES gradients with the highest prevalence of children in care found for children from U1, the area with the lowest SES, and prevalence decreasing as income increases. For example, in time 3, the prevalence of children in care in U1 was 14.1% compared to 0.3% in U5.

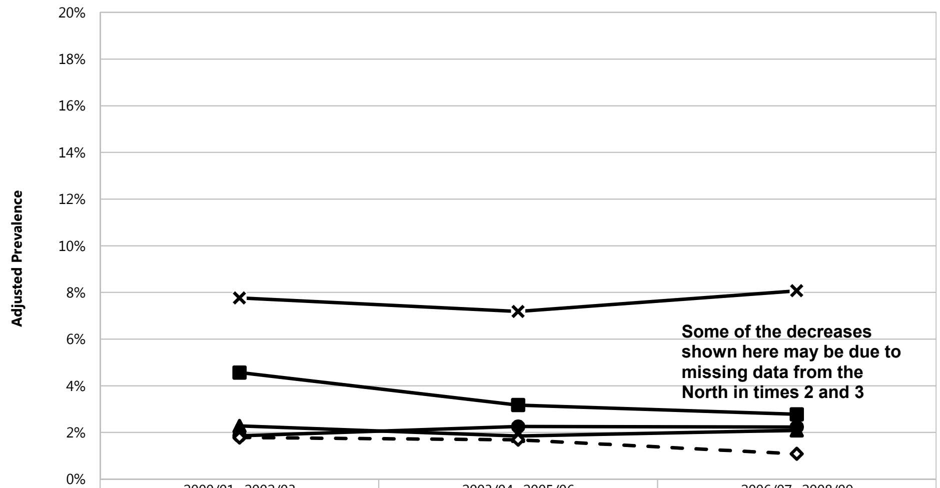
Changes in Inequity Over Time

Figures 4.41 and 4.42 show the inequities in prevalence of children in care in 2000/01–2002/03 and 2006/07–2008/09, respectively, for rural areas. In the first time period, 46.9% of the children in care came from the 23.2% of the population in the lowest income quintile group (R1), with a Gini coefficient of 0.324, indicating a high degree of disparity. In the final time period, 55.8% of the children in care came from the 24.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.368, also indicating high disparity. The Gini coefficient increased significantly from the first to the last time period, indicating that inequity in children in care prevalence increased over the study period in rural areas. Keep in mind that there are missing data in the last time period in the North, and it is not known how this would affect results.

Figures 4.43 and 4.44 show the inequities in prevalence of children in care in the first and last time period for urban areas. In 2000/01–2002/03, 63.6% of the children in care were from the 19.1% of the population in the lowest income quintile group, with a Gini coefficient of 0.571, indicating considerable disparity. In 2006/07–2008/09, 66.7% of the children in care were from the 20.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.582, also indicating high disparity. The Gini coefficient did not change significantly from the first to the last time period, indicating that inequity in prevalence of children in care in urban areas did not change over the study period. The Gini coefficient for urban areas was significantly higher than that in rural areas in the final time period, indicating greater inequity in urban compared to rural areas for prevalence of children in care. It is not known how missing data for the North in the last time period may have affected these results.

Figure 4.39: Prevalence of Children in Care by Rural Income Quintile, 2000/01–2002/03 to 2006/07–2008/09

Age– & sex–adjusted prevalence for children 0–17 years



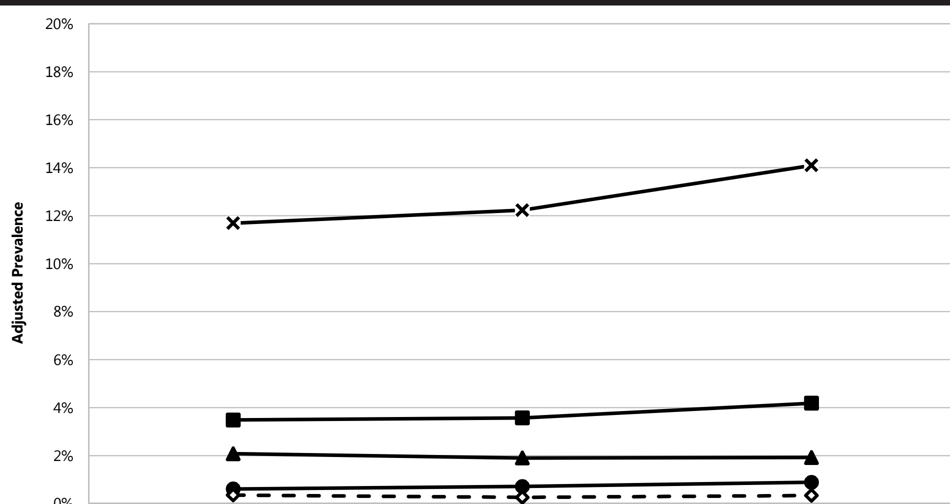
	2000/01–2002/03	2003/04–2005/06	2006/07–2008/09
Income Unknown	10.23%	6.91%	8.32%
R1 – Lowest Income	7.76%	7.19%	8.07%
R2 (t)	4.57%	3.17%	2.78%
R3	2.28%	1.85%	2.09%
R4 (t)	1.86%	2.26%	2.24%
R5 – Highest Income (t)	1.78%	1.69%	1.08%
Linear trend across R1–R5	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 4.40: Prevalence of Children in Care by Urban Income Quintile, 2000/01–2002/03 to 2006/07–2008/09

Age– & sex–adjusted prevalence for children 0–17 years



	2000/01–2002/03	2003/04–2005/06	2006/07–2008/09
Income Unknown	10.23%	6.91%	8.32%
U1 – Lowest Income (t)	11.69%	12.23%	14.09%
U2 (t)	3.49%	3.57%	4.18%
U3	2.08%	1.90%	1.92%
U4 (t)	0.61%	0.71%	0.89%
U5 – Highest Income	0.35%	0.26%	0.34%
Linear trend across U1–U5	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 4.41: Lorenz Curve for Children in Care in Rural Areas, 2000/01–2002/03
Adjusted by age & sex for children 0–17 years

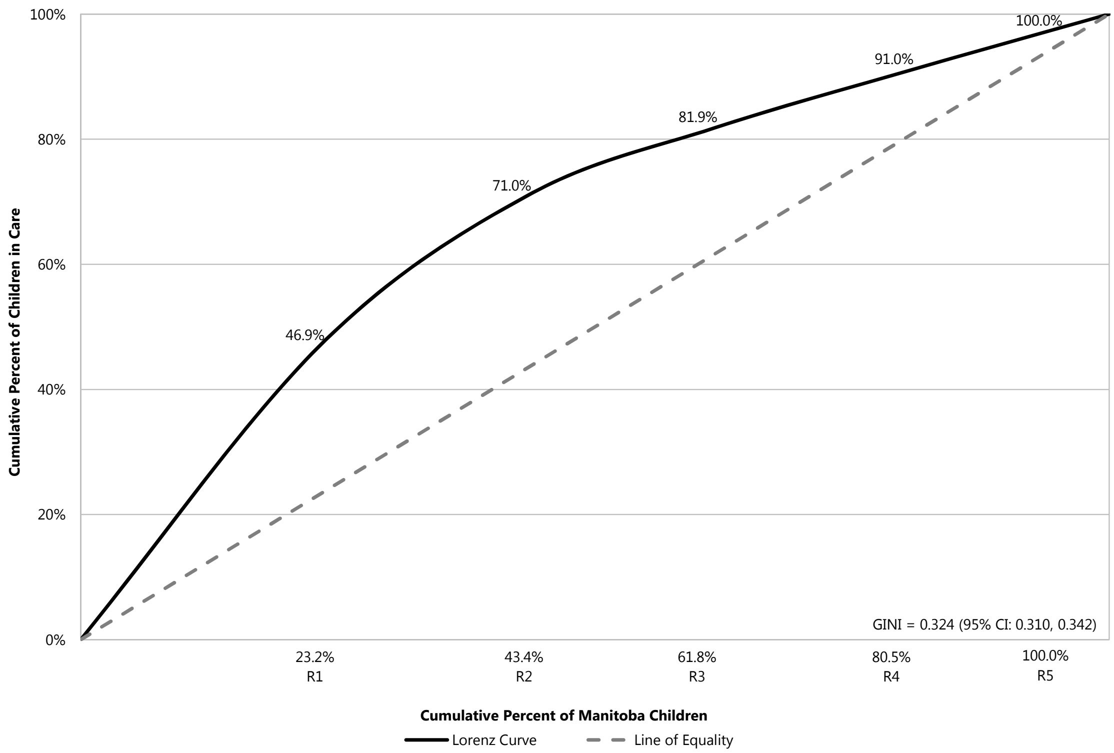


Figure 4.42: Lorenz Curve for Children in Care in Rural Areas, 2006/07–2008/09
Adjusted by age & sex for children 0–17 years

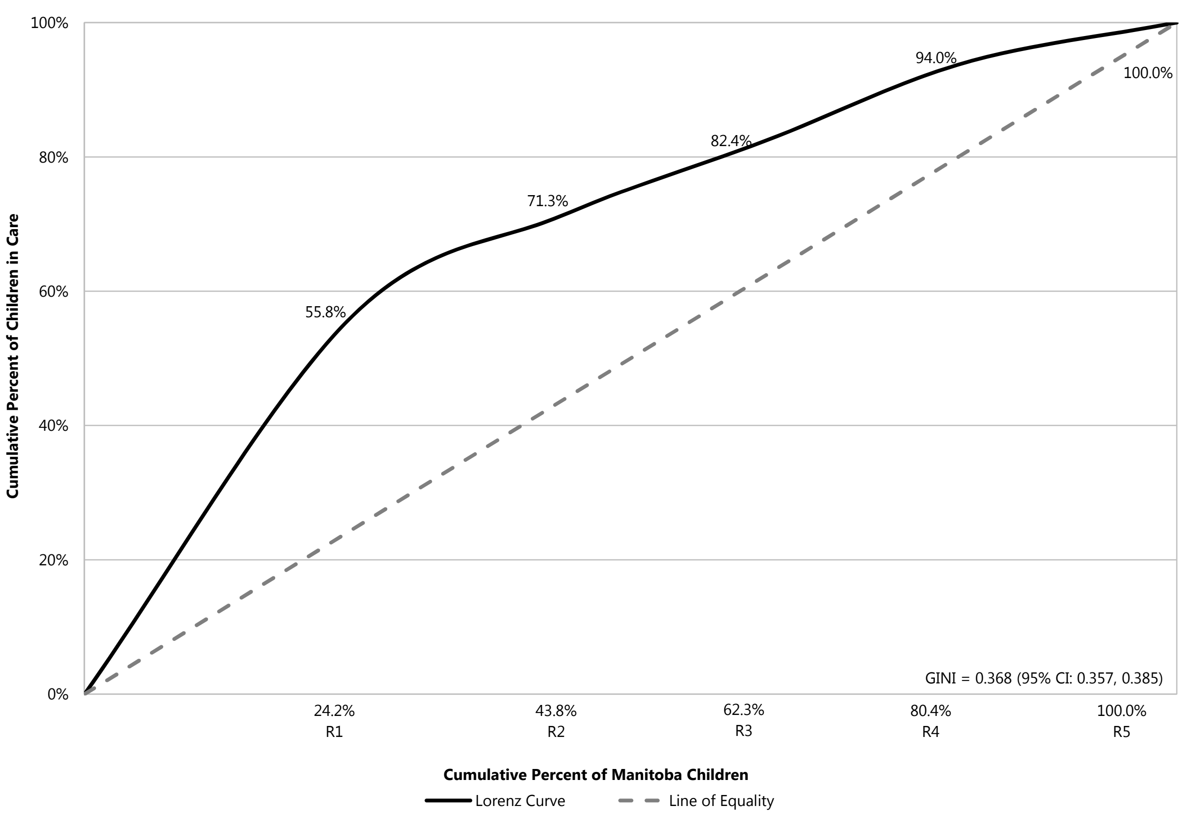


Figure 4.43: Lorenz Curve for Children in Care in Urban Areas, 2000/01–2002/03
Adjusted by age & sex for children 0–17 years

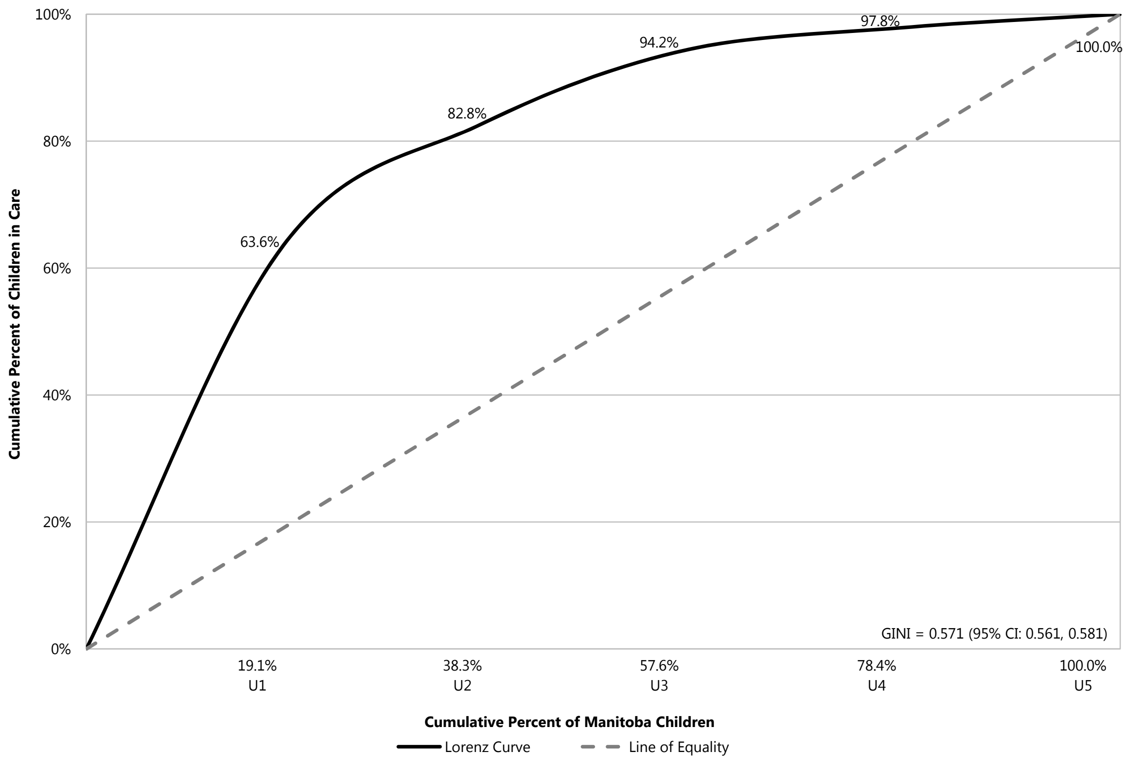
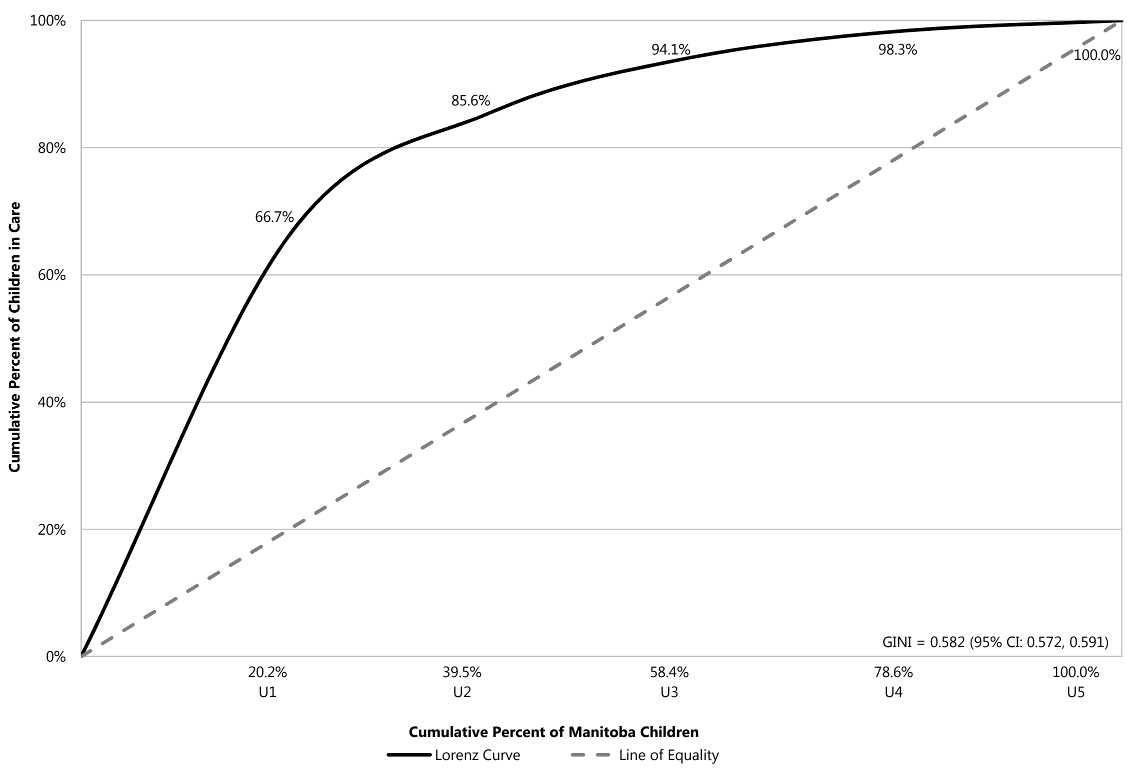


Figure 4.44: Lorenz Curve for Children in Care in Urban Areas, 2006/07–2008/09
Adjusted by age & sex for children 0–17 years



What do these results mean?

The prevalence of children in care is high in Canada relative to other countries (Thoburn, 2007), and Manitoba's rate of out–of–home placements is one of the highest in Canada (Mulcahy & Trocmé, 2010). Indeed, Manitoba's prevalence of out–of–home placements for children up to 11 years is 10 times higher than Western Australia's (Mulcahy & Trocmé, 2010). Our results show that prevalence of children in care increased in Manitoba over the study period; incomplete data may have masked the extent of that increase. Given that these children have poorer health and educational outcomes (Brownell et al., 2008; Brownell et al., 2010; Katz et al., 2011), it is important to have accurate data on children in care for planning purposes. Incomplete data poses difficulties for building consistent evidence to inform policy.

There is a high degree of inequity in children in care, and this inequity increased over the study period in rural areas. Although not examined in this report, there is a disproportionate representation of Aboriginal children in care, comprising over 85% of the children in care in Manitoba on March 31, 2011 (Manitoba Family Services and Consumer Affairs, 2011). The large number of children in care in Manitoba (9,432 on March 31, 2011 (Manitoba Family Services and Consumer Affairs, 2011)) raises questions about the sustainability of providing high quality foster care in some communities (Gilbert et al., 2012) and underscores the importance of ensuring effective prevention and support services are available to families.

Children in a Family Receiving Services from Child and Family Services

The Child and Family Services Information System (CFSIS) includes information on children in a family receiving (protective) services from Child and Family Services (CFS). These services are provided when a child is seen as in need of protection because his/her health or emotional well–being is endangered, but do not entail removal of the child from the home. CFSIS also includes information on families receiving voluntary support services, which are services that the family requests to aid in the resolution of family matters. "Protection" and "support" are distinct categories of services; but because these distinctions are often blurred, for the purpose of this report, children living in families receiving either of these two categories of service are analyzed together under the category "receiving services from CFS".

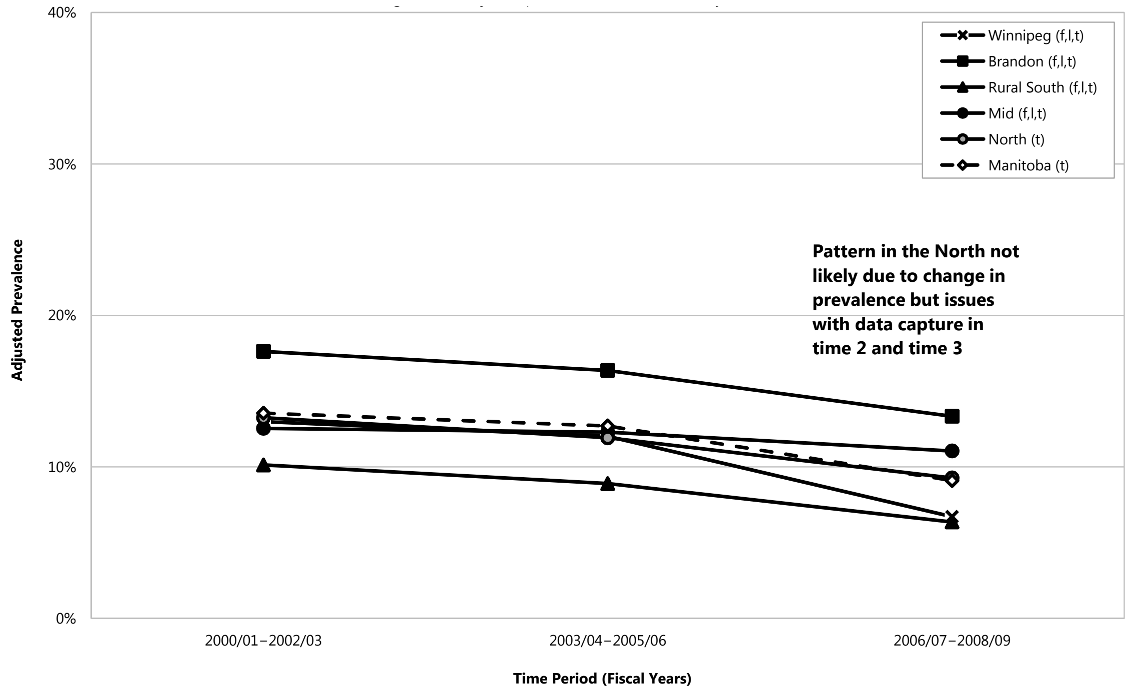
For this indicator, we examined data for children 0 to 17 years of age in three 3–year time periods: 2000/01–2002/03, 2003/04–2005/06, and 2006/07–2008/09. As was noted above in the Children in Care Section, changes to the child welfare system starting in 2003 and continuing through 2004 and 2005 may have had an impact on the recording of data in CFSIS. Preliminary analyses at MCHP found substantial decreases in the number of children in a family receiving services around the time of devolution, not just in rural regions but in Winnipeg as well.

Regional Trends Over Time

Figure 4.45 shows that the prevalence of children in a family receiving protection or support services decreased significantly in Manitoba over the study period, from 13.5% in 2000/01–2002/03 to 9.1% in 2006/07–2008/09. At least part of this decrease may be due to a side effect of the re–structuring of child welfare that occurred in the latter two time periods. Cases which were no longer receiving services were closed in preparation for re–structuring (Richard Asselin, personal communication, July 2012). As well, there is the issue of incomplete entry of information about families receiving services into CFSIS. Prevalence of children in families receiving services decreased significantly for all aggregate regions: Winnipeg went from 13.0% to 6.7%, Brandon from 17.6% to 13.4%, Rural South from 10.1% to 6.4%, Mid from12.6% to 11.1%, and North from 13.3% to 9.3%. The prevalence in Winnipeg and Rural South was significantly lower than the provincial average in both time periods, whereas the prevalence in

Brandon was significantly higher than the Manitoba average in the both time periods; prevalence in Mid was significantly lower in the first time period and higher in the second time period compared to the Manitoba average.

Figure 4.45: Prevalence of Children in a Family Receiving Services from CFS by Aggregate Region, 2000/01–2002/03 to 2006/07–2008/09
Age– & sex–adjusted prevalence for children 0–17 years



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

Trends by Age Group

The highest prevalence is found for females 13 to 17 years of age and the lowest prevalence for males 13 to 17 years. These results can be found in the online Appendix.

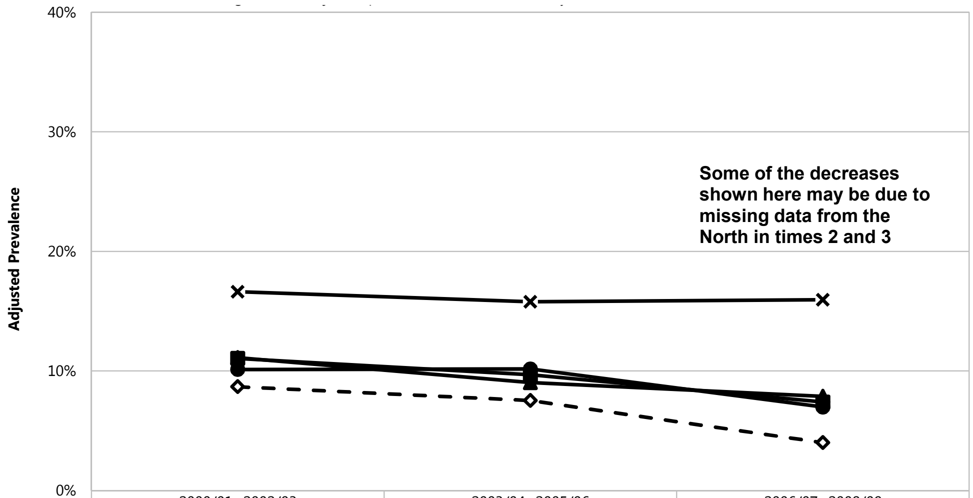
Trends by Socioeconomic Status

Figure 4.46 shows prevalence of children in families receiving services by rural income quintiles over the three time periods. There are statistically significant SES gradients in prevalence of children in families receiving services in each of the time periods examined with the highest prevalence found in R1, the area with the lowest SES, and the lowest prevalence found in R5, the area with the highest SES. For example, in time 3, the prevalence of children in families receiving services in R1 was 15.9% compared to only 4.0% in R5. All income areas with the exception of R1 showed significant decreases in prevalence of children in families receiving services. This could be influenced by incomplete data in the second and third time period.

Figure 4.47 shows prevalence of children in families receiving services by urban income quintiles. There are statistically significant SES gradients in each time period with the highest prevalence of children in families receiving services found for children from U1, the area with the lowest SES, and prevalence decreasing as income increases. For example, in time 3, the prevalence of children in families receiving services in U1 was 25.8% compared to 1.5% in U5. All income areas showed significant decreases over time in the prevalence of children receiving services.

Figure 4.46: Prevalence of Children in a Family Receiving Services from CFS by Rural Income Quintile, 2000/01–2002/03 to 2006/07–2008/09

Age– & sex–adjusted prevalence for children 0–17 years



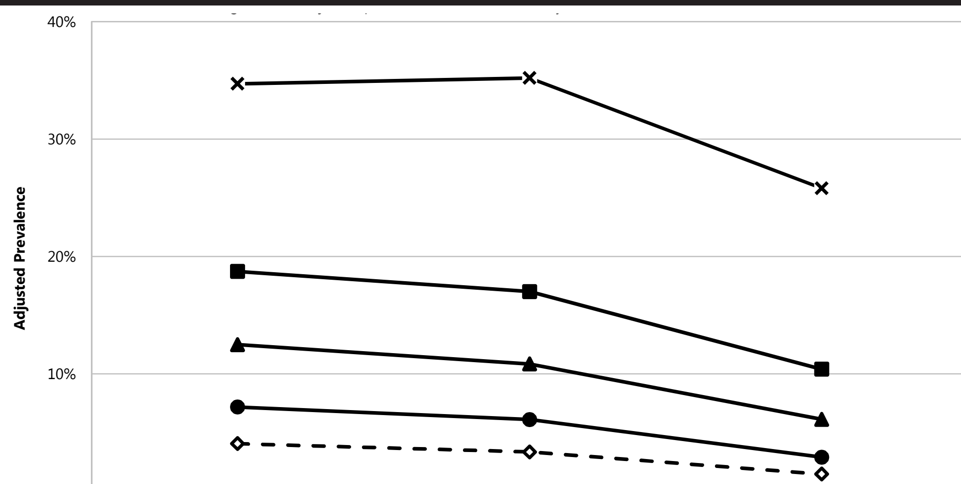
	2000/01–2002/03	2003/04–2005/06	2006/07–2008/09
Income Unknown (t)	10.69%	7.90%	6.48%
R1 – Lowest Income	16.62%	15.78%	15.95%
R2 (t)	11.05%	9.68%	7.40%
R3 (t)	11.12%	9.03%	7.88%
R4 (t)	10.13%	10.16%	6.98%
R5 – Highest Income (t)	8.68%	7.53%	4.00%
Linear trend across R1–R5	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 4.47: Prevalence of Children in a Family Receiving Services from CFS by Urban Income Quintile, 2000/01–2002/03 to 2006/07–2008/09

Age– & sex–adjusted prevalence for children 0–17 years



	2000/01–2002/03	2003/04–2005/06	2006/07–2008/09
Income Unknown (t)	10.69%	7.90%	6.48%
U1 – Lowest Income (t)	34.71%	35.20%	25.81%
U2 (t)	18.72%	17.01%	10.40%
U3 (t)	12.48%	10.84%	6.12%
U4 (t)	7.17%	6.11%	2.90%
U5 – Highest Income (t)	4.05%	3.34%	1.46%
Linear trend across U1–U5	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 4.48 and 4.49 show the inequities in prevalence of children in families receiving services in 2000/01–2002/03 and 2006/07–2008/09, respectively, for rural areas. In the first time period, 32.8% of the children in families receiving services came from the 23.2% of the population in the lowest income quintile group (R1), with a Gini coefficient of 0.122, indicating a moderate degree of disparity. In the final time period, 43.8% of the children in families receiving services came from the 24.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.242, indicating a high degree of disparity. The Gini coefficient increased significantly from the first to the last time period, indicating that inequity in prevalence of children in families receiving services increased over the study period in rural areas. Keep in mind that there are missing data in the last time period in the North, and it is not known how this would affect results.

Figures 4.50 and 4.51 show the inequities in prevalence of children in families receiving services in the first and last time period for urban areas. In 2000/01–2002/03, 44.1% of the children in families receiving services were from the 19.1% of the population in the lowest income quintile group, with a Gini coefficient of 0.385, indicating a high degree of disparity. In 2006/07–2008/09, 56.2% of the children in families receiving services were from the 20.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.489, also indicating high disparity. The Gini coefficient increased significantly from the first to the last time period, indicating that inequity in prevalence of children in families receiving services in urban areas increased over the study period. The Gini coefficient for urban areas was significantly higher than that in rural areas in the final time period, indicating greater inequity in urban compared to rural areas for prevalence of children in families receiving services. It is not known how missing data for families served by Aboriginal Agencies may have affected these results.

Figure 4.48: Lorenz Curve for Children in a Family Receiving Services from CFS in Rural Areas, 2000/01–2002/03
Adjusted by age & sex for children 0–17 years

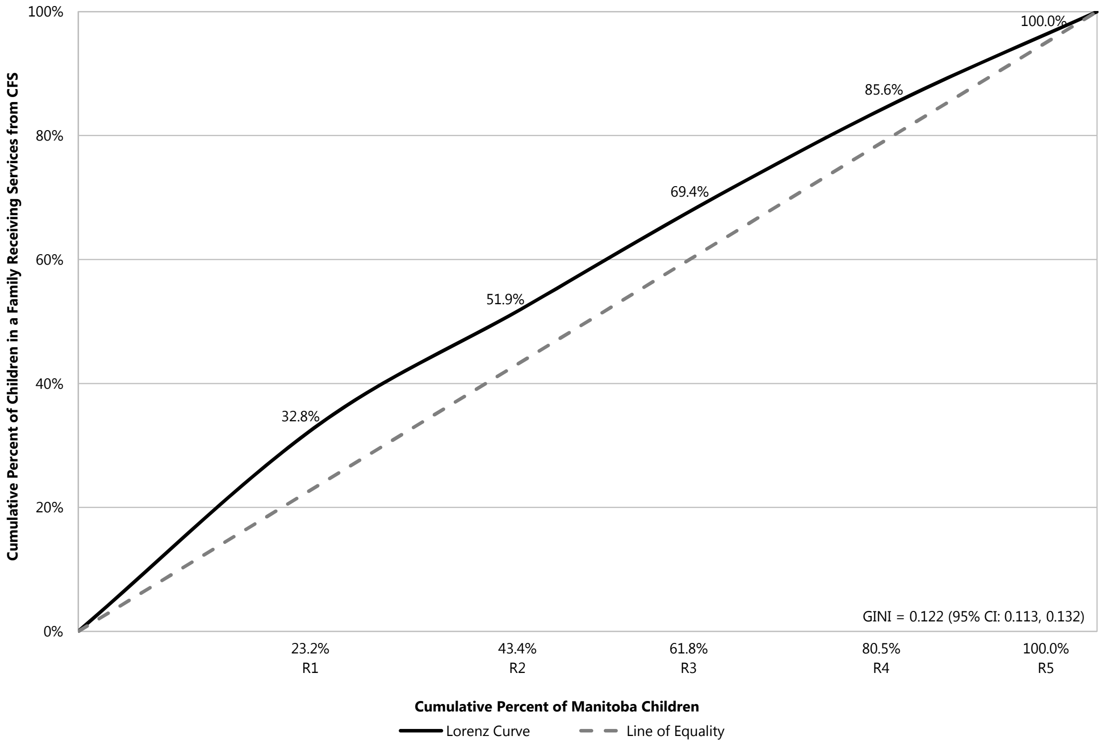


Figure 4.49: Lorenz Curve for Children in a Family Receiving Services from CFS in Rural Areas, 2006/07–2008/09
Adjusted by age & sex for children 0–17 years

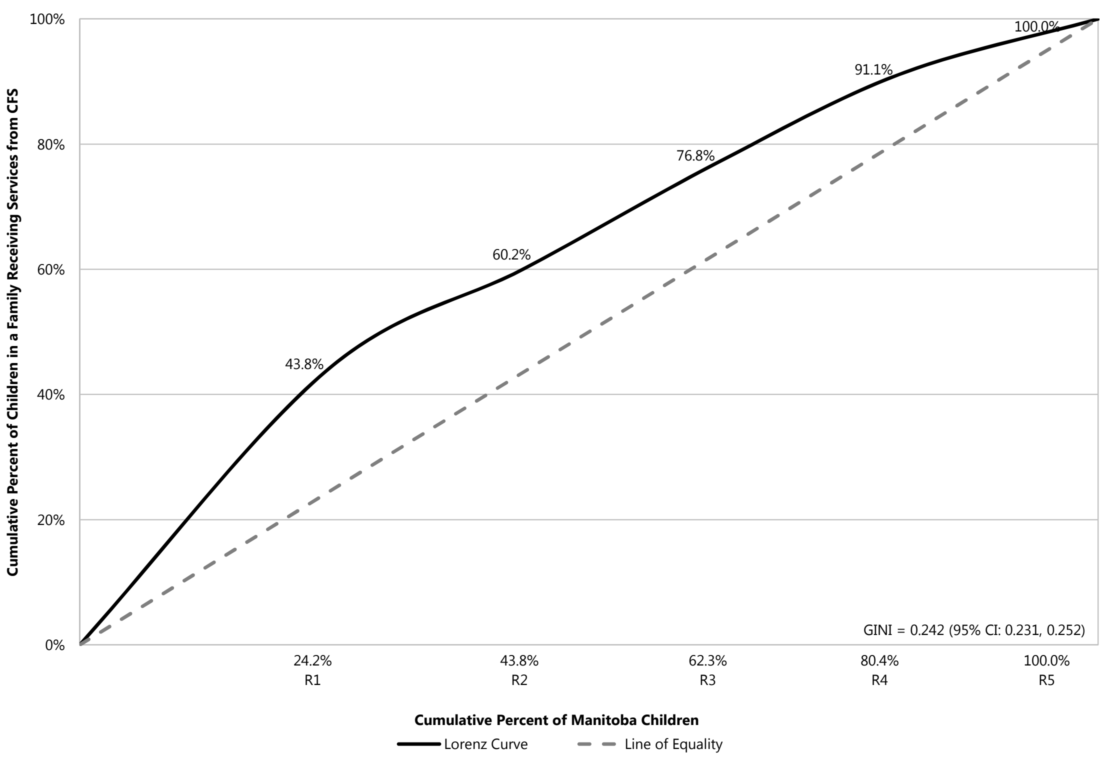


Figure 4.50: Lorenz Curve for Children in a Family Receiving Services from CFS in Urban Areas, 2000/01–2002/03
Adjusted by age & sex for children 0–17 years

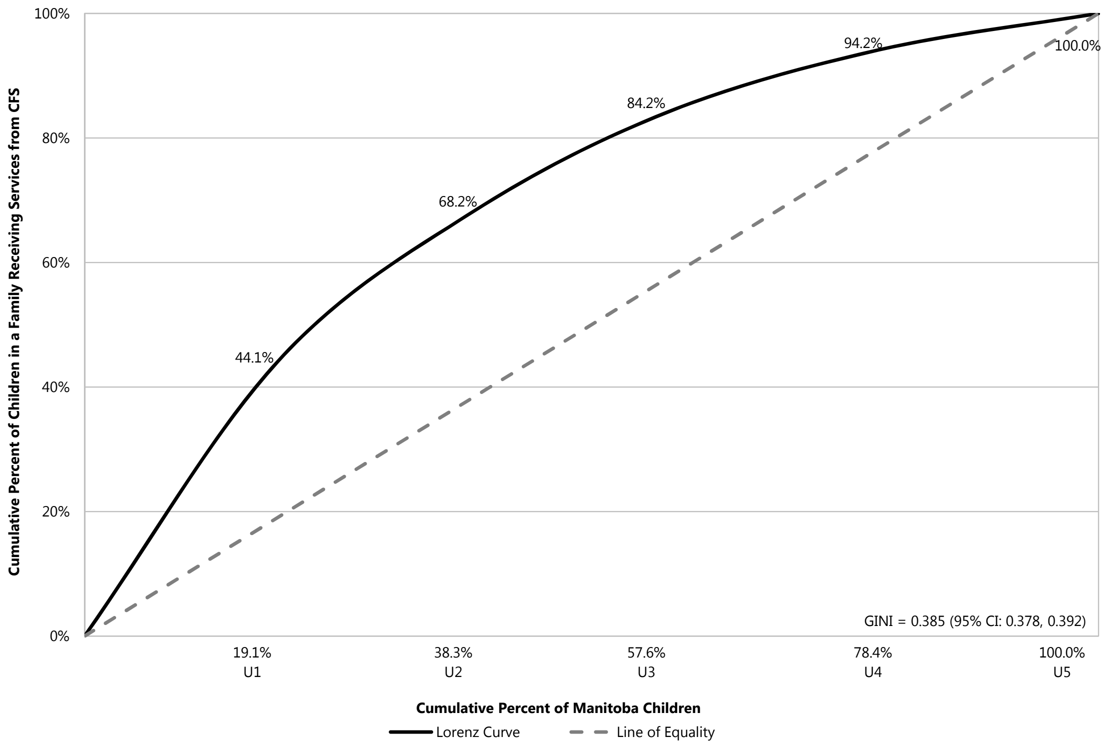
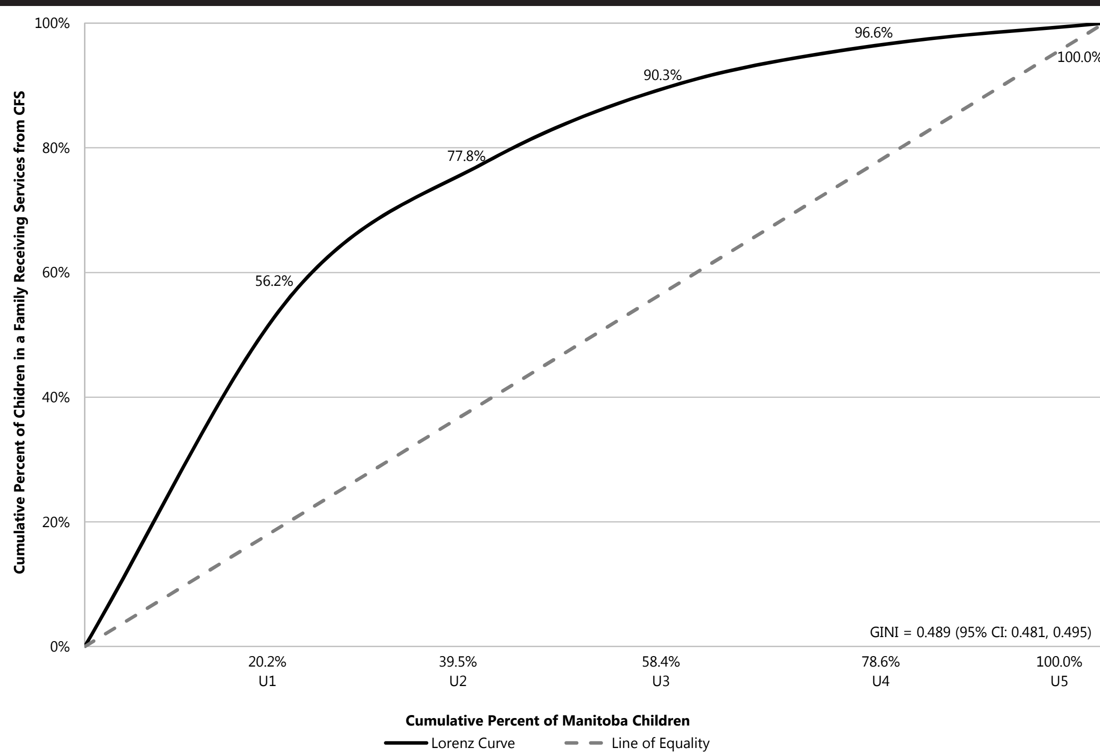


Figure 4.51: Lorenz Curve for Children in a Family Receiving Services from CFS in Urban Areas, 2006/07–2008/09
Adjusted by age & sex for children 0–17 years



Chapter 5: Successful Learning

In this chapter, we look at a number of indicators of successful learning. As with the health indicators in previous chapters, most of the indicators in this chapter are displayed by aggregate region and by area–level income, with results by Regional Health Authority (RHA) and Winnipeg Community Area (CA) available in the online appendix. Most of the data in this chapter come from Manitoba Education, which collects information from schools and school divisions on children's enrolment and performance in Manitoba schools. The Manitoba Education data include children in Kindergarten through Grade 12 in both public and funded **independent schools**. Because First Nations schools come under federal jurisdiction, they are not required to submit enrolment or assessment data to the provincial Department of Education; and although many do, data from these schools are incomplete. For this reason, children attending First Nations schools are excluded from many of the analyses described below.

As was the case with health indicators, when the education indicators in this chapter are displayed by aggregate region, RHA, CA or income quintile, they reflect where the children live, not necessarily where they attended school. For example, a child may live in the St. Vital area of Winnipeg but attend school in St. Boniface. The outcomes for this child would be attributed back to his/her residence in St. Vital rather than the area s/he attended school. This helps to focus the discussion of education outcomes on the influence of demographic and socioeconomic conditions of the child's community, rather than on the school attended.

Outcomes for indicators are displayed according to school year (September through June) rather than fiscal year.

Special Education Funding

In this section, we examine the rate of children 5 to 18 years of age who received **special education funding** support through the Department of Education.[23] This funding is available for students with special needs who require extensive supports in the classroom (Manitoba Education, 2012b). The funding is available at two levels of support. Level II support is provided to students who require individualized instruction for a major portion of the school day, and includes students with severe multiple disabilities, severe psychoses, moderate autism spectrum disorders, and students who are deaf or hard of hearing, severely visually impaired or have a very severe emotional/behavioural disorder. Level III support is provided to students who require specialized support significantly beyond that required by students receiving Level II support, including individualized instruction for the entire school day. This includes students with profound multiple disabilities, severe to profound autism spectrum disorders, profound deafness, blind students, and students with profound emotional and behavioural disorders.

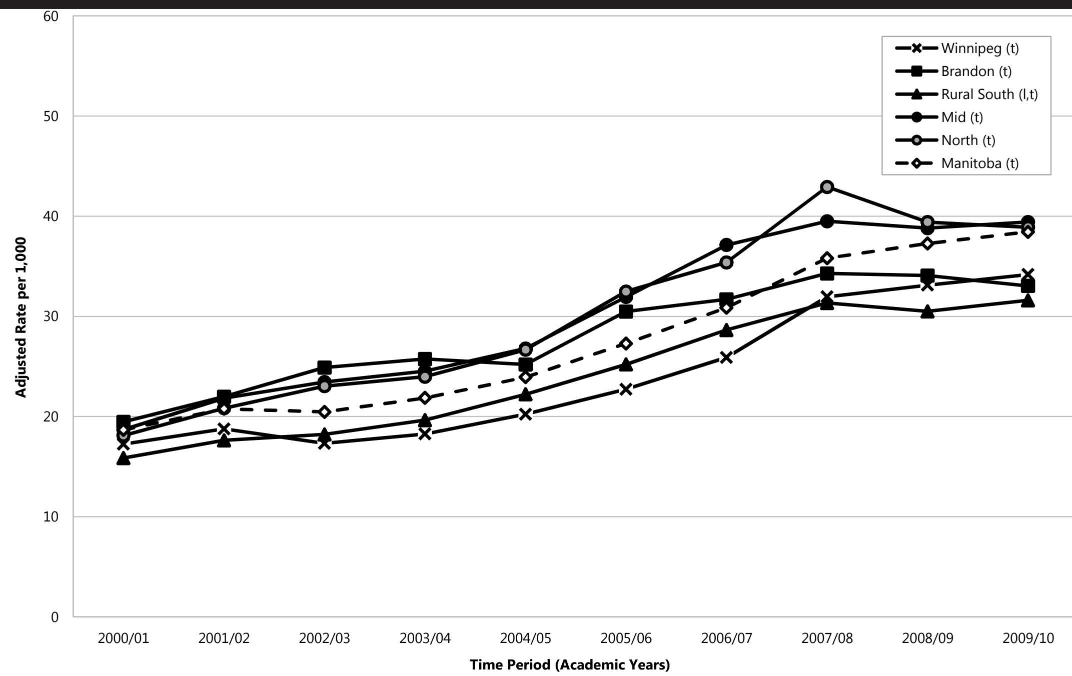
Rates of students receiving **Level II and III** funding are combined and displayed for each school year from 2000/01 through 2009/10. Males were about two–and–a–half times more likely to receive special funding throughout the time period compared to females (separate age–adjusted rates for males and females for each school year can be found in the online appendix).

23 Youths are eligible for special funding beyond 18 years of age, up until they turn 21 years. However, because there are substantially fewer students in the denominator for 19– and 20–year–olds, due to many students graduating before age 19, the effect of including these outlier ages in the overall model resulted in adjusted rates that deviated somewhat more from these crude rates as compared to only including children up to age 18 years. For this reason, adjusted rates in this section include only students between 5 to 18 years. Crude rates including students 5 to 20 years of age (up until they turn 21 years) are included in the online appendix.

Regional Trends Over Time

Figure 5.1 shows the rate of students 5 to 18 years of age in the aggregate areas of Manitoba and over time who received Level II or III funding, for each year from 2000/01 through 2009/10. The provincial rate doubled over the study period, going from 18.7/1000 in 2000/01 to 38.4/1000 in 2009/10, an increase that was statistically significant. All aggregate regions showed significant increases: Winnipeg went from 17.2/1000 to 34.2/1000, Brandon from 19.5/1000 to 33.0/1000, Rural South from 15.9/1000 to 31.6/1000, Mid from 18.7/1000 to 39.4/1000, and the North went from 18.1/1000 to 38.9/1000. Rural South had a significantly lower rate than the provincial average in the last time period.

Figure 5.1: Level II and III Funding Rates by Aggregate Region, 2000/01–2009/10
Age– & sex–adjusted rates per 1,000 students 5–18 years



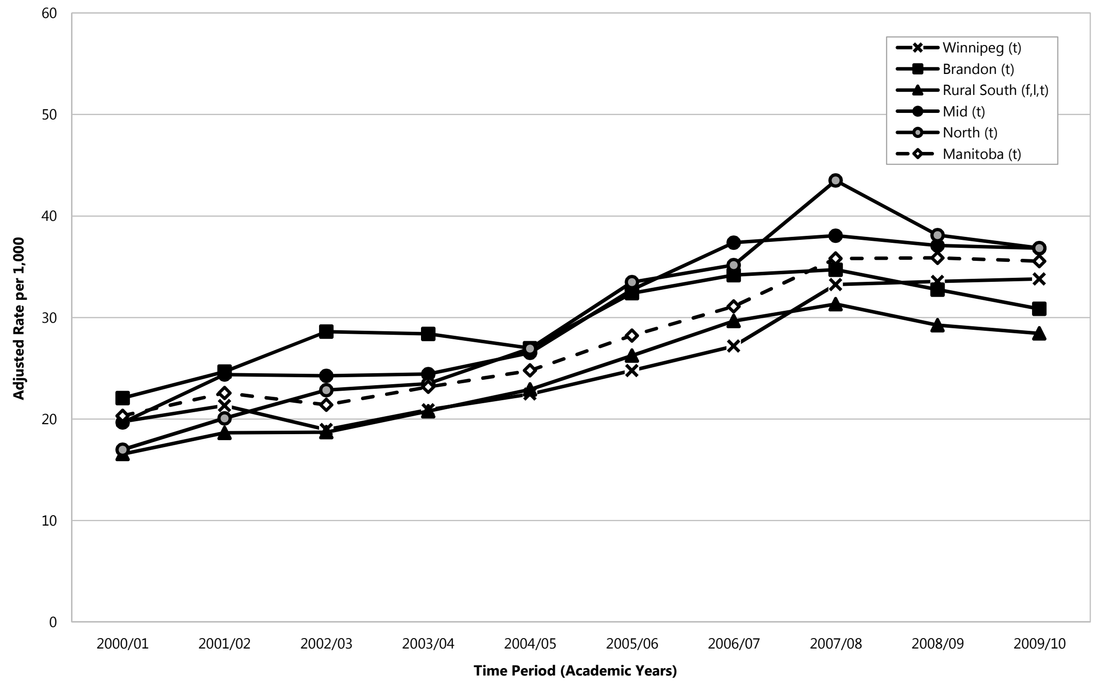
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

Trends by Age Group

Figures 5.2 and 5.3 show Level II and III funding for each of two age categories, 5 to 12 and 13 to 18 years. The pattern for Manitoba and most aggregate regions was for higher rates of funding in the younger age groups in the earlier years shown, but higher rates of funding in the older age groups in the more recent years. For the 5 to 12 age group, the Manitoba rate increased from 20.3/1000 to 35.6/1000 over the 10–year period. For the 13 to 18 age group, the Manitoba rate increased from 16.2/1000 to 40.4/1000 over the 10–year period.

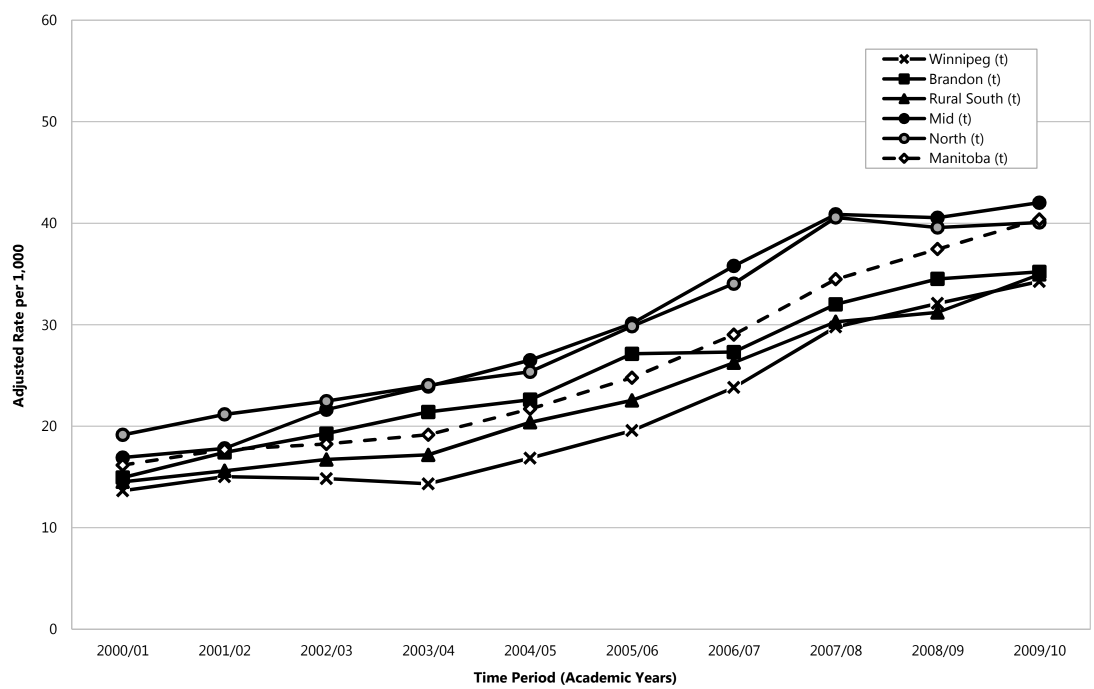
All aggregate regions showed significant increases in funding over the study period for each of the two age groups.

Figure 5.2: Level II and III Funding Rates by Aggregate Region and 5–12 Age Group, 2000/01–2009/10
Age– & sex–adjusted rates per 1,000 students



f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

Figure 5.3: Level II and III Funding Rates by Aggregate Region and 13–18 Age Group, 2000/01–2009/10
Age– & sex–adjusted rates per 1,000 students



t indicates change over time was statistically significant for that region at p<0.05

Trends by Socioeconomic Status

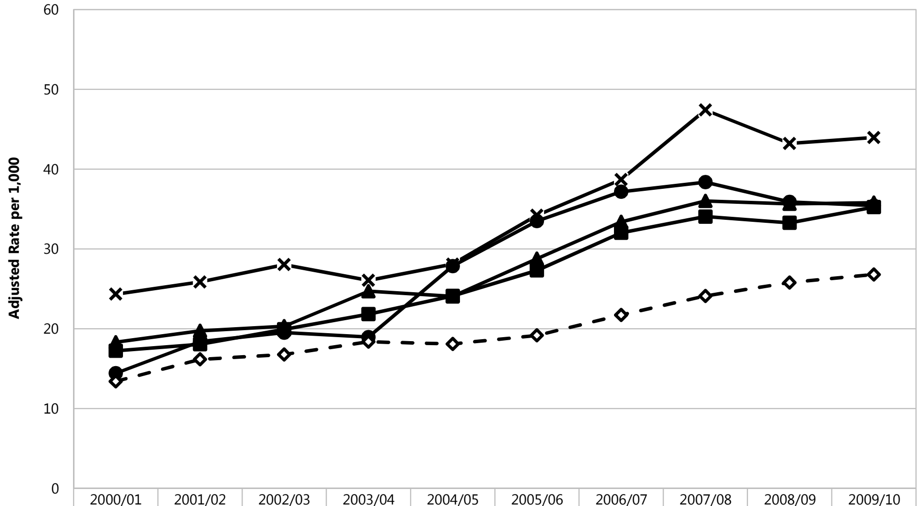
Figure 5.4 shows the rate of students receiving Level II or III funding by rural income quintile for all 10 years. There is a significant gap across income quintiles in all 10 years, with R1 (lowest) having the highest rate of students receiving funding and R5 having the lowest. For example, in 2009/10, 44.0/1000 students in R1 received funding compared to 26.8/1000 in R5. All rural income quintiles showed significant increases in rates of students receiving Level II or III funding over the study period.

Figure 5.5 shows the rate of students receiving Level II or III funding by urban income quintile for all 10 years. There is a significant gap across income quintiles in all 10 years, with U1 (lowest) having the highest rate of students receiving funding and U5 having the lowest. For example, in 2009/10, 52.0/1000 students in U1 received funding compared to 22.1/1000 in U5. All urban income quintiles showed significant increases in rates of students receiving Level II or III funding over the study period.

A graph showing the breakdown of reasons for funding (e.g., Autism Spectrum Disorders, Emotional–Behavioural Disorders) can be found in Appendix 6.

Figure 5.4: Level II and III Funding Rates by Rural Income Quintile, 2000/01–2009/10

Age– & sex–adjusted rates per 1,000 students 5–18 years



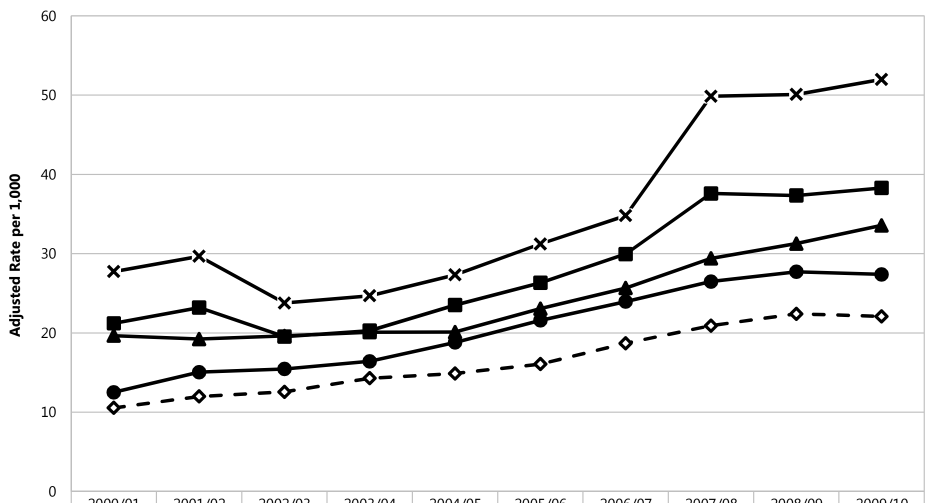
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	214.93	168.53	204.42	230.56	193.24	216.67	232.34	253.82	260.64	205.61
R1 – Lowest Income (t)	24.33	25.86	28.04	26.06	28.10	34.21	38.69	47.41	43.22	43.97
R2 (t)	17.23	18.06	19.94	21.83	24.12	27.32	32.03	34.06	33.28	35.25
R3 (t)	18.31	19.73	20.32	24.71	24.06	28.78	33.40	36.02	35.66	35.81
R4 (t)	14.43	18.39	19.51	18.96	27.86	33.49	37.17	38.37	35.90	35.43
R5 – Highest Income (t)	13.41	16.15	16.77	18.37	18.09	19.16	21.73	24.10	25.78	26.80
Linear trend across R1–R5	*	*	*	*	*	*	*	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Figure 5.5: Rates of Level II and III Funding by Urban Income Quintile, 2000/01–2009/10

Age– & sex–adjusted rates per 1,000 students 5–18 years



	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	214.93	168.53	204.42	230.56	193.24	216.67	232.34	253.82	260.64	205.61
U1 – Lowest Income (t)	27.74	29.67	23.77	24.69	27.33	31.22	34.80	49.86	50.09	51.99
U2 (t)	21.22	23.20	19.53	20.30	23.52	26.32	29.95	37.60	37.34	38.29
U3 (t)	19.65	19.23	19.62	20.10	20.11	23.06	25.66	29.41	31.27	33.56
U4 (t)	12.51	15.05	15.45	16.42	18.80	21.58	23.96	26.48	27.72	27.38
U5 – Highest Income (t)	10.55	11.98	12.56	14.29	14.88	16.06	18.70	20.91	22.40	22.08
Linear trend across U1–U5	*	*	*	*	*	*	*	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Changes in Inequity Over Time

Figures 5.6 and 5.7 show the inequities in Level II and III funding for 2000/01 and 2009/10, respectively, for rural areas. In both time periods, the lowest income quintile (R1) had a higher percentage of children receiving Level II or III funding than expected given the proportion of the population. In time 1, 21.1% of the students receiving special funding were found in the 14.7% of the population (5 to 18 years) in R1. The Gini coefficient was 0.107, indicating a moderate degree of disparity across rural income quintiles. In time 10, 19.5% of the students receiving special funding were found in the 15.4% of the population in R1. The Gini coefficient was 0.078, also indicating moderate disparity. The change in the Gini coefficient over the study period in the rural areas was not statistically significant, indicating no change in disparity over time. It should be noted that "disparity" in funding is not necessarily a negative finding. Indeed, we may expect that more children in the lowest income quintiles require special funding due to higher rates of special needs (Campbell & Ramey, 1994), in which case "disparity" in funding demonstrates that children who most require the special funding are receiving it.

Figures 5.8 and 5.9 show the inequities in Level II and III funding for 2000/01 and 2009/10, respectively, for urban areas. In both time periods, the lowest income quintile (U1) had a higher percentage of children receiving Level II or III funding than expected given the proportion of the population. In time 1, 26.4% of the students receiving special funding were found in the 16.7% of the population (5 to 18 years) in U1. The Gini coefficient was 0.193, indicating a moderate degree of disparity across urban income quintiles. In time 10, 28.1% of the students receiving special funding were found in the 18.4% of the population in U1. The Gini coefficient was 0.165, also indicating moderate disparity. The change in the Gini coefficient over the study period in the urban areas was not statistically significant, indicating no change in disparity over time. The Gini coefficient was significantly higher in urban compared to rural areas, suggesting greater disparity in urban areas. As noted above, "disparity" in funding is not necessarily a negative finding, but potentially an indication that students most in need are the ones receiving the funding. Whether the higher Gini coefficient in urban compared to rural areas suggests a greater match of funding to need in urban areas was not examined here.

What do these results mean?

There were substantial increases in Level II and III funding over the study period, for all regions and all income areas. The information on Level II and III funding does not include students who have more mild to moderate disabilities, such as a learning disability; support for programming for students with milder disabilities is provided according to a formula rather than an application process. According to Manitoba Education, increased funding could reflect a growing need to support students greatly affected by the influence of negative external factors such as poverty, increases in diagnosis of Autism Spectrum Disorders, and improved survival of children experiencing traumatic births or injuries (Joanna Blais, personal communication, July 2012).

Figure 5.6: Lorenz Curve for Level II and III Funding in Rural Areas, 2000/01
Adjusted by age & sex for students 5–18 years

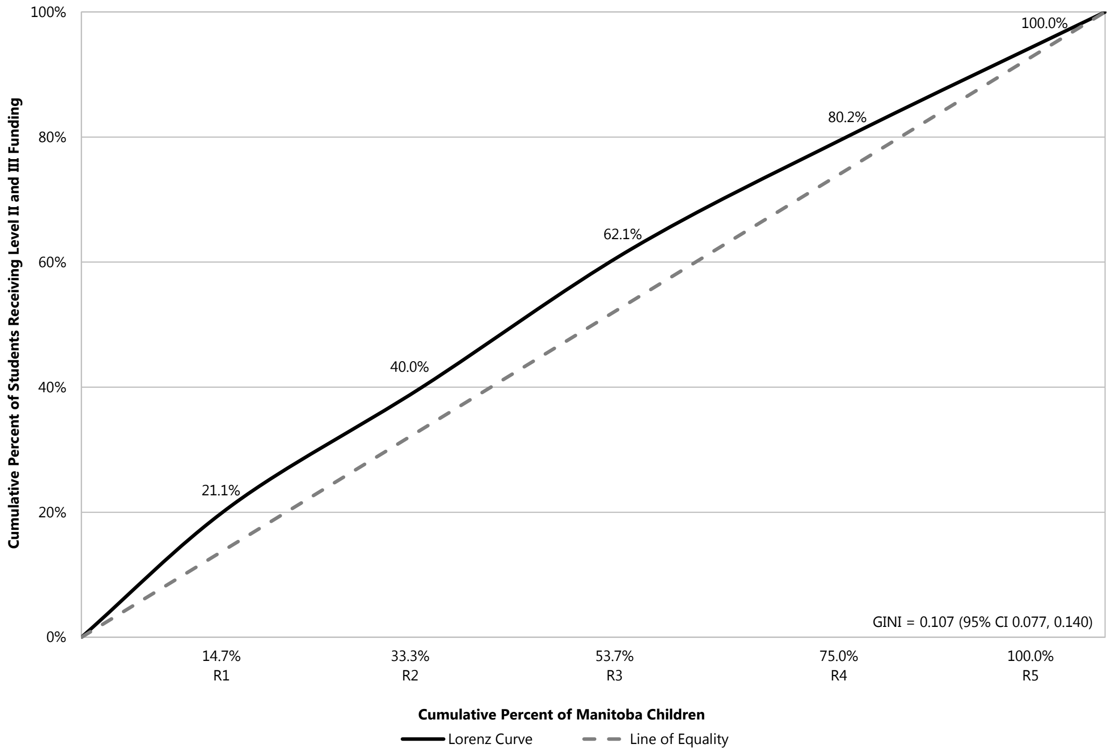


Figure 5.7: Lorenz Curve for Level II and III Funding in Rural Areas, 2009/10
Adjusted by age & sex for students 5–18 years

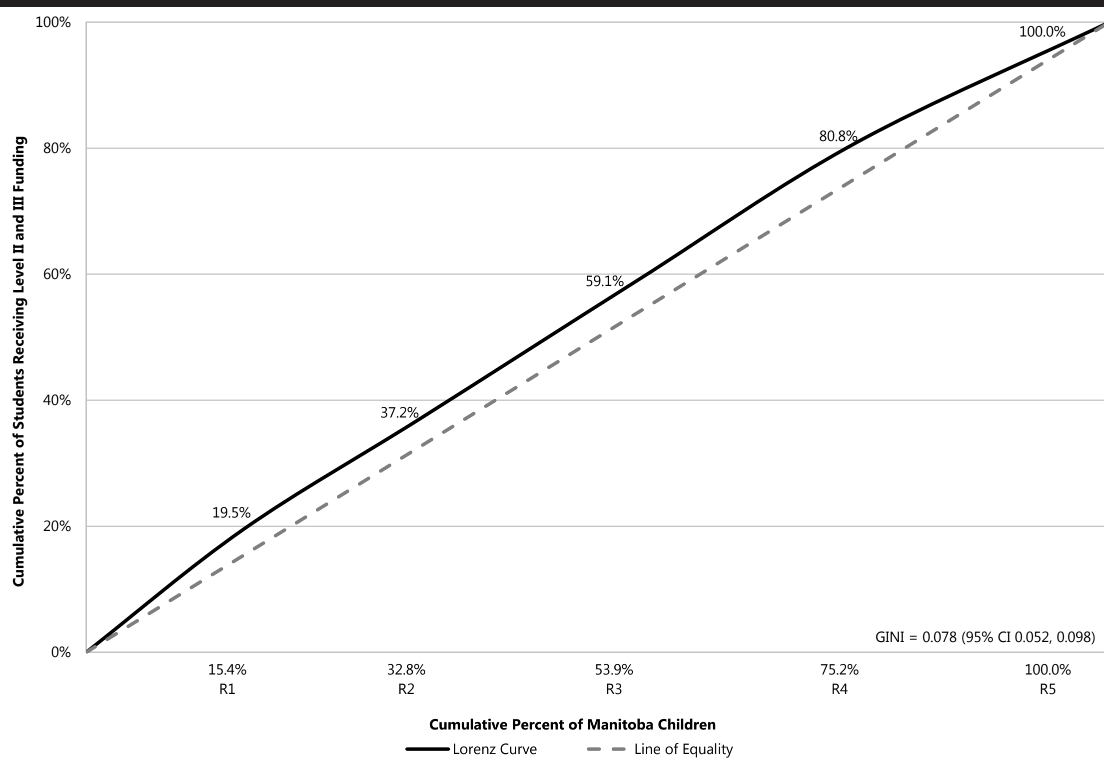


Figure 5.8: Lorenz Curve for Level II and III Funding in Urban Areas, 2000/01
Adjusted by age & sex for students 5–18 years

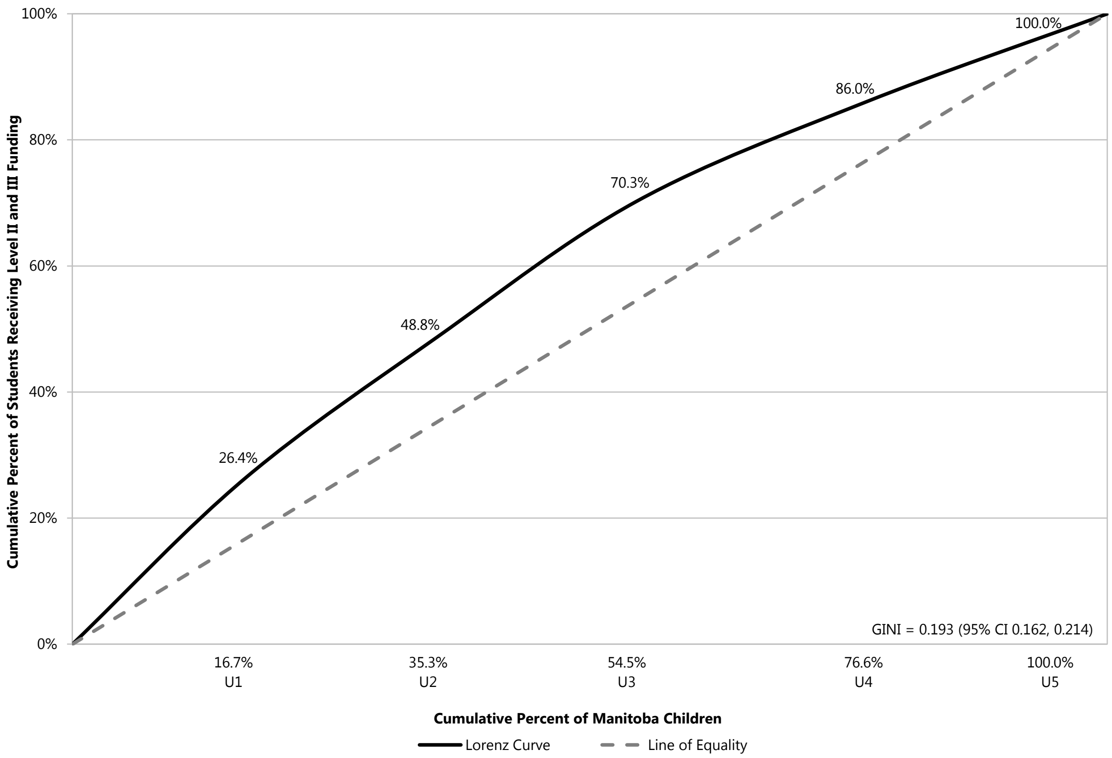
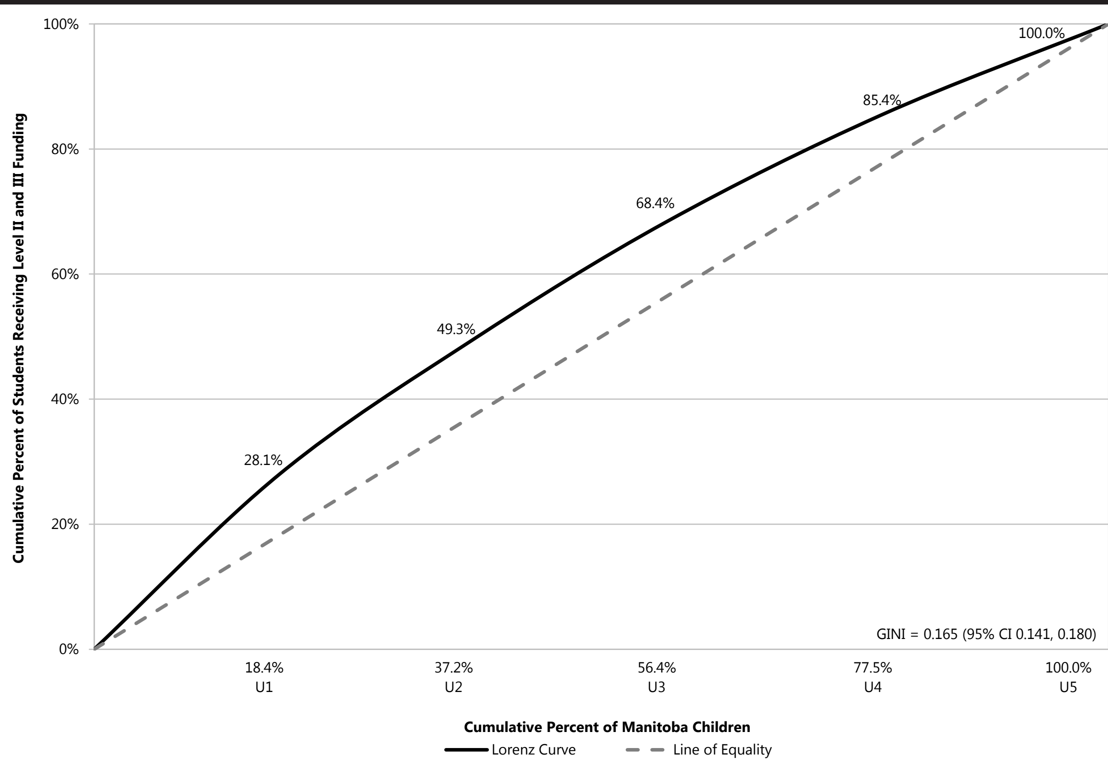


Figure 5.9: Lorenz Curve for Level II and III Funding in Urban Areas, 2009/10
Adjusted by age & sex for students 5–18 years



Grade Repetition

Grade repetition is defined as a student having been enrolled in the same grade for two or more consecutive years. Despite the assumption by some teachers that grade repetition would benefit the education of the student (Pouliot & Potvin, 2000; Rosado, 2002), research suggests that grade repetition does not provide such benefits (Guèvremont, Roos, & Brownell, 2007; Holmes, 1989; Holmes & Matthews, 1984; Jimerson, 2001) and may actually be associated with a higher likelihood of dropping out of school compared to students that were not made to repeat a grade (Guèvremont et al., 2007; Jimerson, Anderson, & Whipple, 2002).

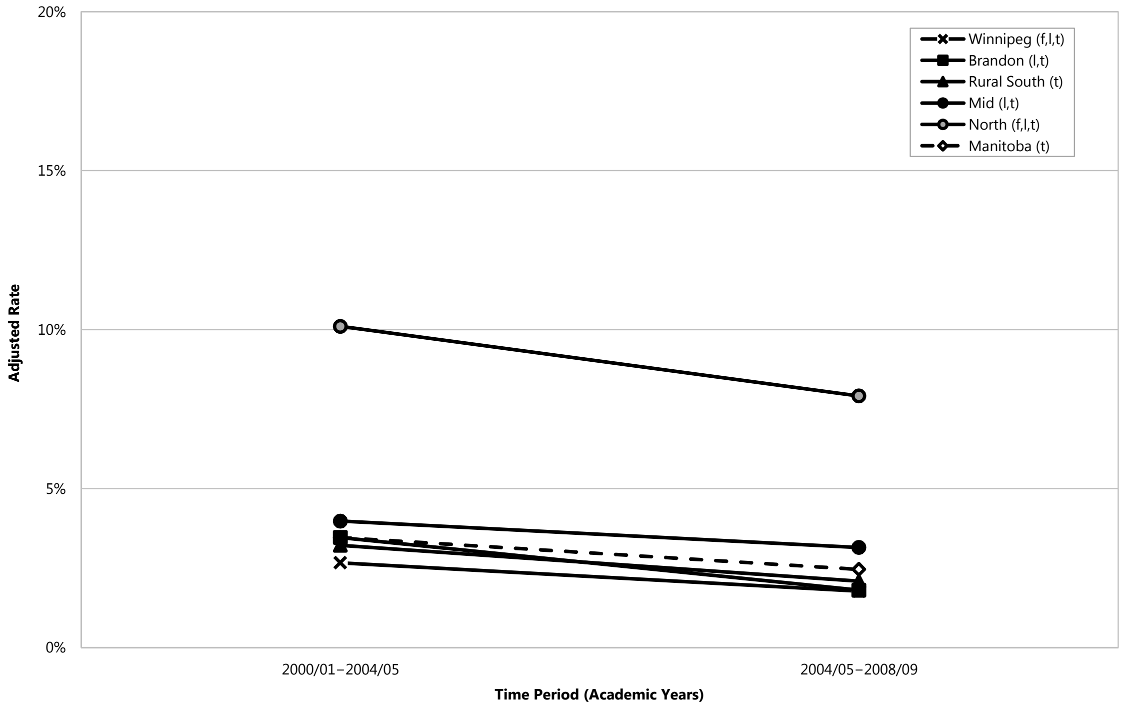
In this report, we looked at grade repetition for students in Kindergarten through Grade 8 in two 5–year periods: 2000/01–2004/05 and 2004/05–2008/09. Rates were based on students who repeated at least one grade. As with all indicators, area rates represent where the students live, rather than where they attended school.[24]

Regional Trends Over Time

Figure 5.10 shows the percent of students in the aggregate regions of Manitoba and over time who repeated a grade sometime from Kindergarten through Grade 8. The provincial rate went from 3.5% in 2000/01–2004/05 to 2.5% in 2004/05–2008/09, a decrease that was statistically significant. More students in the North repeated a grade than the provincial average in both time periods, whereas fewer students in Winnipeg repeated a grade than the provincial average in both time periods. In Brandon, the percent of students repeating a grade was lower than the provincial average in the last time period, whereas in Mid, the percent of students repeating was higher than the provincial average in the last time period. All regions showed significant decreases in grade repetition over the study period: Winnipeg went from 2.7% to 1.8%, Brandon from 3.5% to 1.8%, Rural South from 3.2% to 2.1%, Mid from 4.0% to 3.2%, and in the North area grade repetition went from 10.1% to 7.9%.

24 Grade repetition rates for students who attend First Nation schools may be underestimated due to sometimes incomplete enrolment data from these schools.

Figure 5.10: Grade Repetition Rates by Aggregate Region, 2000/01–2004/05 to 2004/05–2008/09
Age– & sex–adjusted rates for students in Kindergarten to Grade 8



f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates statistically significant difference between first and last time periods for that region at p<0.05

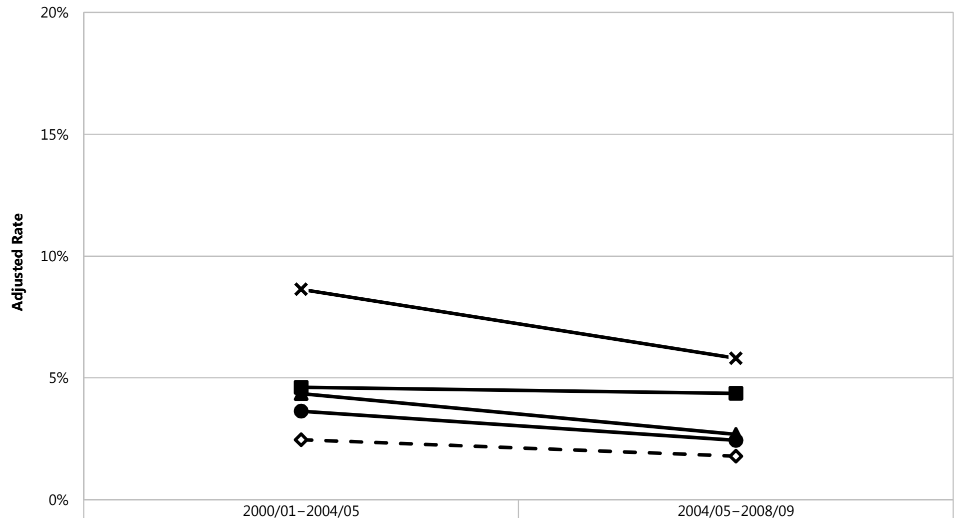
Trends by Socioeconomic Status

Figure 5.11 shows the percent of students who repeated a grade between Kindergarten through Grade 8 by rural income quintile for the two time periods. There is a significant SES gradient across income quintiles in both time periods, with grade repetition decreasing with increases in income quintile. For example, in 2004/05–2008/09, 5.8% of the students in R1 repeated a grade sometime before Grade 9 compared to 1.8% in R5. All rural income quintiles showed statistically significant decreases in grade repetition over time with the exception of R2.

Figure 5.12 shows the percent of students who repeated a grade between Kindergarten through Grade 8 by urban income quintile for the two time periods. As was found in the rural areas, there is a significant SES gradient across income quintiles in both time periods. For example, in 2004/05–2008/09, 4.1% of the students in U1 had repeated a grade at some point before Grade 9 compared to 1.3% in U3 and 0.5% U5. All urban income quintiles showed statistically significant decreases in grade repetition over time.

Figure 5.11: Grade Repetition Rates by Rural Income Quintile, 2000/01–2004/05 to 2004/05–2008/09

Age– & sex–adjusted rates for students in Kindergarten to Grade 8



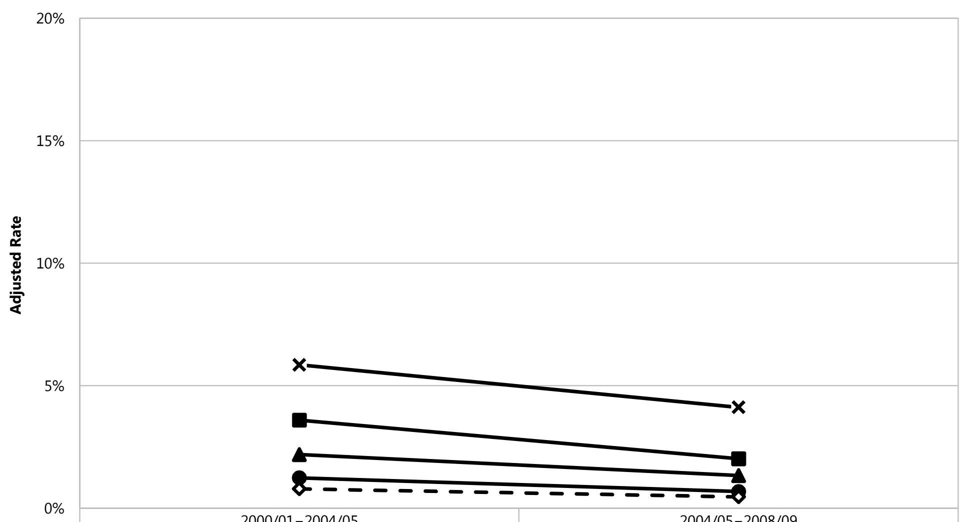
	2000/01–2004/05	2004/05–2008/09
Income Unknown (t)	8.70%	4.63%
R1 – Lowest Income (t)	8.63%	5.81%
R2	4.61%	4.36%
R3 (t)	4.36%	2.68%
R4 (t)	3.63%	2.43%
R5 – Highest Income (t)	2.46%	1.79%
Linear trend across R1–R5	*	*

Time Period (Academic Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Figure 5.12: Grade Repetition Rates by Urban Income Quintile, 2000/01–2004/05 to 2004/05–2008/09

Age– & sex–adjusted rates for students in Kindergarten to Grade 8



	2000/01–2004/05	2004/05–2008/09
Income Unknown (t)	8.70%	4.63%
U1 – Lowest Income (t)	5.85%	4.11%
U2 (t)	3.59%	2.02%
U3 (t)	2.19%	1.33%
U4 (t)	1.23%	0.68%
U5 – Highest Income (t)	0.79%	0.46%
Linear trend across U1–U5	*	*

Time Period (Academic Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Changes in Inequity Over Time

Figures 5.13 and 5.14 show the inequities in grade repetition in 2000/01–2004/05 and 2004/05–2008/09, respectively, for rural areas. In both time periods, the lowest income quintile (R1) had a higher percentage of children repeating a grade than expected given the proportion of the population. In time 1, 30.7% of the students repeating grades were found in the 16.0% of the population in R1. The Gini coefficient was 0.220, indicating a high degree of disparity across rural income quintiles. In time 2, 30.6% of the students repeating a grade were found in the 17.1% of the child population in R1. The Gini coefficient was 0.234, also indicating high disparity. The change in the Gini coefficient over the study period in the rural areas was not statistically significant, indicating no change in disparity over time.

Figures 5.15 and 5.16 show the inequities in grade repetition in both time periods for urban areas. In 2000/01–2004/05, 42.3% of the students repeating a grade were found in the 19.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.373, indicating a high degree of disparity. In 2004/05–2008/09, 48.7% of the students repeating at least one grade were found in the 20.2% of the population in the lowest income quintile group, with a Gini coefficient of 0.408, again indicating high disparity. There was a significant increase in the Gini coefficient over time in urban areas, indicating an increase in disparity in grade repetition. A comparison of the Gini coefficients in the last time period indicated that there was significantly more inequity in the urban compared to the rural income areas for grade repetition.

What do these results mean?

According to the Programme for International Student Assessment (PISA), 6.6% of 15–year–old students in Canada reported repeating a grade in primary school (first six years of school), and 7.2% reported repeating a grade in the first nine years of school (OECD Programme for International Student Assessment (PISA), 2009). The Manitoba rate of grade repetition in 2000/01–2004/05 was 3.5%, lower than that reported by students in PISA; and it decreased significantly in the second half of the study period. There was a high degree of inequity in grade repetition in both rural and urban areas, with children from lower income areas more likely to repeat a grade, and inequity increased significantly in urban areas. Targeted efforts to ensure that children from low income areas who have difficulty keeping up in school receive the supports they need to progress with their peers are required.

Figure 5.13: Lorenz Curve for Grade Repetition in Rural Areas, 2000/01–2004/05
Adjusted by age & sex for students in Kindergarten to Grade 8

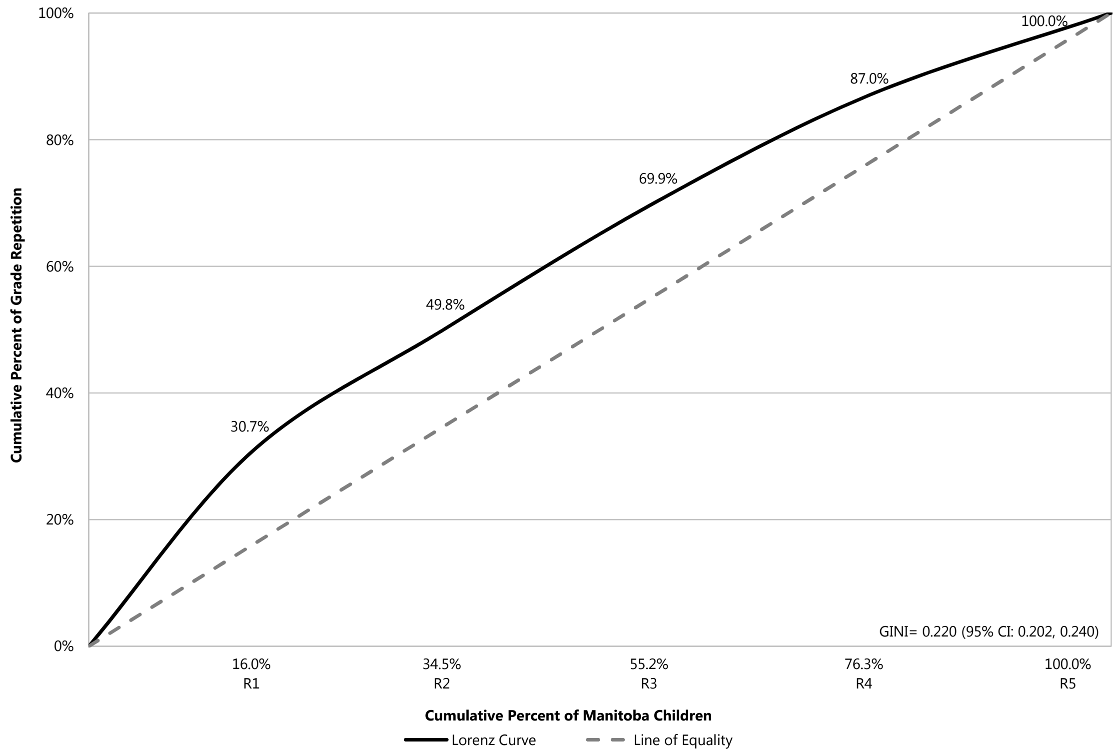


Figure 5.14: Lorenz Curve for Grade Repetition in Rural Areas, 2004/05-2008/09
Adjusted by age & sex for students in Kindergarten to Grade 8

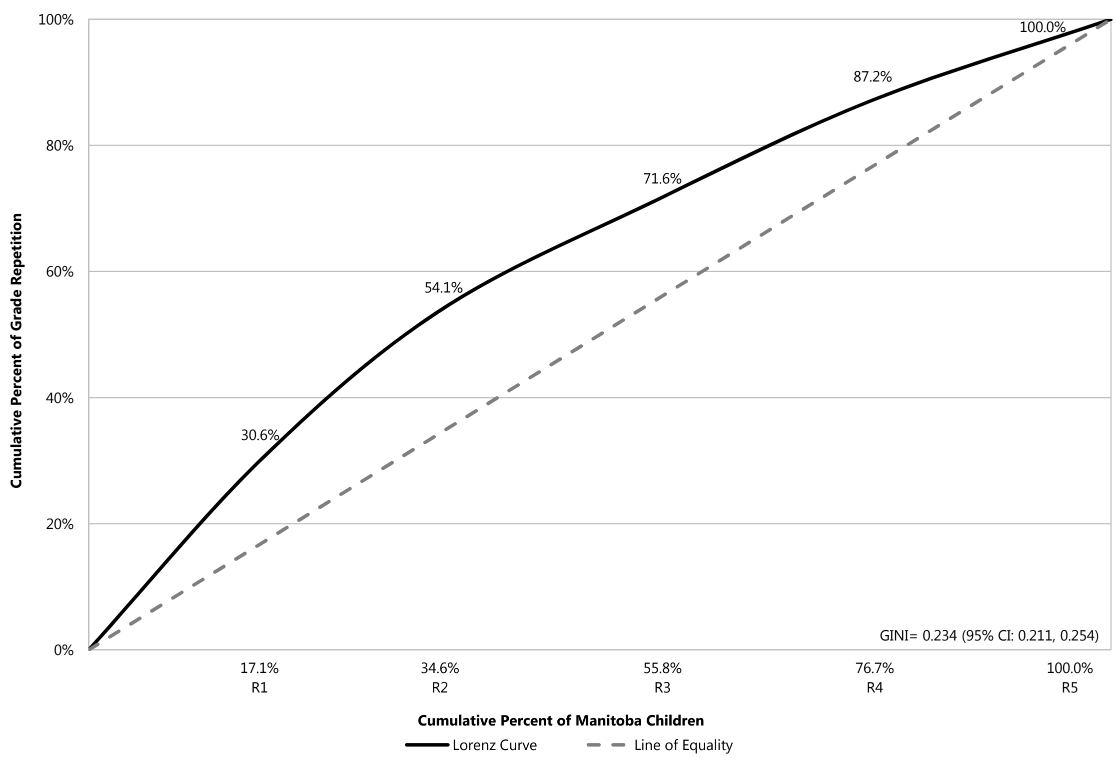


Figure 5.15: Lorenz Curve for Grade Repetition in Urban Areas, 2000/01–2004/05
Adjusted by age & sex for students in Kindergarten to Grade 8

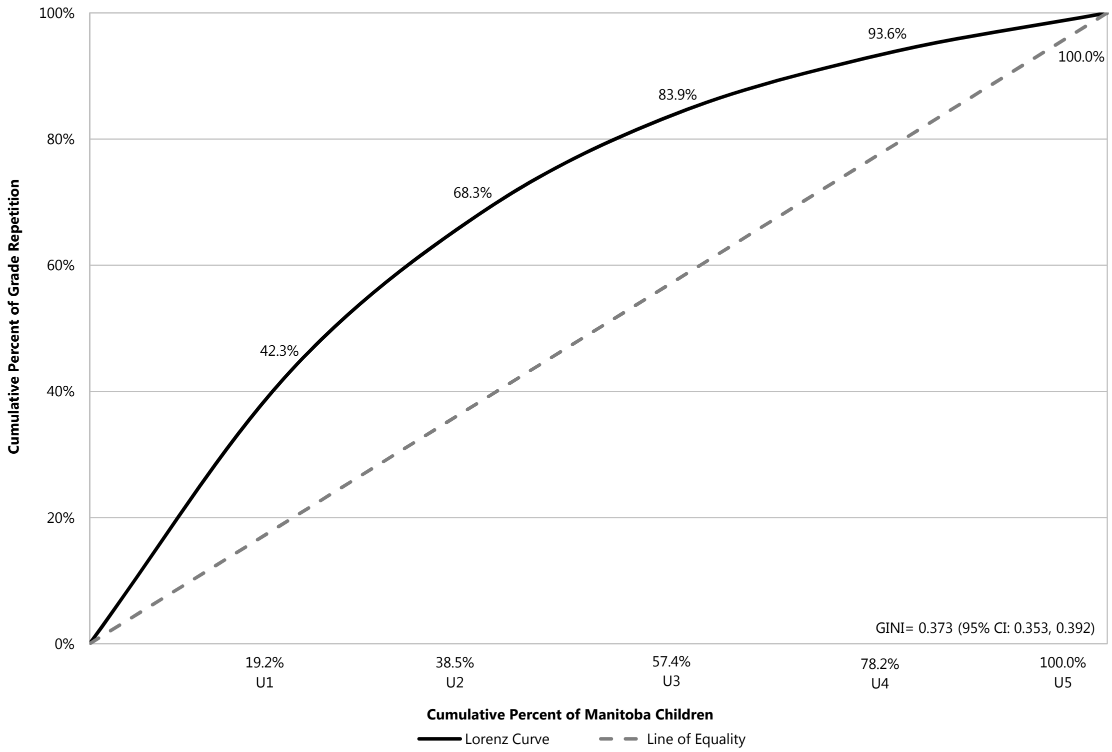
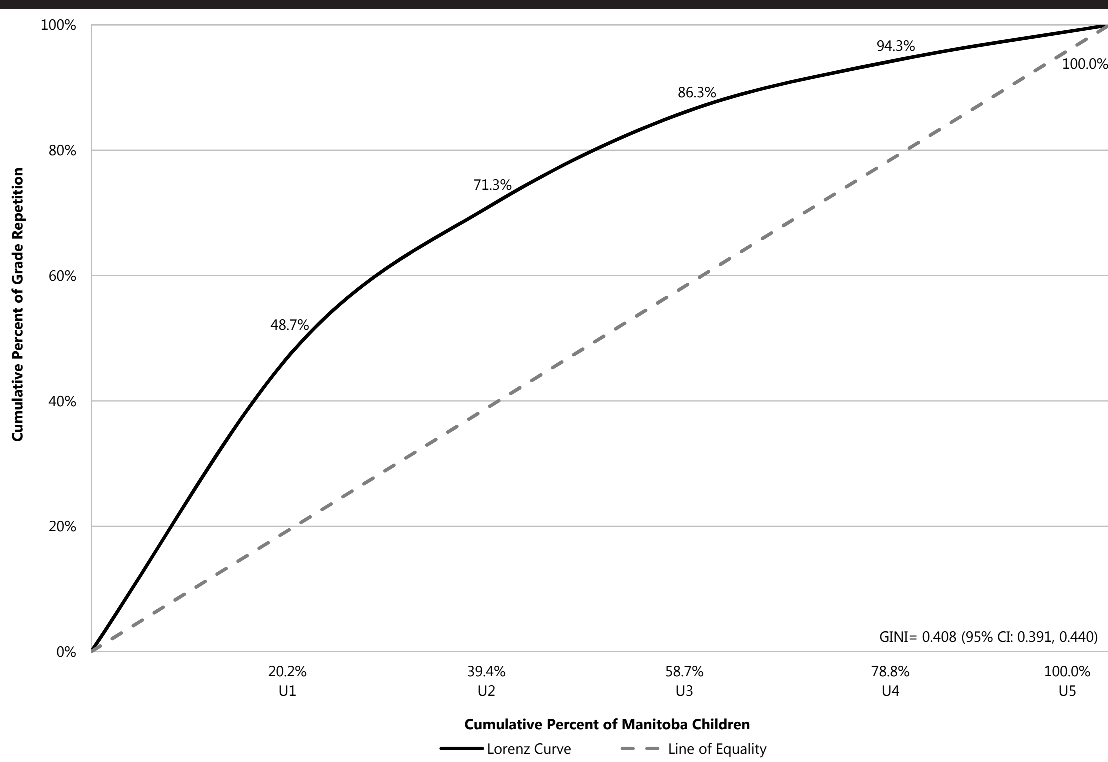


Figure 5.16: Lorenz Curve for Grade Repetition in Urban Areas, 2004/05–2008/09
Adjusted by age & sex for students in Kindergarten to Grade 8



Grade 3/4 Assessments

Manitoba Education has implemented a policy on educational assessment and evaluation in provincially funded schools where teachers must assess students enrolled in Grade 3 and in Grade 4 French Immersion classes in competencies in reading and numeracy. Using select criteria provided by the Department of Education, along with their professional judgement and examples from daily classroom activities, teachers must complete these **Grade 3/4 assessments** early in the school year. By identifying the students' strengths and needs in reading and numeracy, teachers are able to communicate information about student achievement in key competencies and to guide the class curriculum for the school year. Evidence suggests that when teachers adjust the curriculum to students' needs, identified through frequent interactive assessments, the students are more likely to achieve higher competencies (Organisation for Economic Co-operation and Development (OECD), 2005; Black & Wiliam, 2005; Allal & Lopez, 2005; Wiggins, 1998). The assessments can also be used to aggregate information in examining trends, supporting research, and providing resources for student learning (Manitoba Education, 2009b). Students in English and French Immersion programs are assessed in reading in English in Grade 3, and students in the Français program are assessed in lecture (reading in French) in Grade 3. Students in the English program are assessed in numeracy in English in Grade 3, and students in the Français and French Immersion programs are assessed in notions de calcal (numeracy in French) in Grade 3. Students in French Immersion are also assessed in lecture in French in Grade 4. For this report, we used only the assessments done in Grade 3 (reading for students in English and French Immersion, lecture for students in Français, numeracy for students in English and notions de calcal for students in Français and French Immersion). Thus, we refer to these assessments as Grade 3 assessments.

Grade 3 Assessment in Reading

Students in Grade 3 are assessed on three different reading competencies: 1) reflects on and sets reading goals, 2) uses strategies during reading to make sense of texts, and 3) demonstrates comprehension. After consultation with the Assessment and Evaluation branch of Manitoba Education, we decided to include only the second and third competencies in our measure of Grade 3 reading. While the first competency is certainly an important one for reading development, there was a sense that the reliability of this particular assessment was not as strong as for the other two competencies. Results with the two competencies combined (shown in this section) were very similar to those when all three competencies were combined (available in the online appendix).

Students are categorized according to one of four levels of achievement for Grade 3 entry level performance standards on each competency: 1) meeting expectations, 2) approaching expectations, 3) needs ongoing help, and 4) out of range.[25] In this report, we present the percent of students who were "meeting" or "approaching" expectations on both competencies at the time of the assessment. Bar graphs showing each of the four categories of achievement for students for each competency separately can be found in the online appendix.

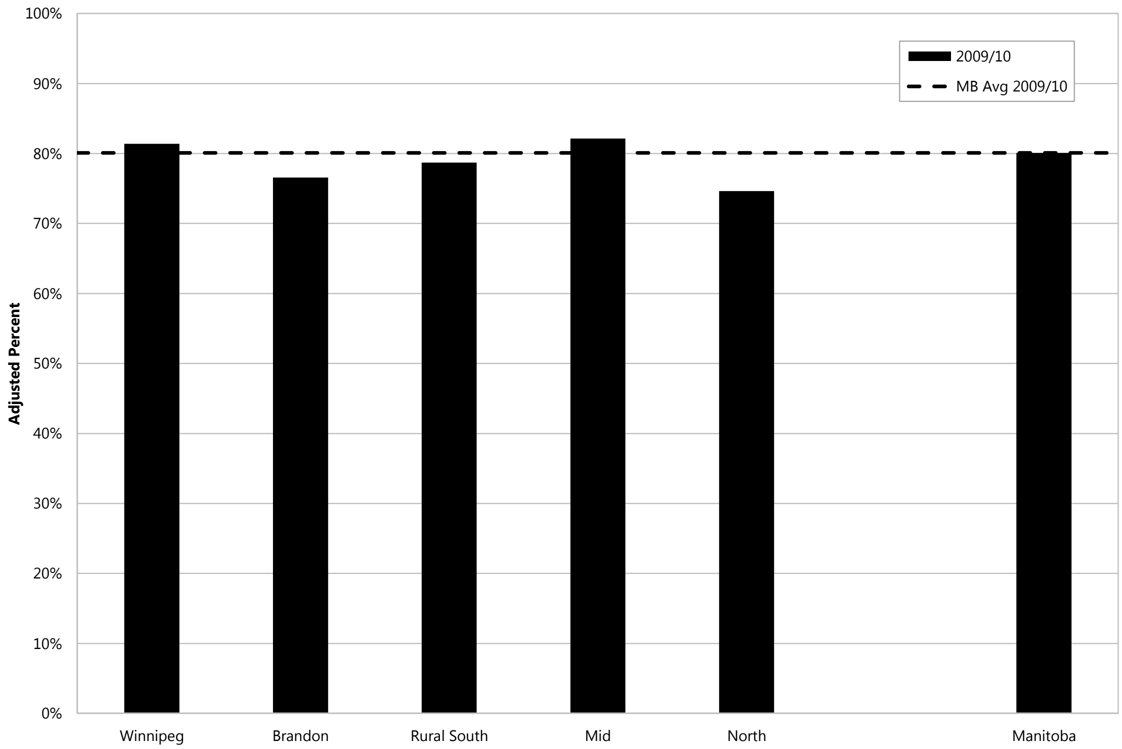
Rates by area represent where students live rather than where they attend school. Some First Nations schools do not participate in the **Grade 3 assessments in reading**, so for this reason, children in First Nations schools have been removed from these analyses. As 2009/10 was the first year of province–wide collections of student–level data for this assessment, only one year of Grade 3 reading assessment data was available for analysis in this report.

25 Used to describe those students who are working well below grade–level curriculum relative to the competencies assessed, due to their learning disabilities or their need for new language learning.

Regional Trends

Figure 5.17 shows the percent of students meeting or approaching expectations on the two competencies described by aggregate regions for the 2009/10 school year. The adjusted percent ranged from 74.6% in the North to 81.4% in Winnipeg with the Manitoba average at 80.1%.

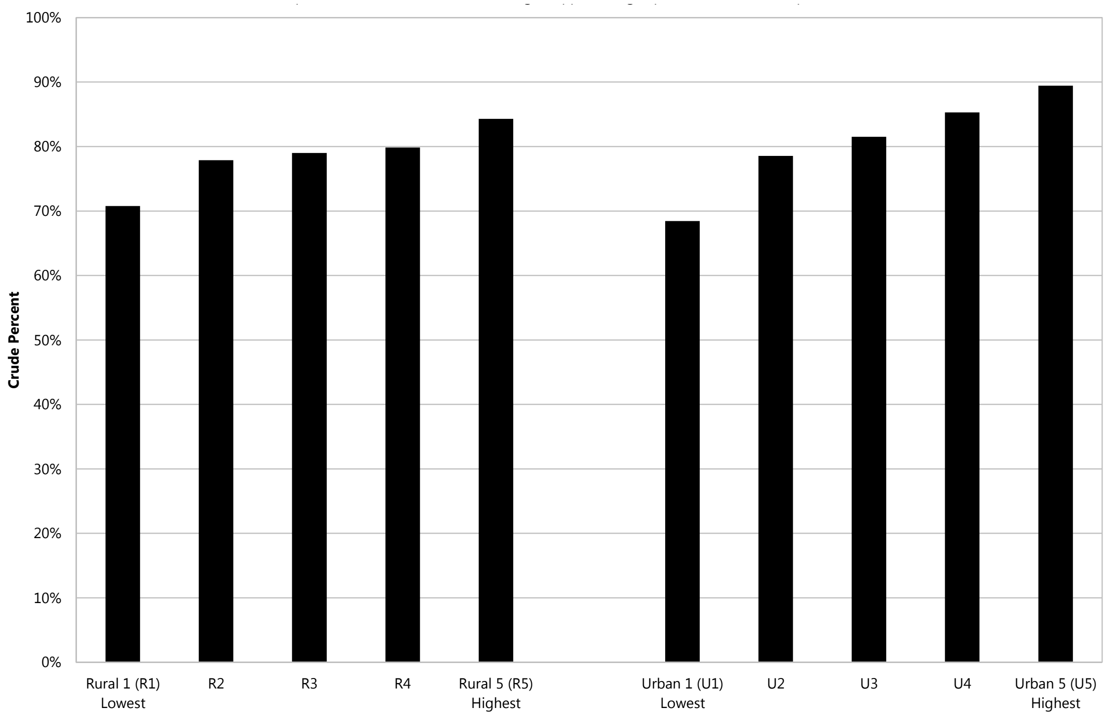
Figure 5.17: Grade 3 Student Reading Competency by Aggregate Region, 2009/10
Age- & sex-adjusted percent of Grade 3 students meeting or approaching expectations in two competencies



Trends by Socioeconomic Status

Figure 5.18 shows the percent of Grade 3 students meeting or approaching expectations on the two competencies by rural and urban income quintile for 2009/10. Gradients were statistically significant in both the rural and urban areas, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles and increasing achievement as income level increases. For example, 70.8% of the Grade 3 students in R1 were meeting or approaching expectations on both competencies compared to 84.3% in R5. In U1, 68.5% of the students were meeting or approaching expectations compared to 89.4% of those from U5.

Figure 5.18: Grade 3 Student Reading Competency by Income Quintile*, 2009/10
Crude percent of Grade 3 students meeting or approaching expectations in two competencies



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at p<0.05
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at p<0.05

Inequity

Figure 5.19 shows the inequities in Grade 3 reading in the 2009/10 school year for rural areas. The lowest income quintile (R1) had a lower percent of children meeting or approaching expectations than expected given the proportion of the population. In 2009/10, the 15.7% of the population in R1 accounted for 14.1% of the Grade 3 students who were meeting or approaching expectations on both competencies. The Gini coefficient was 0.028, indicating very little disparity across rural income quintiles.

Figure 5.20 shows similar disparities in Grade 3 reading for urban areas. In 2009/10, the 19.2% of the population in U1 accounted for 16.3% of the Grade 3 students who were meeting or approaching expectations. The Gini coefficient was 0.048, indicating a low degree of disparity. A comparison of the Gini coefficients indicated that the difference in inequity between rural and urban areas was not statistically significant.

Figure 5.19: Lorenz Curve for Grade 3 Student Reading Competency in Rural Areas, 2009/10

Crude for Grade 3 students meeting or approaching expectations in two competencies

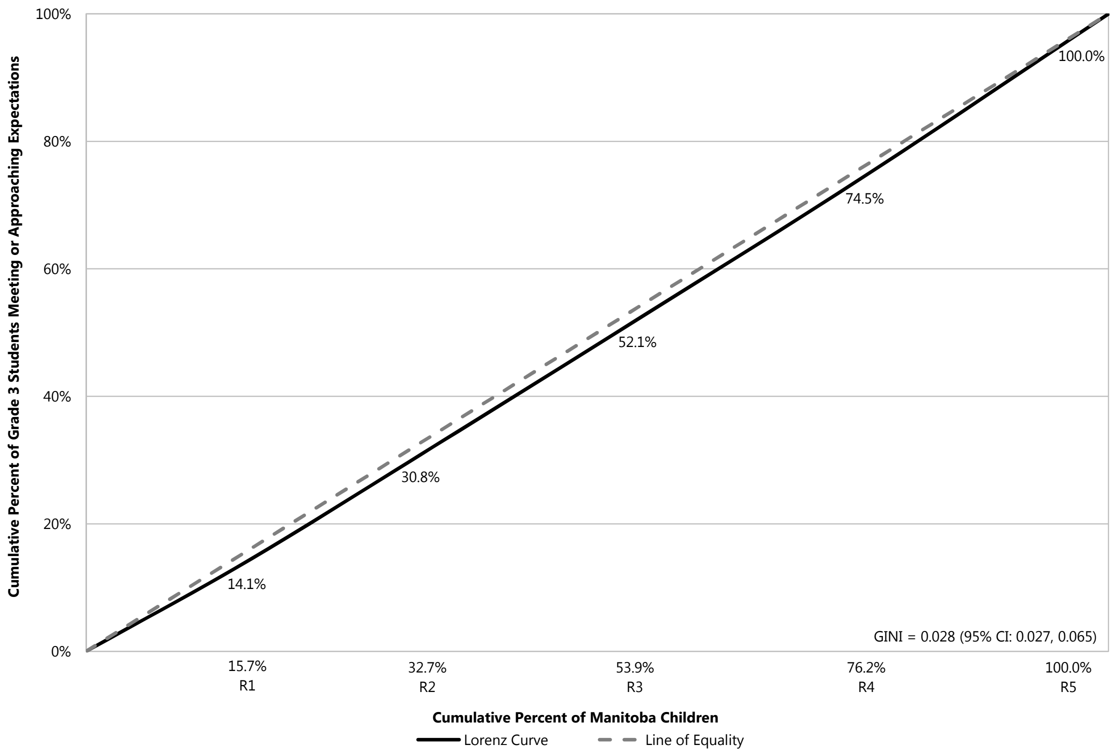
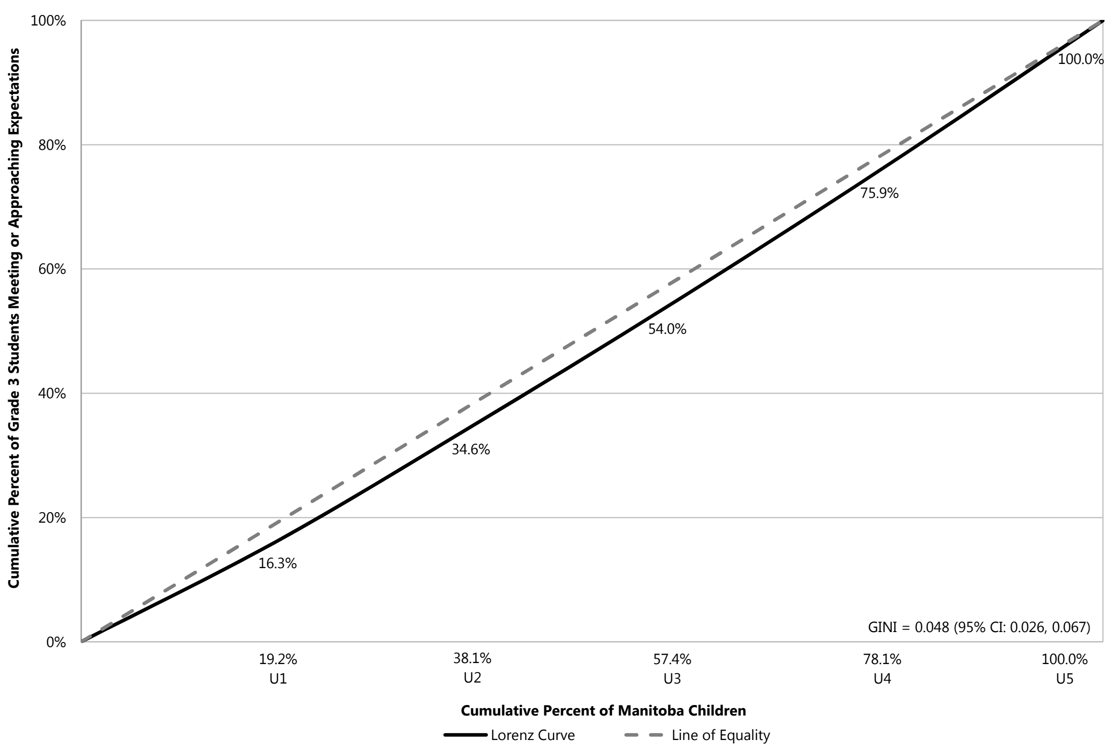


Figure 5.20: Lorenz Curve for Grade 3 Student Reading Competency in Urban Areas, 2009/10

Crude for Grade 3 students meeting or approaching expectations in two competencies



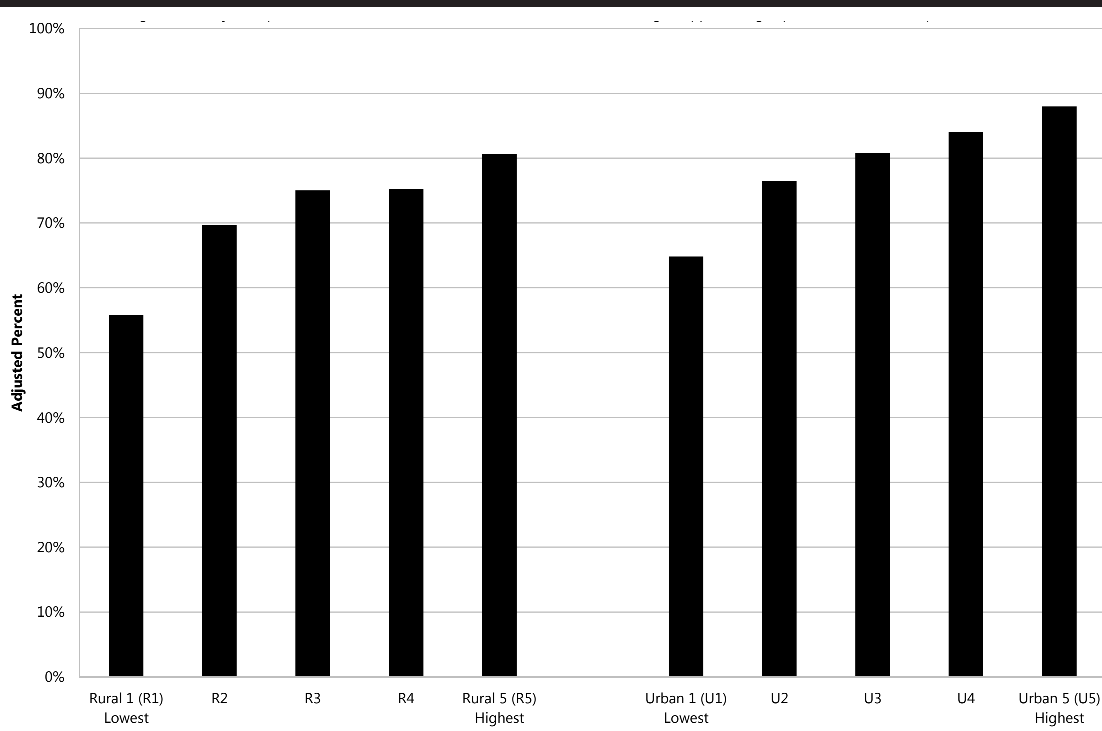
Cohort Approach to Grade 3 Assessment in Reading

The preceding analysis used all students with Grade 3 assessment scores in 2009/10. Previous work at MCHP (Brownell et al., 2004; Brownell, Roos, & Fransoo, 2006; Roos et al., 2006) has demonstrated that simply including students with assessments may underestimate actual gradients and inequities, because students who have fallen behind (been held back a grade or more) or for whom assessments are unavailable (perhaps due to severe disabilities or extensive absences from class) are more likely to be from the lower SES groups. For this reason, we repeated the analysis by SES using a cohort approach. In this analysis, all students born in 2001, and living in Manitoba in 2009/10 were included. Students without assessments were included in the category "not meeting expectations". Students who moved away from the province were excluded from the cohort.

Trends by Socioeconomic Status

Figure 5.21 shows the percent of Grade 3 students meeting or approaching expectations on the two competencies of Grade 3 reading, by rural and urban income quintile for 2009/10, using this cohort approach. The Manitoba average for the percent of Grade 3 students meeting or approaching expectations on the two competencies in Grade 3 reading is slightly lower (76.2%) using the cohort approach compared to the results, which used all students in Grade 3 with assessment scores (80.1%). In Figure 5.21, gradients are statistically significant in both rural and urban areas, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles and increasing achievement as income level increases. Comparing Figure 5.21 to 5.18, it is clear that gradients are steeper using the cohort approach, particularly for children living in rural areas.

Figure 5.21: Grade 3 Student Reading Competency by Income Quintile* (Cohort Approach), 2009/10
Age- & sex-adjusted percent of Grade 3 students in the 2001 birth cohort meeting or approaching expectations in two competencies



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at p<0.05
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at p<0.05

Inequity

Figure 5.22 shows the inequities in Grade 3 reading in the 2009/10 school year for rural areas using the cohort approach. The lowest income quintile (R1) had a lower percent of children meeting or approaching expectations than expected given the proportion of the population. In 2009/10, the 17.4% of the population in R1 accounted for only 13.5% of the Grade 3 students who were meeting or approaching expectations in reading on both competencies. The Gini coefficient was 0.059, which was larger than the Gini coefficient using only children in Grade 3 with assessment information (0.028), but still considered low. The cohort approach may provide a more accurate picture of disparities (Brownell et al., 2006; Roos et al., 2006) as it includes children who have fallen behind or who may not be attending school.[26]

Figure 5.23 shows similar disparities in Grade 3 reading for urban areas using the cohort approach. In 2009/10, the 18.1% of the population in U1 accounted for only 14.8% of the Grade 3 students who were meeting or approaching reading expectations. The Gini coefficient was 0.053, indicating a low degree of disparity, and just slightly more disparity than the approach including only children in Grade 3 in 2009/10 with assessments (0.048).

26 In our preliminary analysis of the cohort approach, we found 1,383 children in the 2001 cohort were still living in Manitoba but not enrolled in school. Children in First Nations schools had already been removed from the analysis, however we did find a number of the 1,383 children who were currently living in a **First Nations community**, or who had previously been enrolled in a First Nations school. These children were excluded from the cohort, as were children who were ever home schooled or ever had a history of attending a non–funded independent school. These exclusions reduced the number of children from the 2001 birth cohort who were not enrolled in school in 2009/10 to 501. Further exploration of whether there are this many children of Grade 3 age not enrolled in school is warranted.

Figure 5.22: Lorenz Curve for Grade 3 Student Reading Competency in Rural Areas (Cohort Approach), 2009/10

Adjusted by age & sex for Grade 3 students in the 2001 birth cohort meeting or approaching expectations in two competencies

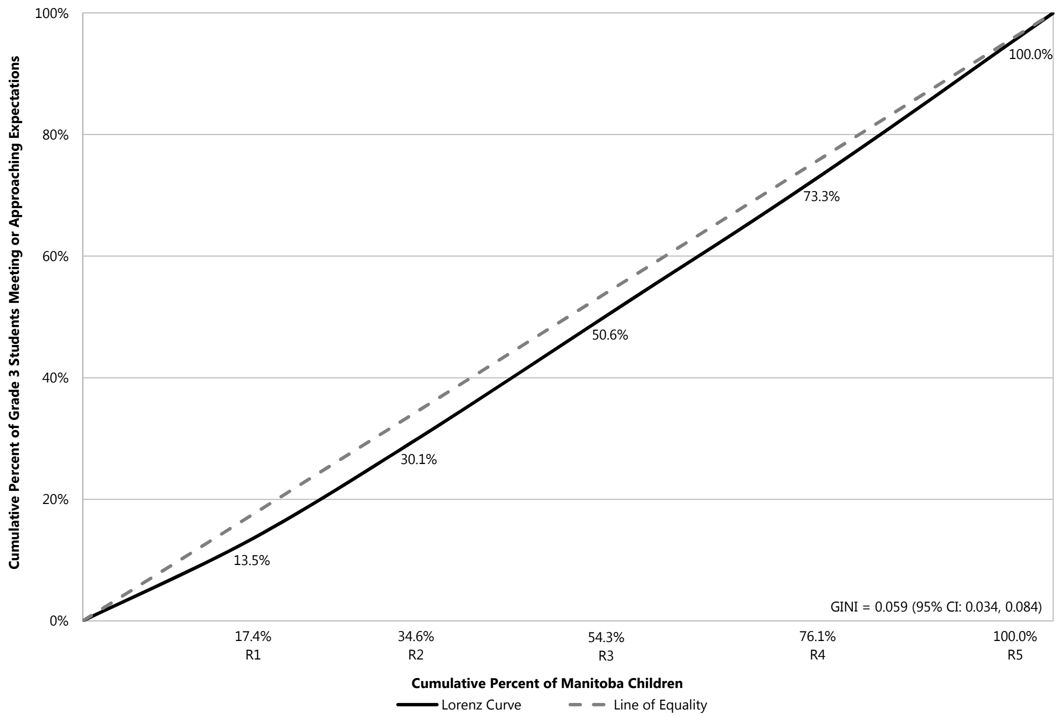
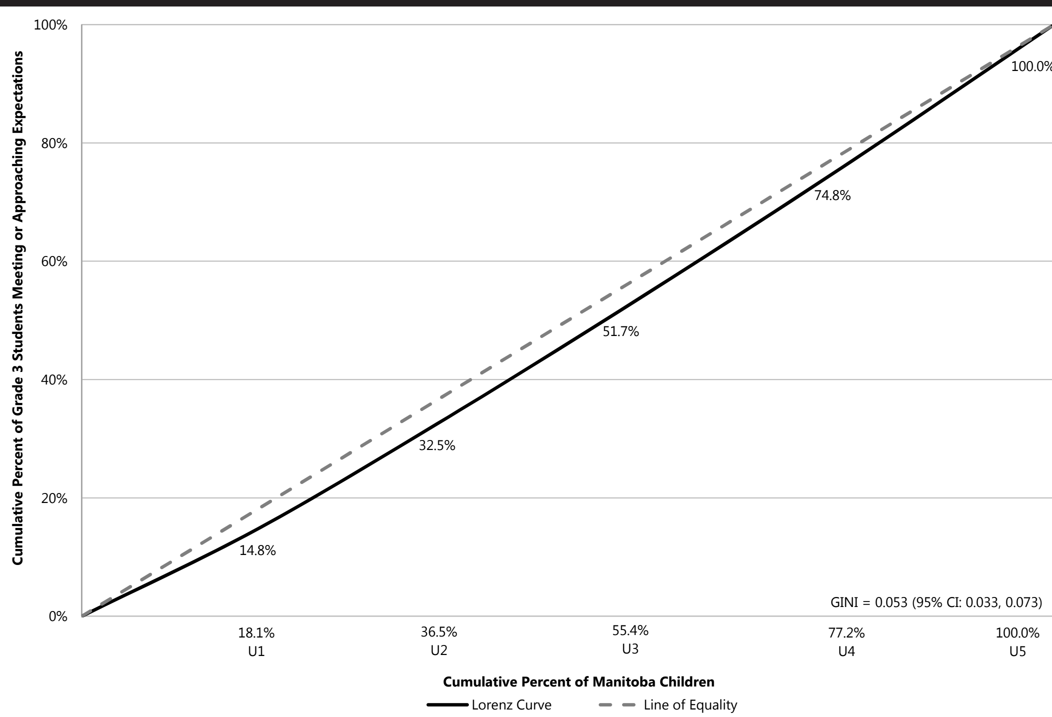


Figure 5.23: Lorenz Curve for Grade 3 Student Reading Competency in Urban Areas (Cohort Approach), 2009/10

Adjusted by age & sex for Grade 3 students in the 2001 birth cohort meeting or approaching expectations in two competencies



Grade 3 Assessment in Numeracy

In addition to assessments in reading, the educational assessment and evaluation of competencies also assesses certain skills in numeracy. The assessment in numeracy is focused on two aspects of mathematics that are necessary for success in public education and in society in general: algebraic reasoning (such as the ability to use representation, analyze and generalize patterns and regularities in mathematics) and number sense (proficiency in counting, numbers, operations, understanding number systems and structures, and solving problems). The ***Grade 3 Assessment in Numeracy****: Support Document for Teacher*s (Manitoba Education, 2009a) provides teachers with details of the skills to be assessed and detailed strategies on conducting the assessment. The assessment is not carried out as a formal test, but is conducted in class from various exercises and conversations where students are encouraged to discover connections, identify the rules that they see when presented with a pattern and even create their own patterns, demonstrate their knowledge of numbers, and solve problems. Teachers compare the ideas from students' responses to examples from the support document to determine the level of competency for each student.

Students in Grade 3 are assessed on four different numeracy competencies: 1) predicts an element in a repeating pattern, 2) understands that the equal symbol represents an equality of the terms found on either side of the symbol, 3) understands that a given whole number may be represented in a variety of ways, and 4) uses various mental math strategies to determine answers to addition and subtraction questions up to the number 18.

As with the reading assessment, students are categorized according to one of four levels of achievement for Grade 3 entry level performance standards: 1) meeting expectations, 2) approaching expectations, 3) needs ongoing help, and 4) out of range.[27] In this report, we present the percent of students who were "meeting" or "approaching" expectations on all four competencies at the time of the assessment. Bar graphs showing each of the four categories of achievement for students for each competency separately can be found in the online appendix.

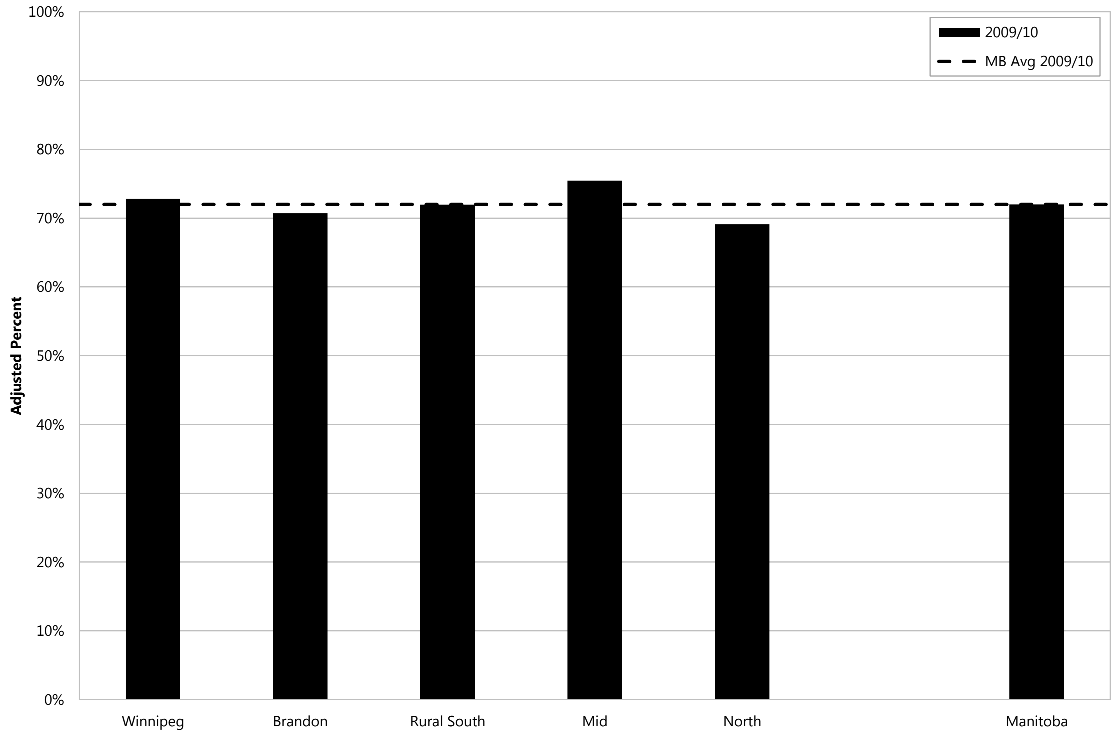
Rates by area represent where students live rather than where they attend school. Students in First Nations schools are excluded from analyses. Only one year of Grade 3 numeracy assessment data was available for analysis in this report.

Regional Trends

Figure 5.24 shows the percent of students meeting or approaching expectations on the four competencies described above, by aggregate regions for the 2009/10 school year. The adjusted percent ranged from 69.1% in the North to 75.5% in Mid with the Manitoba average at 72.0%.

27 Used to describe those students who are working well below grade–level curriculum relative to the competencies assessed due to their learning disabilities or their need for new language learning.

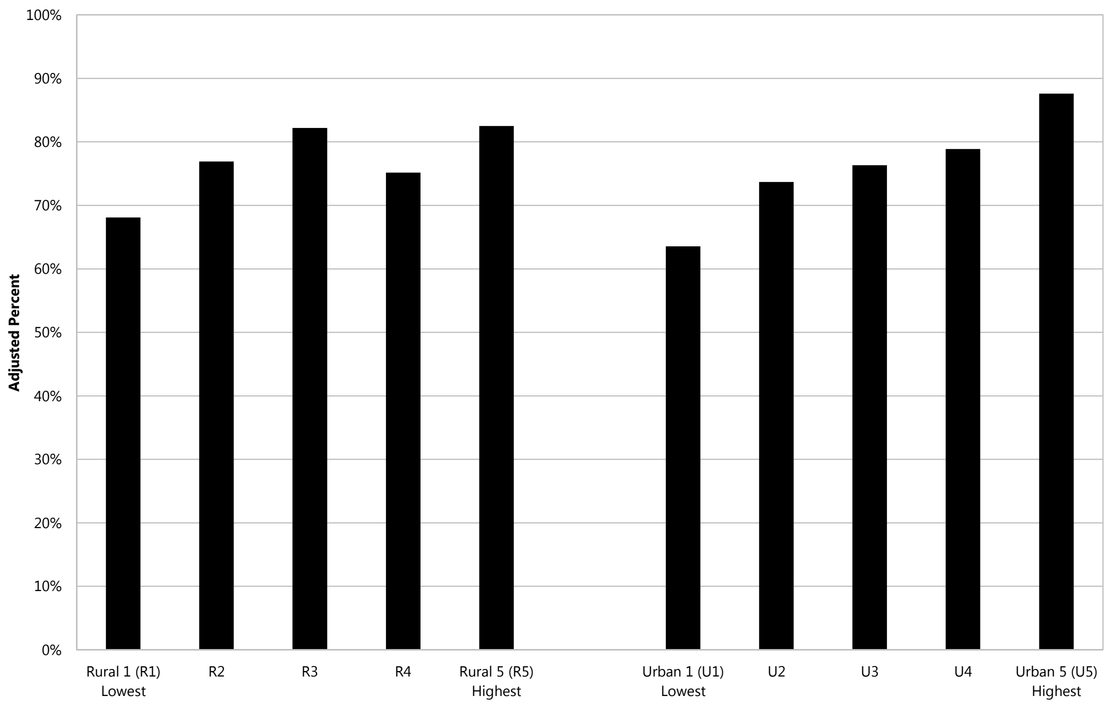
Figure 5.24: Grade 3 Student Numeracy Competency by Aggregate Region, 2009/10
Age- & sex-adjusted percent of Grade 3 students meeting or approaching expectations in all four competencies



Trends by Socioeconomic Status

Figure 5.25 shows the percent of Grade 3 students who are meeting or approaching expectations on all four competencies of Grade 3 numeracy by rural and urban income quintile for 2009/10. There was a significant SES gradient in both rural and urban areas, with a lower percent of students meeting or approaching expectations in numeracy in the lower income quintiles compared to the higher income quintiles. For example, 68.1% of the students in R1 were meeting or approaching expectations on all four competencies for Grade 3 numeracy compared to 82.5% in R5. Likewise, in urban areas, 63.6% of the students in U1 were meeting or approaching expectations on all four competencies compared to 87.6% in U5.

Figure 5.25: Grade 3 Student Numeracy Competency by Income Quintile*, 2009/10
Age- & sex-adjusted percent of Grade 3 students meeting or approaching expectations in all four competencies



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at p<0.05
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at p<0.05

Inequity

Figure 5.26 shows the inequities in Grade 3 numeracy in the 2009/10 school year for rural areas. The lowest income quintile (R1) had a lower percent of students meeting or approaching expectations on all four competencies for numeracy than expected given the proportion of the population. In 2009/10, the 15.7% of the population in R1 accounted for 13.8% of the Grade 3 students who were meeting or approaching expectations in numeracy. The Gini coefficient was 0.025, indicating a low degree of disparity across rural income quintiles.

Figure 5.27 shows that there was also little disparity in Grade 3 numeracy in urban areas. In 2009/10, the 19.2% of the population in U1 accounted for only 16.0% of the Grade 3 students who were meeting or approaching expectations on all four numeracy competencies. The Gini coefficient was 0.056, indicating a low degree of disparity. A comparison of the Gini coefficients indicated that there was no significant difference in inequity in the rural and urban income areas.

Figure 5.26: Lorenz Curve for Grade 3 Student Numeracy Competency in Rural Areas, 2009/10
Adjusted by age & sex for Grade 3 students meeting or approaching expectations in all four competencies

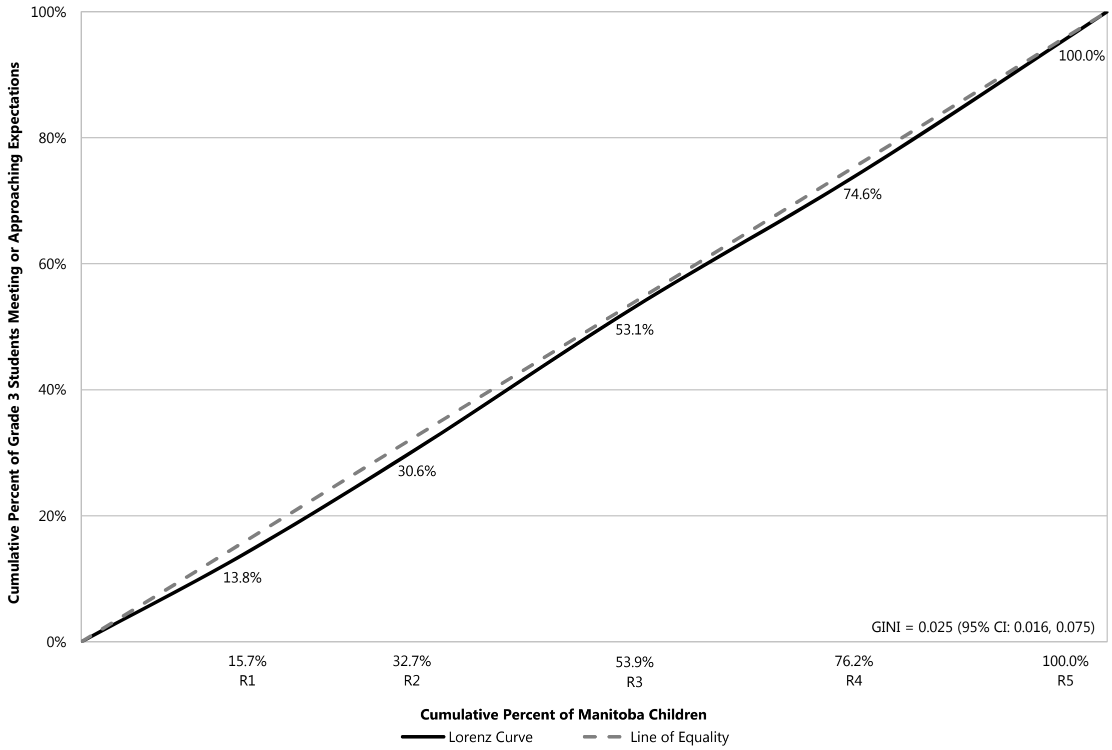
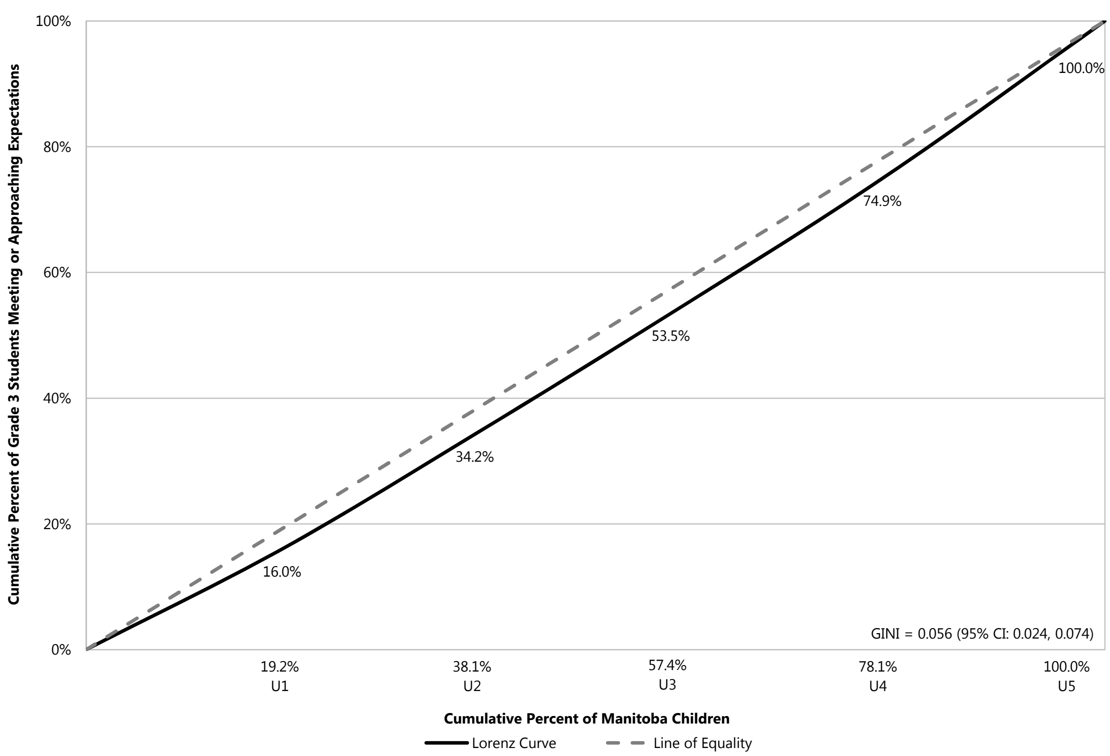


Figure 5.27: Lorenz Curve for Grade 3 Student Numeracy Competency in Urban Areas, 2009/10
Adjusted by age & sex for Grade 3 students meeting or approaching expectations in all four competencies



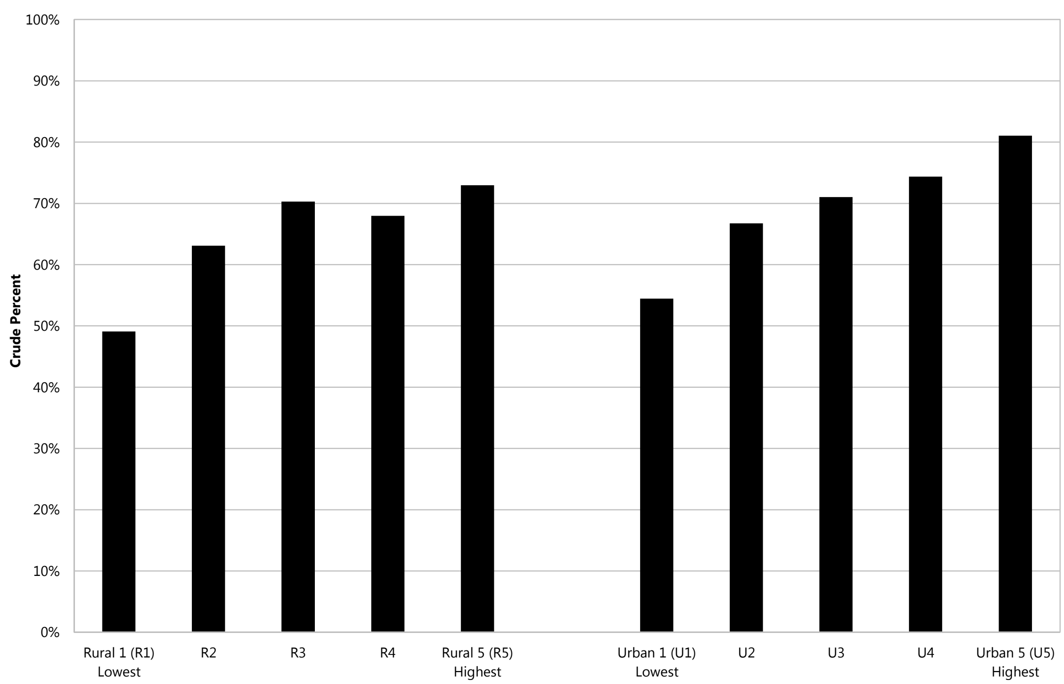
Cohort Approach to Grade 3 Assessment in Numeracy

The preceding analysis used all students with Grade 3 assessment scores in 2009/10. As described for Grade 3 reading assessment above, we repeated the analysis by SES using a cohort approach. In this analysis, all students born in 2001 and living in Manitoba in 2009/10 were included. Students without assessments were included in the category "not meeting expectations". Students who moved away from the province were excluded from the cohort.

Trends by Socioeconomic Status

Figure 5.28 shows the percent of Grade 3 students meeting or approaching expectations on all four competencies of Grade 3 numeracy, by rural and urban income quintile for 2009/10, using this cohort approach. The Manitoba average for the percent of Grade 3 students meeting or approaching expectations on all four competencies in Grade 3 numeracy is slightly lower (67.9%) using the cohort approach compared to the results, which used all students in Grade 3 with assessment scores (72.0%). In Figure 5.28, gradients are statistically significant in both rural and urban areas, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles, and increasing achievement as income level increases. Comparing Figure 5.28 to 5.25, it is clear that gradients are steeper using the cohort approach.

Figure 5.28: Grade 3 Student Numeracy Competency by Income Quintile* (Cohort Approach), 2009/10
Crude percent of Grade 3 students in the 2001 birth cohort meeting or approaching expectations in all four competencies



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at $p<0.05$
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at $p<0.05$

Inequity

Figure 5.29 shows the inequities in Grade 3 numeracy in the 2009/10 school year for rural areas using the cohort approach. The lowest income quintile (R1) had a lower percent of children meeting or approaching expectations than expected given the proportion of the population. In 2009/10, the 17.4% of the population in R1 accounted for only 13.1% of the Grade 3 students who were meeting or approaching expectations in numeracy on all competencies. The Gini coefficient was 0.061, which was larger than the Gini coefficient using only children in Grade 3 with assessment information (0.025), and indicates a moderate degree of disparity. The cohort approach may provide a more accurate picture of disparities (Brownell et al., 2006; Roos et al., 2006) as it includes children who have fallen behind, who were not assessed, or who may not be attending school.

Figure 5.30 shows similar disparities in Grade 3 numeracy for urban areas using the cohort approach. In 2009/10, the 18.1% of the population in U1 accounted for only 14.0% of the Grade 3 students who were meeting or approaching numeracy expectations. The Gini coefficient was 0.069, indicating a moderate degree of disparity and slightly more disparity than the approach including only children in Grade 3 in 2009/10 with assessments (0.056).

What do these results mean?

Although there are significant differences in the percent of children meeting or approaching expectations in both reading and numeracy across income quintiles in rural and urban areas, the degree of inequity for these indicators is relatively low.

Figure 5.29: Lorenz Curve for Grade 3 Student Numeracy Competency in Rural Areas (Cohort Approach), 2009/10

Crude for Grade 3 students in the 2001 birth cohort meeting or approaching expectations in all four competencies

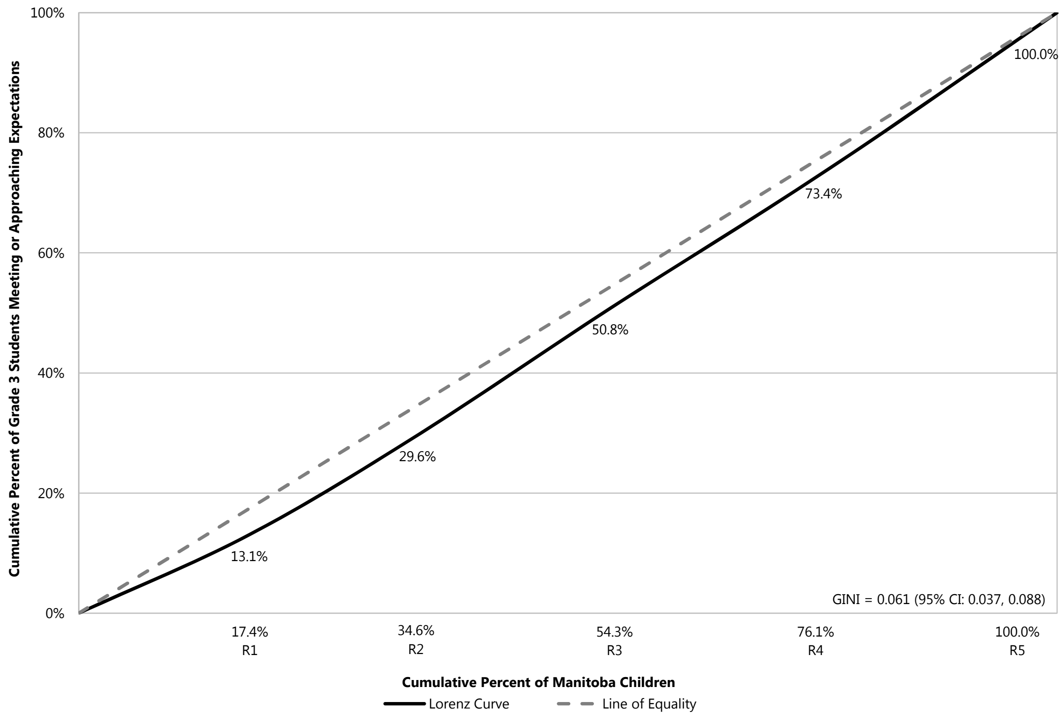
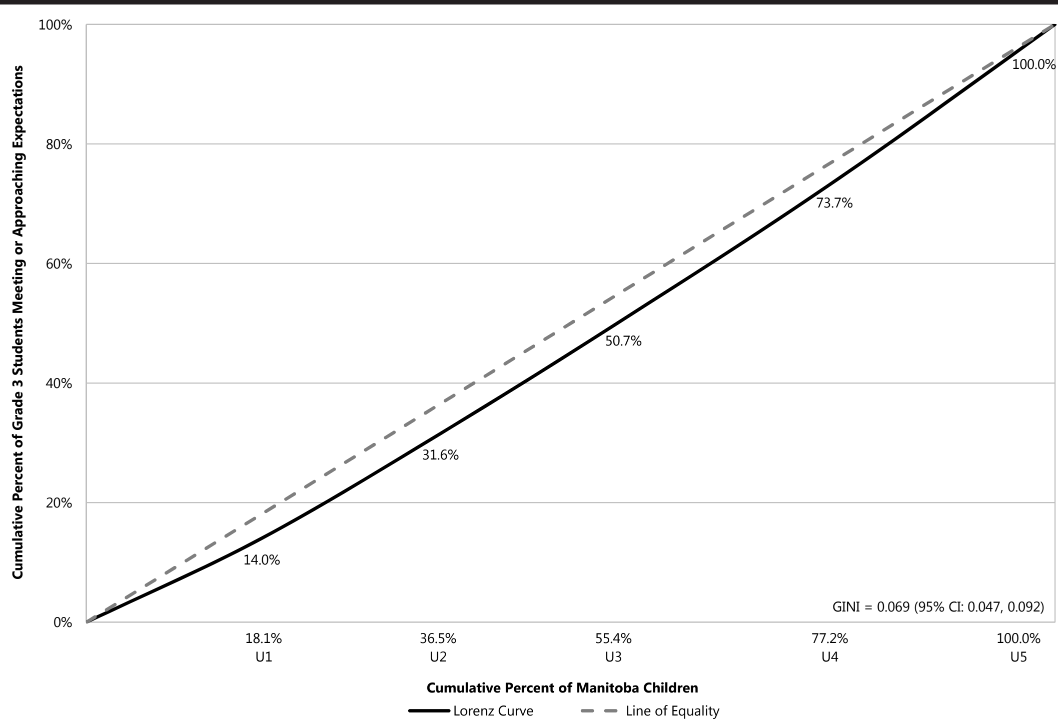


Figure 5.30: Lorenz Curve for Grade 3 Student Numeracy Competency in Urban Areas (Cohort Approach), 2009/10

Crude for Grade 3 students in the 2001 birth cohort meeting or approaching expectations in all four competencies



Grade 7 Assessment in Mathematics

In Grade 7, students are assessed for certain competencies in mathematics throughout the year, this time with more focus on the involvement of the students in the assessments so that they may become independent learners (i.e., review their own competencies and address their own learning needs) (Manitoba Education, 2010). Students and teachers work together to develop the best learning process to reach their competency goals. In the last two weeks of January, the teacher prepares a summative assessment report on each student for the student and parents to review. The Department of Education also receives the data for their summary reports.

Students in Grade 7 are assessed on five different mathematics competencies: 1) orders fractions, 2) orders decimal numbers, 3) understands that a given number may be represented in a variety of ways, 4) uses number patterns to solve mathematical problems, and 5) uses a variety of strategies to calculate and explain a mental math problem.

For each of these competencies, students are categorized according to one of four levels of achievement for Grade 7 level performance standards: 1) meeting expectations, 2) approaching expectations, 3) not meeting expectations, and 4) out of range.[28] In this report, we present the percent of students who were "meeting" or "approaching" expectations at the time of the assessment. Bar graphs showing each of the four categories of achievement for students for each of the five competencies separately can be found in the online appendix. The rates presented below show students approaching or meeting expectations on all five competencies.

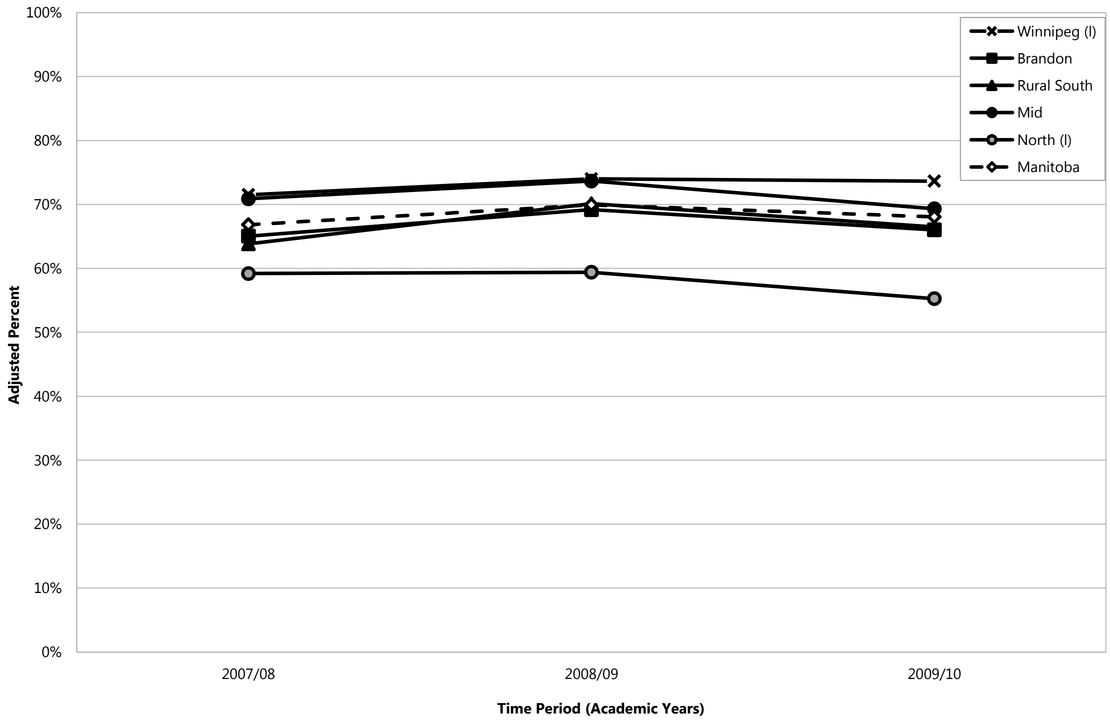
Rates by area represent where students live rather than where they attend school. Some First Nations schools do not participate in the **Grade 7 assessments in mathematics**; so for this reason, children in First Nations schools have been removed from these analyses. At the time of this report, only three years of Grade 7 mathematics assessments were available (2007/08–2009/10)

Regional Trends Over Time

Figure 5.31 shows the percent of students meeting or approaching expectations on all five mathematics competencies described by aggregate regions for the 2007/08 through 2009/10 school years. The Manitoba average was 66.8% in the first time period and 68.1% in the last time period, a change that was not statistically significant. None of the aggregate regions showed a change in the percent of Grade 7 students meeting or approaching expectations in mathematics over the three years. In the final time period, the rate in Winnipeg (73.7%) was significantly greater than the Manitoba average, whereas the rate in the North (55.3%) was significantly lower than the Manitoba average.

28 See note 27.

Figure 5.31: Grade 7 Student Mathematics Competency by Aggregate Region, 2007/08–2009/10
Age– & sex–adjusted percent of Grade 7 students meeting or approaching expectations in all five competencies



l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

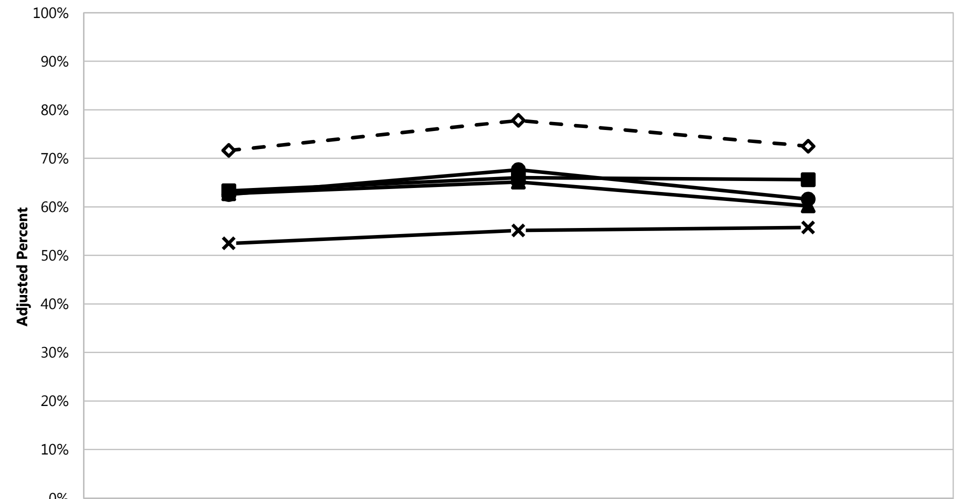
Trends by Socioeconomic Status

Figure 5.32 shows the percent of Grade 7 students meeting or approaching expectations on all five competencies of Grade 7 mathematics by rural income quintile for 2007/08 to 2009/10. There was a significant SES gradient in each year, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles and increasing achievement as income level increases. For example, 55.7% of the Grade 7 students in R1 were meeting or approaching expectations on all five competencies in the last time period compared to 72.5% in R5.

Figure 5.33 shows the percent of Grade 7 students meeting or approaching expectations on all five competencies of mathematics by urban income quintile for 2007/08 through 2009/10. There were significant SES gradients in all three years, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles and increasing achievement as income level increased. For example, in U1, 56.4% of the students were meeting or approaching expectations on all five competencies of Grade 7 numeracy in the last time period compared to 84.1% of those from U5.

Figure 5.32: Grade 7 Student Mathematics Competency by Rural Income Quintile, 2007/08–2009/10

Age– & sex–adjusted percent of Grade 7 students meeting or approaching expectations in all five competencies



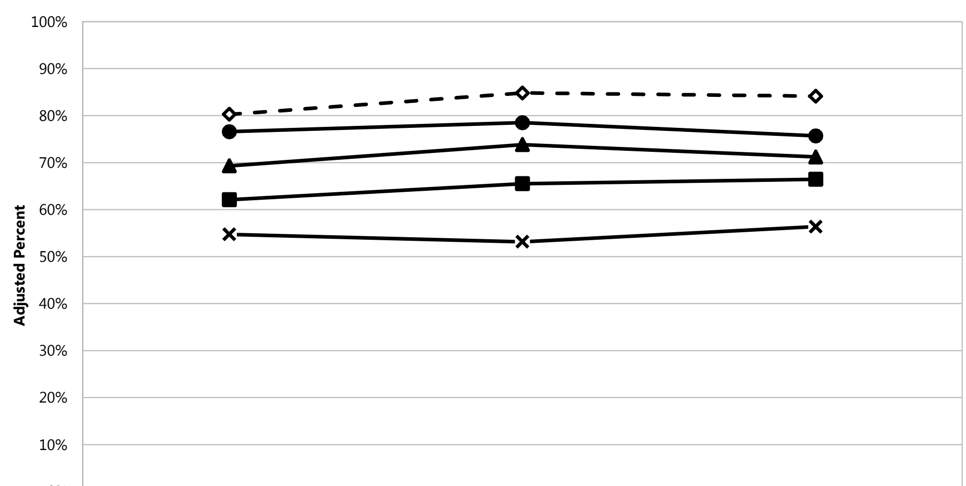
	2007/08	2008/09	2009/10
Income Unknown	45.55%	48.33%	46.01%
R1 – Lowest Income	52.47%	55.13%	55.74%
R2	63.30%	66.01%	65.61%
R3	62.71%	65.11%	60.20%
R4	62.56%	67.66%	61.59%
R5 – Highest Income	71.61%	77.81%	72.50%
Linear trend across R1–R5	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Figure 5.33: Grade 7 Student Mathematics Competency by Urban Income Quintile, 2007/08–2009/10

Age– & sex–adjusted percent of Grade 7 students meeting or approaching expectations in all five competencies



	2007/08	2008/09	2009/10
Income Unknown	45.55%	48.33%	46.01%
U1 – Lowest Income	54.74%	53.15%	56.37%
U2	62.10%	65.52%	66.45%
U3	69.31%	73.82%	71.21%
U4	76.58%	78.50%	75.69%
U5 – Highest Income	80.27%	84.80%	84.14%
Linear trend across U1–U5	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Changes in Inequity Over Time

Figures 5.34 and 5.35 show the inequities in Grade 7 mathematics in 2007/08 and 2009/10 for rural areas. In both time periods, the percent of Grade 7 students meeting or approaching expectations on all five mathematics competencies was lower than expected in R1 given the proportion of the population comprising R1. For example, in 2007/08, the 15.6% of the population in R1 accounted for 12.9% of the students meeting or approaching expectations. The Gini coefficient was 0.046, indicating a low degree of disparity across rural income quintiles. In 2009/10, the 14.5% of the population in R1 accounted for 12.7% of the students meeting or approaching expectations in mathematics competencies. The Gini coefficient was 0.038, which was not significantly different from the first time period.

Figures 5.36 and 5.37 show the disparities in Grade 7 mathematics for urban areas. In 2007/08, the 17.5% of the population that comprises U1 accounted for 13.8% of the Grade 7 students meeting or approaching mathematics expectations. The Gini coefficient was 0.074, indicating a moderate degree of disparity. In 2009/10, the 17.6% of the population in U1 accounted for 13.8% of the Grade 7 students who were meeting or approaching numeracy expectations. The Gini coefficient in 2007/08 was 0.072, indicating a moderate degree of disparity. There was no significant change in the Gini coefficient over the time periods, indicating that the inequity in Grade 7 numeracy outcomes did not change over the years studied. A comparison of the Gini coefficients in the last time period indicated that the inequity in urban areas was significantly greater than in rural areas.

Figure 5.34: Lorenz Curve for Grade 7 Student Mathematics Competency in Rural Areas, 2007/08
Adjusted by age & sex for Grade 7 students meeting or approaching expectations in all five competencies

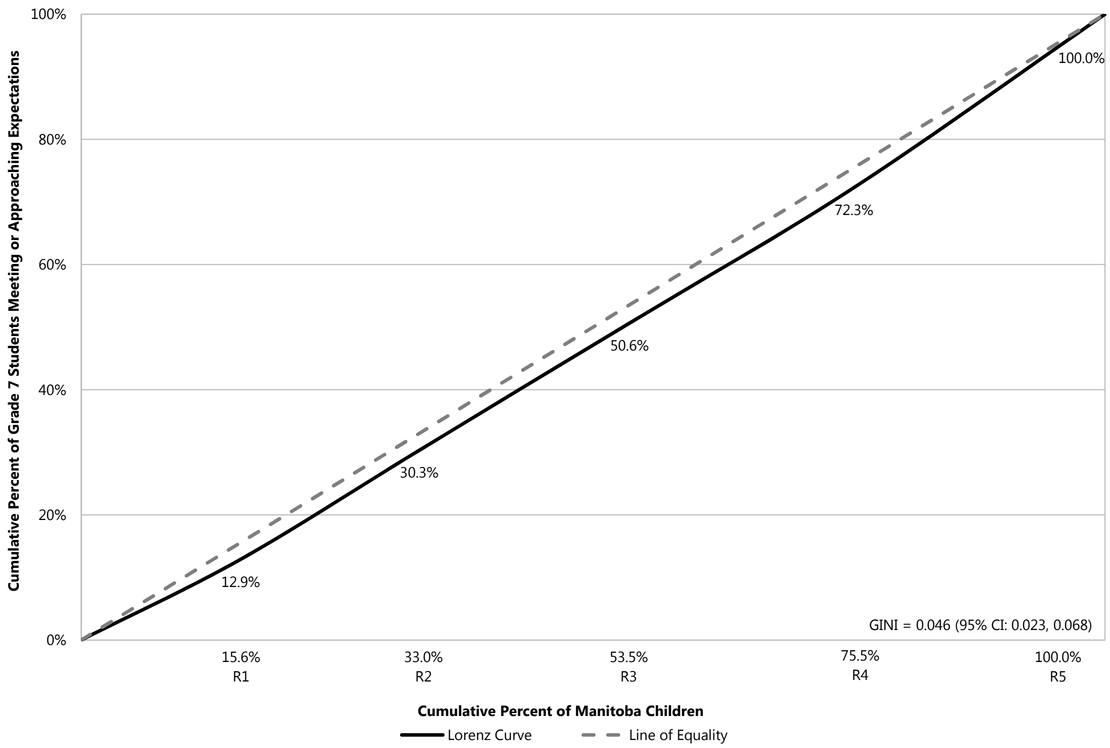


Figure 5.35: Lorenz Curve for Grade 7 Student Mathematics Competency in Rural Areas, 2009/10
Adjusted by age & sex for Grade 7 students meeting or approaching expectations in all five competencies

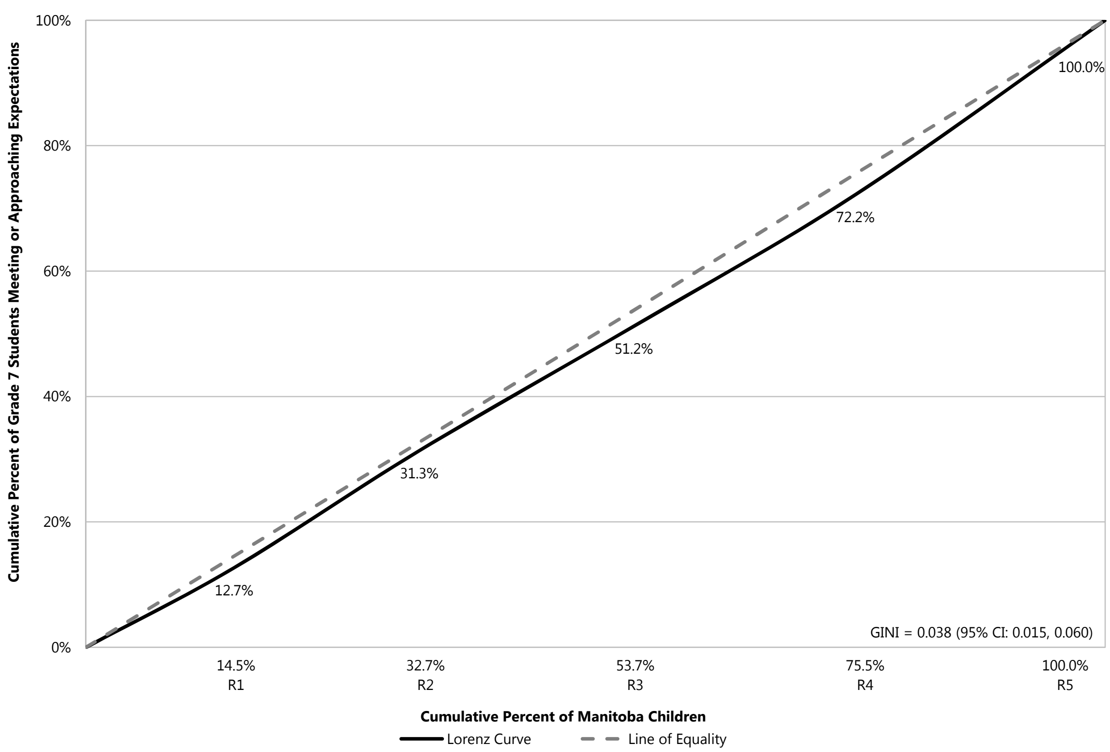


Figure 5.36: Lorenz Curve for Grade 7 Student Mathematics Competency in Urban Areas, 2007/08
Adjusted by age & sex for Grade 7 students meeting or approaching expectations in all five competencies

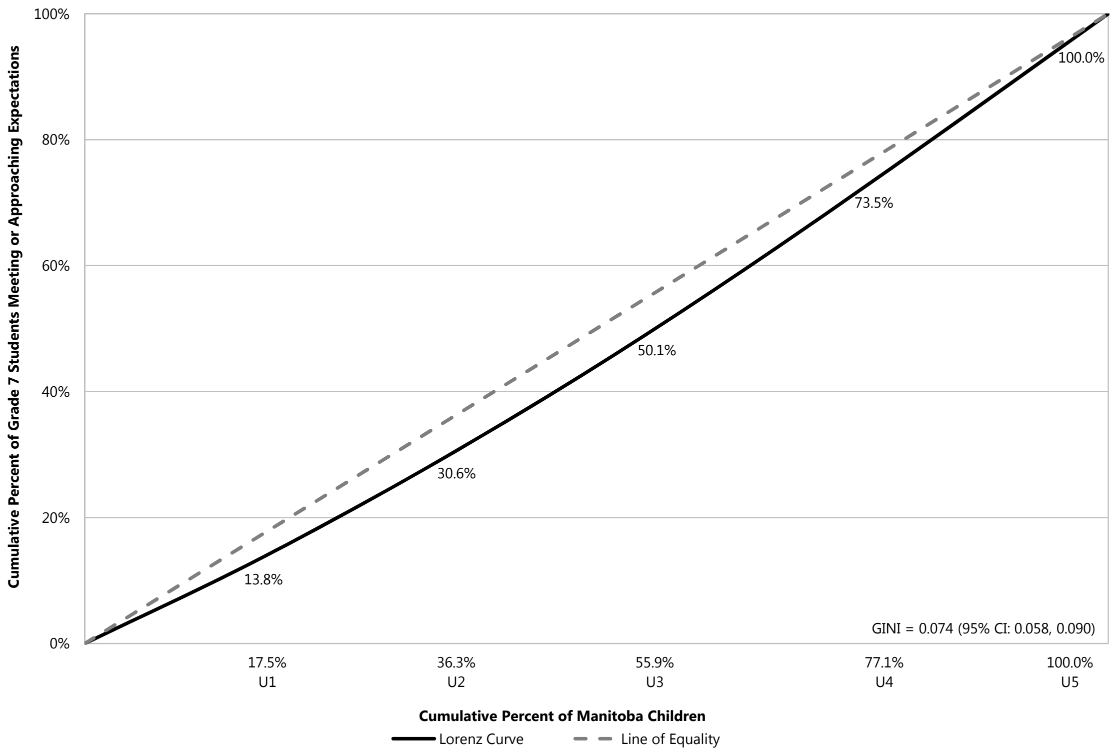
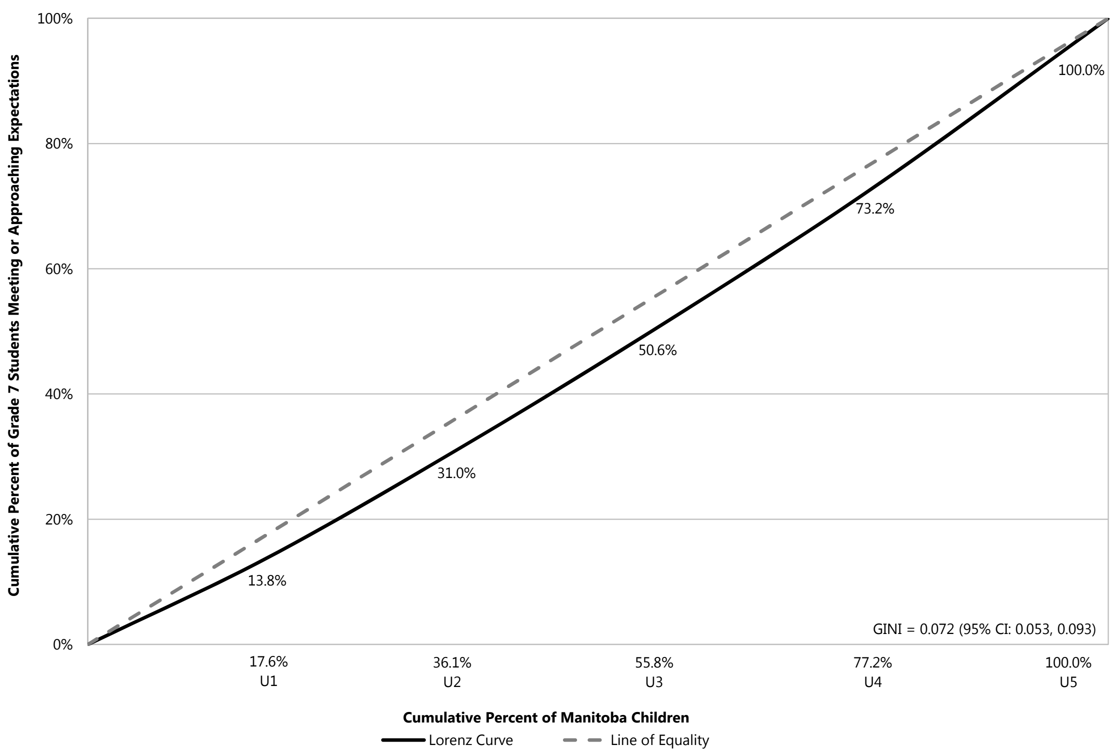


Figure 5.37: Lorenz Curve for Grade 7 Student Mathematics Competency in Urban Areas, 2009/10
Adjusted by age & sex for Grade 7 students meeting or approaching expectations in five competencies



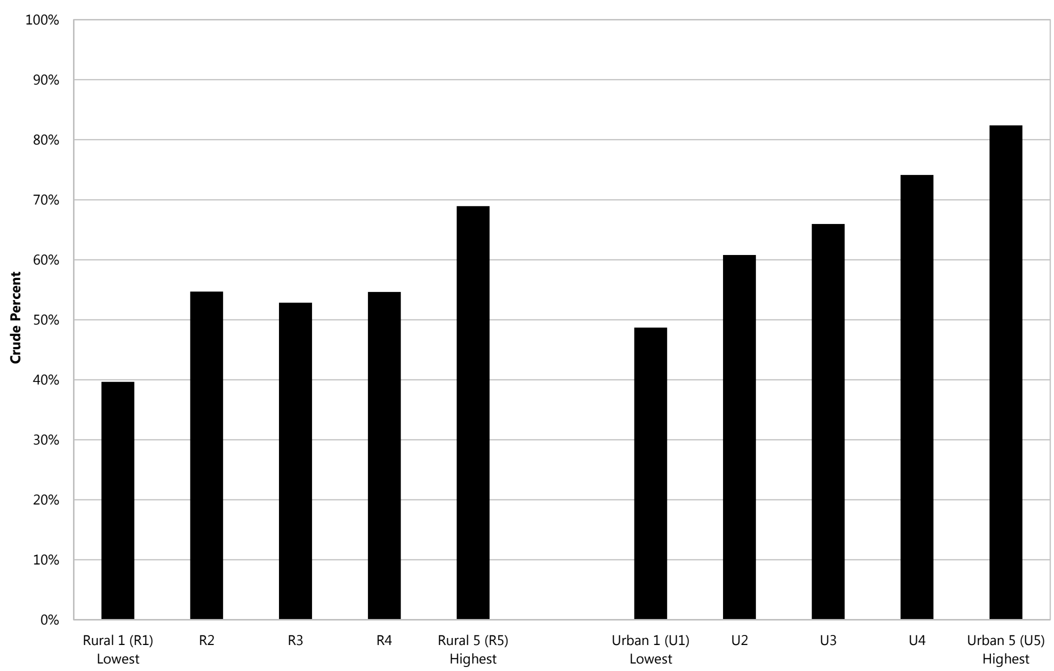
Cohort Approach to Grade 7 Assessment in Mathematics

The preceding analysis used all students with Grade 7 assessment scores in 2007/08–2009/10. As described for Grade 3 assessments, we repeated the analysis by SES using a cohort approach for the most recent year (2009/10). In this analysis, all students born in 1997, and living in Manitoba in 2009/10, were included. This is the cohort that would be expected to be in Grade 7 and being assessed on mathematics skills had they progressed through the school system in the expected manner. Students without assessments were included in the category "not meeting expectations". Students who moved away from the province were excluded from the cohort.

Trends by Socioeconomic Status

Figure 5.38 shows the percent of Grade 7 students meeting or approaching expectations on all five competencies of Grade 7 mathematics, by rural and urban income quintile for 2009/10, using this cohort approach. The Manitoba average for the percent of Grade 7 students meeting or approaching expectations on all five competencies in Grade 7 mathematics is slightly lower (62.1%) using the cohort approach compared to the results which used all students in Grade 7 with assessment scores (68.1%). In Figure 5.38, gradients are statistically significant in both rural and urban areas, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles, and increasing achievement as income level increases. Comparing Figure 5.38 to Figures 5.32 and 5.33 it is clear that gradients are steeper using the cohort approach.

Figure 5.38: Grade 7 Student Mathematics Competency by Income Quintile*, 2009/10
Crude percent of Grade 7 students in the 1997 birth cohort meeting or approaching expectations in all five competencies



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at $p<0.05$
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at $p<0.05$

Inequity

Figure 5.39 shows the inequities in Grade 7 mathematics in the 2009/10 school year for rural areas using the cohort approach. The lowest income quintile (R1) had a lower percent of children meeting or approaching expectations than expected given the proportion of the population. In 2009/10, the 17.0% of the population in R1 accounted for only 12.2% of the Grade 7 students who were meeting or approaching expectations on all five mathematics competencies. The Gini coefficient was 0.086, which was larger than the Gini coefficient using only children in Grade 7 with assessment information (0.038), and indicates a moderate degree of disparity. The cohort approach may provide a more accurate picture of disparities (Brownell et al., 2006; Roos et al., 2006) as it includes children who have fallen behind, who were not assessed, or who may not be attending school.

Figure 5.40 shows similar disparities in Grade 7 numeracy for urban areas using the cohort approach. In 2009/10, the 16.1% of the population in U1 accounted for only 11.5% of the Grade 7 students who were meeting or approaching mathematics expectations. The Gini coefficient was 0.093, indicating a moderate degree of disparity and more disparity than the approach including only children in Grade 7 in 2009/10 with assessments (0.072).

Figure 5.39: Lorenz Curve for Grade 7 Student Mathematics Competency in Rural Areas (Cohort Approach), 2009/10

Crude for Grade 7 students in the 1997 birth cohort meeting or approaching expectations in all five competencies

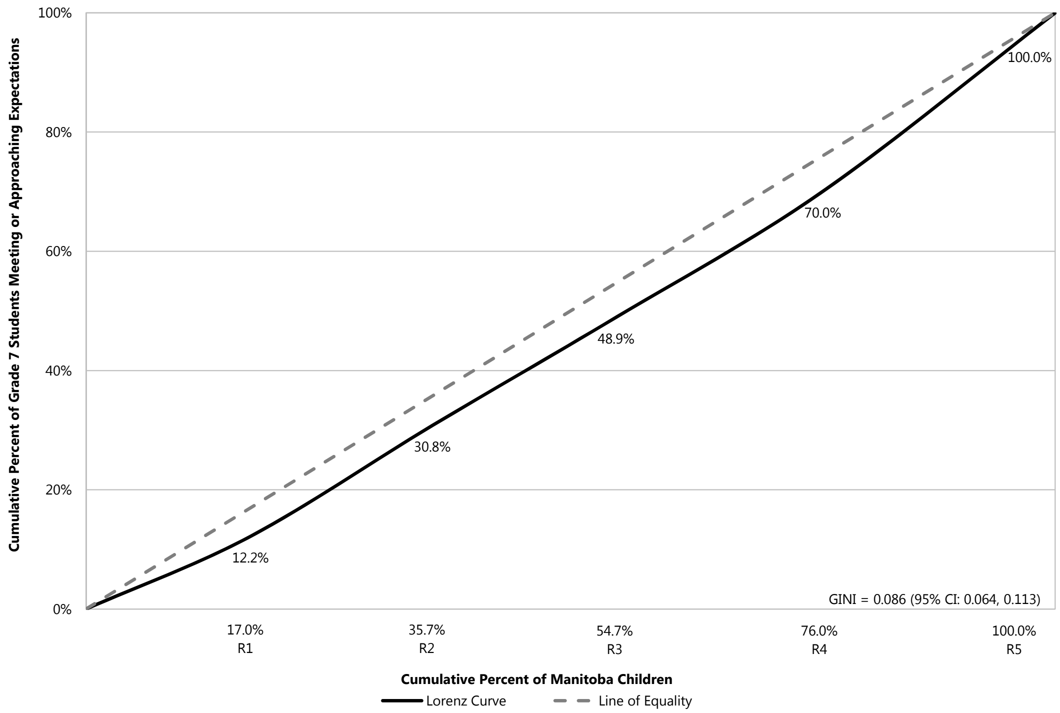
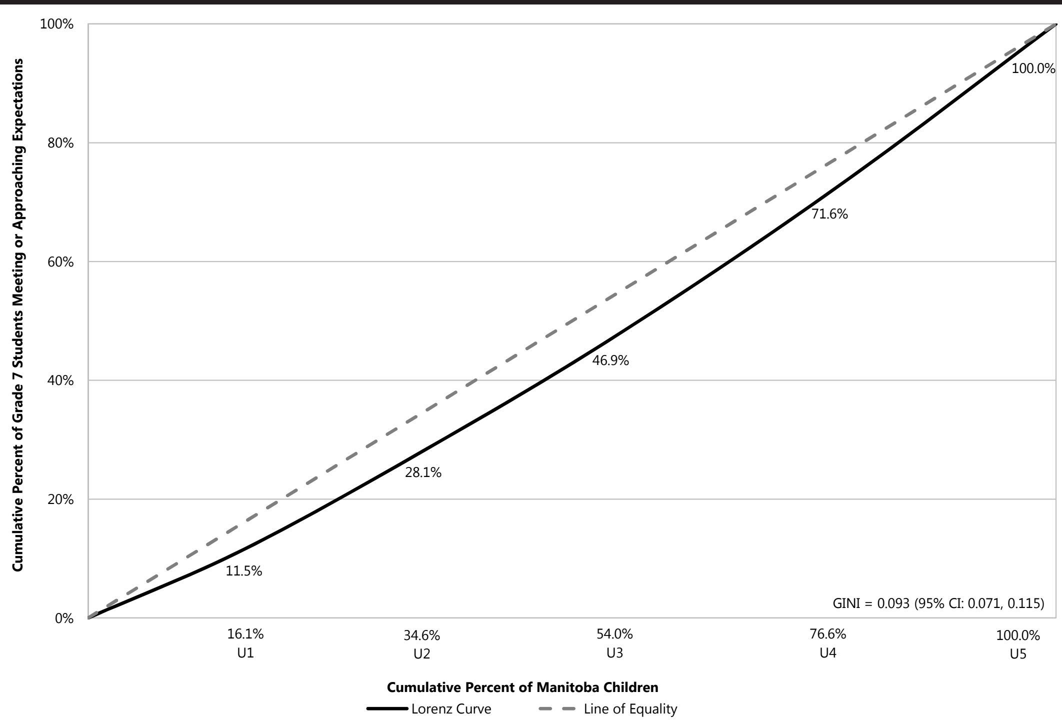


Figure 5.40: Lorenz Curve for Grade 7 Student Mathematics Competency in Urban Areas (Cohort Approach), 2009/10

Crude for Grade 7 students in the 1997 birth cohort meeting or approaching expectations in all five competencies



Grade 8 Assessment in Reading and Writing

In Grade 8, students are assessed on reading comprehension and writing of informational texts. As in the Grade 7 mathematics assessment, students and teachers work together in reaching the reading and writing goals throughout the year. In the last two weeks of January, the teachers use their daily classroom observations to prepare a summative assessment report on each student for the student and parents to review and for the Department of Education (Manitoba Education, 2010).

Students in Grade 8 are assessed on six different reading and writing competencies: 1) understands key ideas and messages in a variety of texts; 2) interprets a variety of texts; 3) responds critically to a variety of texts; 4) generates, selects and organizes ideas to support the reader's understanding; 5) chooses languages (word choices and sentence patterns) to make an impact on the reader; and 6) uses conventions (spelling, grammar, and/or punctuation) and resources to edit and proofread to make meaning clear.

Because students in French Immersion are assessed in both French and English, there are two sets of scores for these students. For the majority of students, their scores are the same; however there are some discrepancies (i.e., in some cases students do better in English, in some cases students do better in French). In order to keep only one set of scores for each student, we summed the values across all six competencies for the language where the student's total score was the highest.

For each of the six competencies, students are categorized according to one of four levels of achievement for Grade 8 level performance standards: 1) meeting expectations, 2) approaching expectations, 3) not meeting expectations, and 4) out of range.[29] In this report we present the percent of students who were "meeting" or "approaching" expectations at the time of the assessment. Bar graphs showing each of the four categories of achievement for students for each of the six competencies separately can be found in the online appendix. The rates presented here show students approaching or meeting expectations on all six competencies.

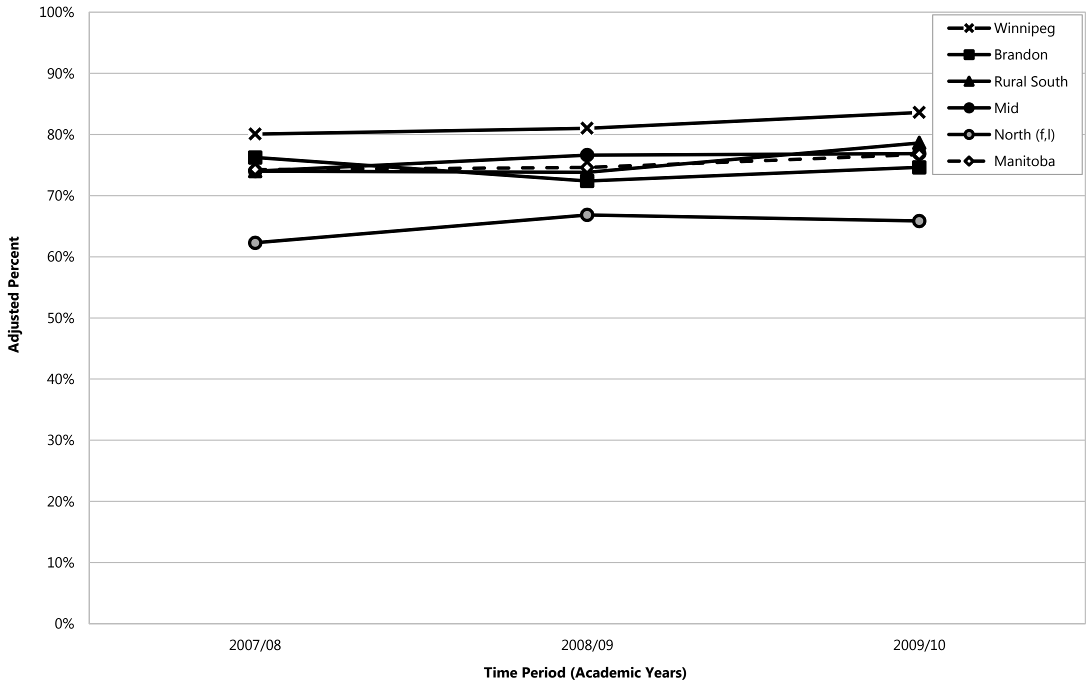
Rates by area represent where students live rather than where they attend school. Some First Nations schools do not participate in the **Grade 8 assessments in reading and writing**, so for this reason, children in First Nations schools have been removed from these analyses. Only three years of Grade 8 reading and writing assessment data were available for analysis in this report (2007/08–2009/10).

Regional Trends Over Time

Figure 5.41 shows the percent of students meeting or approaching expectations on all six reading and writing competencies described above by aggregate regions for the 2007/08 through 2009/10 school years. The Manitoba average was 74.3% in the first time period and 76.7% in the last time period, a change that was not statistically significant. None of the aggregate regions showed a change in the percent of Grade 8 students meeting or approaching expectations in reading and writing over the three years. In the first and last time periods, the rate in the North (62.3% and 65.9%) was significantly lower than the Manitoba average.

29 See note 27.

Figure 5.41: Grade 8 Student Reading and Writing Competency by Aggregate Region, 2007/08–2009/10
Age- & sex–adjusted percent of Grade 8 students meeting or approaching expectations in all six competenices



f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

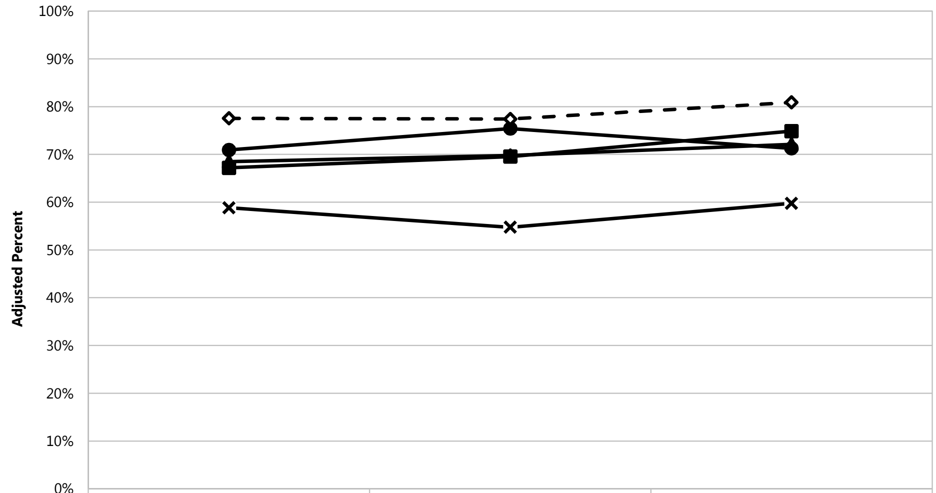
Trends by Socioeconomic Status

Figure 5.42 shows the percent of Grade 8 students meeting or approaching expectations on all six competencies of Grade 8 reading and writing by rural income quintile for 2007/08 through 2009/10. There was a significant SES gradient in each year, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles and increasing achievement as income level increases. For example, in 2009/10, 59.7% of the Grade 8 students in R1 were meeting or approaching expectations on all six reading and writing competencies compared to 80.9% in R5. Rates for students in R2 increased significantly over time from 67.2% in 2007/08 to 74.9% in 2009/10.

Figure 5.43 shows the percent of Grade 8 students meeting or approaching expectations on all six competencies of reading and writing by urban income quintile for 2007/08 through 2009/10. There were significant SES gradients in all three years, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles and increasing achievement as income level increased. For example, in 2009/10 in U1, 64.8% of the students were meeting or approaching expectations on all six competencies of Grade 8 reading and writing, compared to 89.5% of those from U5.

Figure 5.42: Grade 8 Student Reading and Writing Competency by Rural Income Quintile, 2007/08–2009/10

Age- & sex–adjusted percent of Grade 8 students meeting or approaching expectations in all six competencies



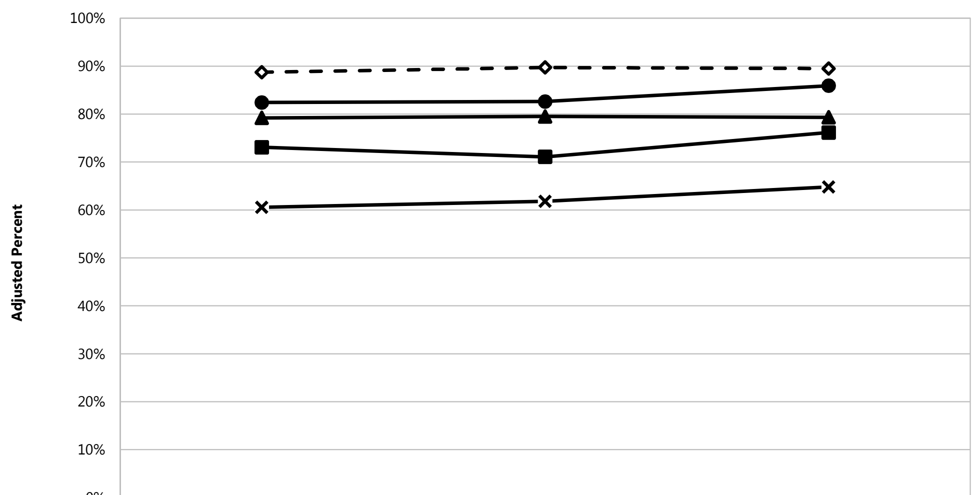
	2007/08	2008/09	2009/10
Income Unknown	56.82%	52.57%	57.37%
R1 – Lowest Income	58.82%	54.74%	59.74%
R2 (t)	67.18%	69.54%	74.85%
R3	68.50%	69.76%	72.10%
R4	70.93%	75.41%	71.27%
R5 – Highest Income	77.53%	77.40%	80.88%
Linear trend across R1–R5	*	*	*

Time Period (Academic Years)

t indicates change over time statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 5.43: Grade 8 Student Reading and Writing Competency by Urban Income Quintile, 2007/08–2009/10

Age- & sex–adjusted percent of Grade 8 students meeting or approaching expectations in all six competencies



	2007/08	2008/09	2009/10
Income Unknown	56.82%	52.57%	57.37%
U1 – Lowest Income	60.53%	61.80%	64.78%
U2	73.07%	71.07%	76.16%
U3	79.20%	79.51%	79.33%
U4	82.41%	82.61%	85.91%
U5 – Highest Income	88.72%	89.71%	89.49%
Linear trend across U1–U5	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 5.44 and 5.45 show the inequities in Grade 8 reading and writing in 2007/08 and 2009/10 for rural areas. In both time periods, the percent of Grade 8 students meeting or approaching expectations on all six reading and writing competencies was lower than expected in R1 given the proportion of the population comprising R1. For example, in 2007/08, the 16.1% of the population in R1 accounted for 13.6% of the students meeting or approaching expectations. The Gini coefficient was 0.046, indicating a low degree of disparity across rural income quintiles. In 2009/10, the 14.9% of the population in R1 accounted for 12.2% of the students meeting or approaching expectations in reading and writing. The Gini coefficient was 0.040, which was not significantly different from the first time period.

Figures 5.46 and 5.47 show the disparities in Grade 8 reading and writing for urban areas. In 2007/08, the 17.0% of the population that comprises U1 accounted for 13.3% of the Grade 8 students meeting or approaching reading and writing expectations. The Gini coefficient was 0.066, indicating a moderate degree of disparity. In 2009/10, the 17.0% of the population in U1 accounted for 13.7% of the Grade 8 students who were meeting or approaching reading and writing expectations. The Gini coefficient was 0.057, indicating a low degree of disparity. There was no significant change in the Gini coefficient over the time periods, indicating that the inequity in Grade 8 reading and writing outcomes did not change over the years studied. A comparison of the Gini coefficients in the last time period indicated that the inequity in urban and rural areas was not significantly different.

Figure 5.44: Lorenz Curve for Grade 8 Student Reading and Writing Competency in Rural Areas, 2007/08

Adjusted by age & sex for Grade 8 students meeting or approaching expectations in all six competencies

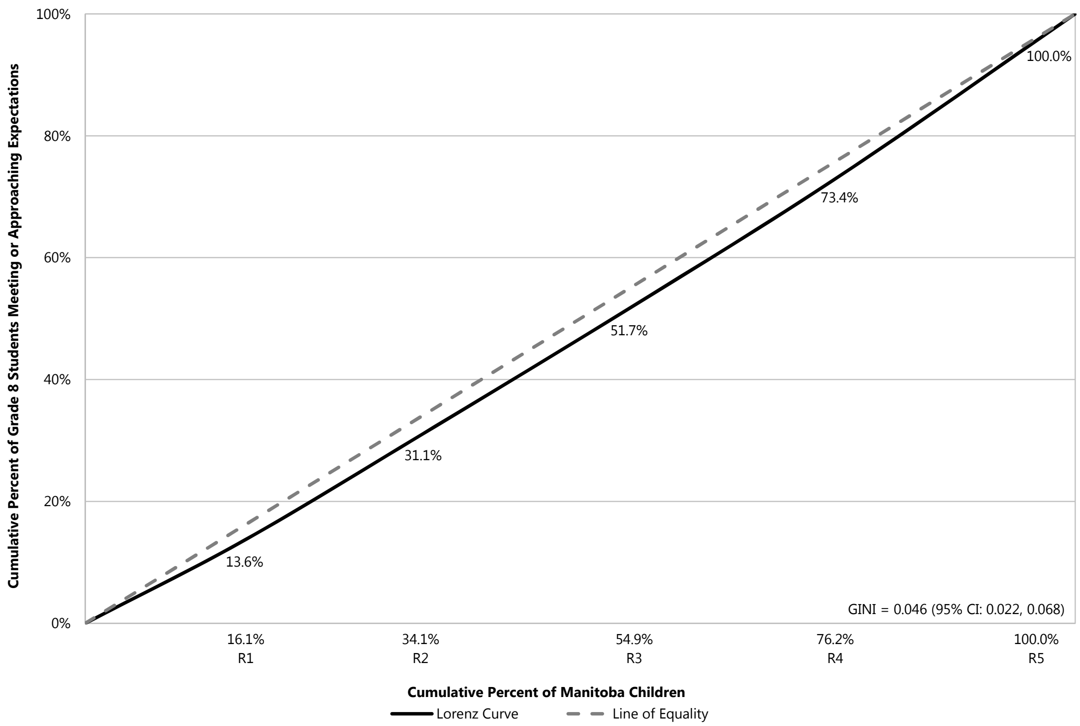


Figure 5.45: Lorenz Curve for Grade 8 Student Reading and Writing Competency in Rural Areas, 2009/10

Adjusted by age & sex for Grade 8 students meeting or approaching expectations in all six competencies

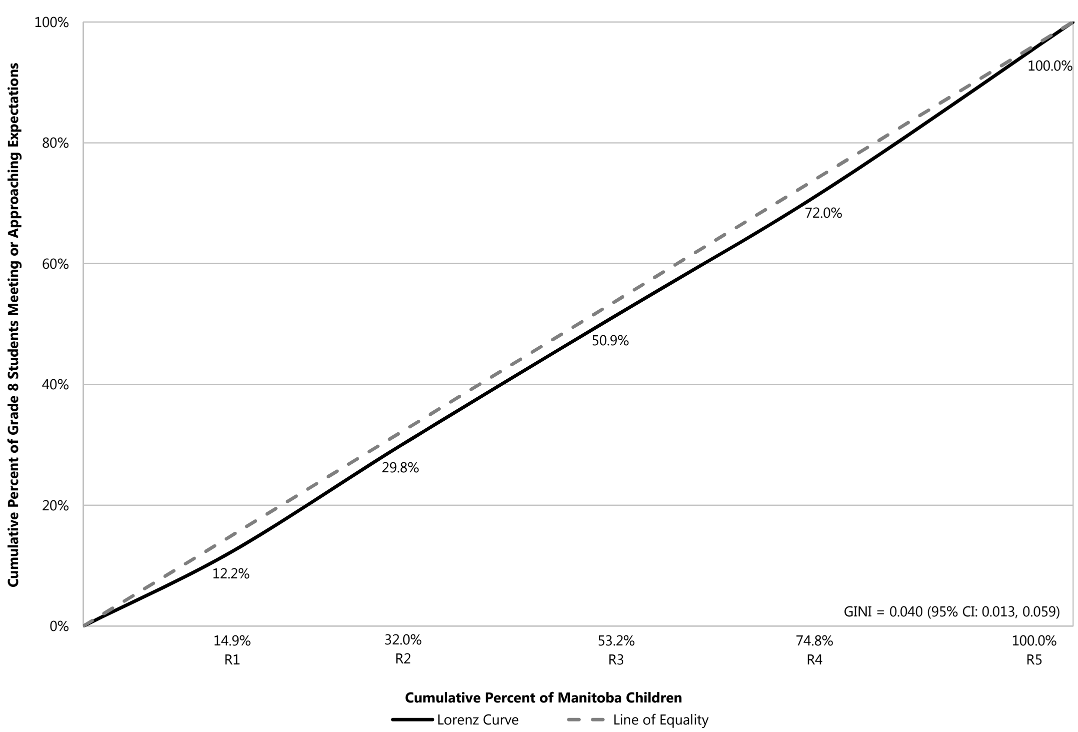


Figure 5.46: Lorenz Curve for Grade 8 Student Reading and Writing Competency in Urban Areas, 2007/08

Adjusted by age & sex for Grade 8 students meeting or approaching expectations in all six competencies

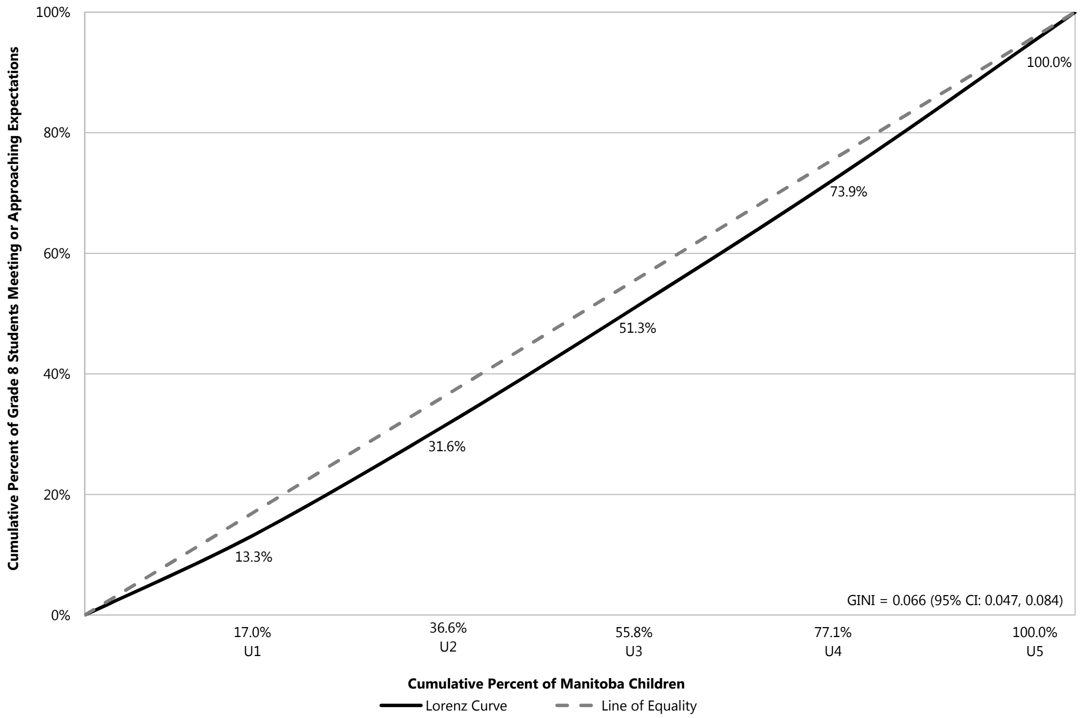
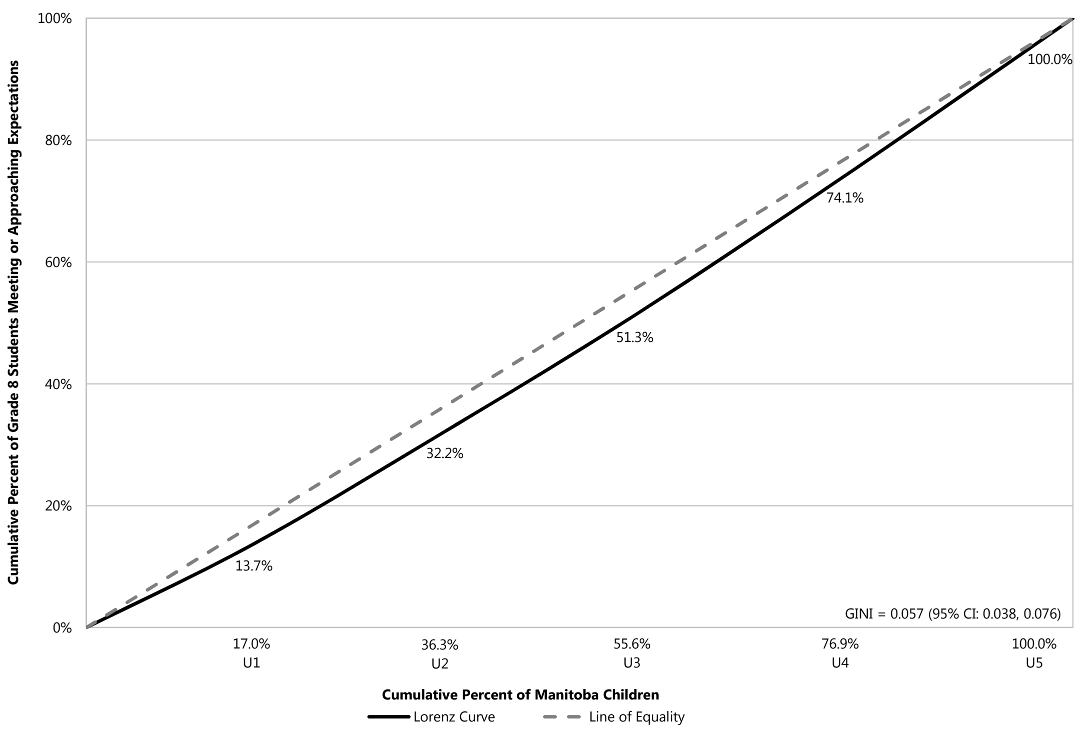


Figure 5.47: Lorenz Curve for Grade 8 Student Reading and Writing Competency in Urban Areas, 2009/10

Adjusted by age & sex for Grade 8 students meeting or approaching expectations in all six competencies



Cohort Approach to Grade 8 Assessment in Reading and Writing

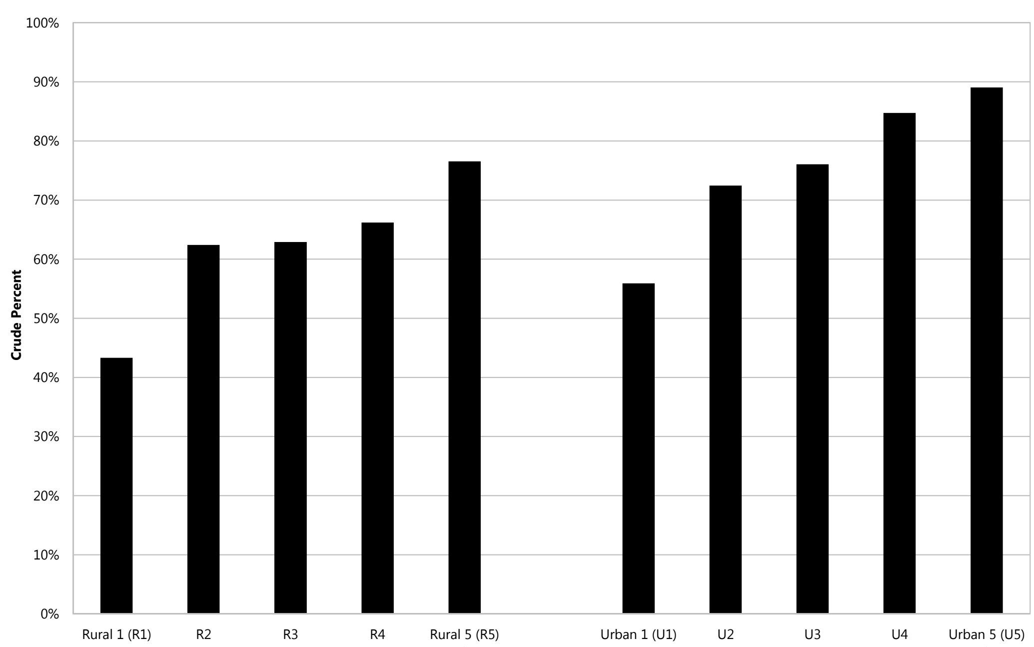
The preceding analysis used all students with Grade 8 assessment scores in 2009/10. Previous work at MCHP (Brownell et al., 2004; Brownell et al., 2006; Roos et al., 2006) has demonstrated that simply including students with assessments may underestimate actual gradients and inequities because students who have fallen behind (been held back a grade or more) or for whom assessments are unavailable (perhaps due to severe disabilities or extensive absences from class) are more likely to be from the lower SES groups. For this reason, we repeated the analysis by SES using a cohort approach for 2009/10. In this analysis, all students born in 1996, and living in Manitoba in 2009/10, were included. This is the birth cohort of students who should be in Grade 8 in 2009/10, as long as they progressed through school in the expected manner. Students without assessments were included in the category "not meeting expectations". Students who moved away from the province were excluded from the cohort.

Trends by Socioeconomic Status

Figure 5.48 shows the percent of Grade 8 students meeting or approaching expectations on all six competencies of Grade 8 reading and writing, by rural and urban income quintile for 2009/10, using this cohort approach. The Manitoba average for the percent of Grade 8 students meeting or approaching expectations on all six competencies in Grade 8 reading and writing is slightly lower (71.0%) using the cohort approach compared to the results, which used all students in Grade 8 with assessment scores (74.3%). In Figure 5.48, gradients are statistically significant in both rural and urban areas, with the lowest percent of children meeting or approaching expectations in the lowest income quintiles, and increasing achievement as income level increases. Comparing Figure 5.48 to Figures 5.42 and 5.32, it is clear that gradients are steeper using the cohort approach.

Figure 5.48: Grade 8 Student Reading and Writing Competency by Income Quintile* (Cohort Approach), 2009/10

Crude percent of Grade 8 students in the 1996 birth cohort meeting or approaching expectations in all six competencies



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at $p<0.05$
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at $p<0.05$

Inequity

Figure 5.49 shows the inequities in Grade 8 reading and writing in the 2009/10 school year for rural areas using the cohort approach. The lowest income quintile (R1) had a lower percent of children meeting or approaching expectations than expected given the proportion of the population. In 2009/10, the 17.6% of the population in R1 accounted for only 12.0% of the Grade 8 students who were meeting or approaching expectations in reading and writing on all six competencies. The Gini coefficient was 0.088, which was larger than the Gini coefficient using only children in Grade 8 with assessment information (0.040) and indicates a moderate degree of disparity. The cohort approach may provide a more accurate picture of disparities (Brownell et al., 2006; Roos et al., 2006) as it includes children who have fallen behind, were not assessed, or who may not be attending school.

Figure 5.50 shows similar disparities in Grade 8 reading and writing for urban areas using the cohort approach. In 2009/10, the 15.6% of the population in U1 accounted for only 11.3% of the Grade 8 students who were meeting or approaching reading and writing expectations. The Gini coefficient was 0.077, indicating a moderate degree of disparity and more disparity than the approach including only children in Grade 8 in 2009/10 with assessments (0.057).

What do these results mean?

According to the PISA, 15–year–old Manitoba students' math scores decreased in 2009 compared to 2003, and reading performance decreased significantly in 2009 compared to 2000 (Knighton, Brochu, & Gluszynski, 2010). In 2010, the Pan–Canadian Assessment Program (PCAP) reported that Manitoba Grade 8 students scored an average of 468 (CI 464–472) on math assessment compared to the Canadian average of 500 (CI 498–502). Manitoba students scored an average of 478 (CI 474–482) compared to the Canadian average of 500 (CI498–502) in reading (Council of Ministers of Education, 2012).

Across the three years of available middle years of assessment data, we found stability in Grade 7 math and Grade 8 reading and writing assessments. Although there are significant differences across rural and urban income quintiles in the percent of student meeting or approaching expectations in Grade 7 math and Grade 8 reading and writing, the degree of inequity for these assessments is relatively low to moderate.

Figure 5.49: Lorenz Curve for Grade 8 Student Reading and Writing Competency in Rural Areas (Cohort Approach), 2009/10

Crude for Grade 8 students in the 1996 birth cohort meeting or approaching expectations in all six competencies

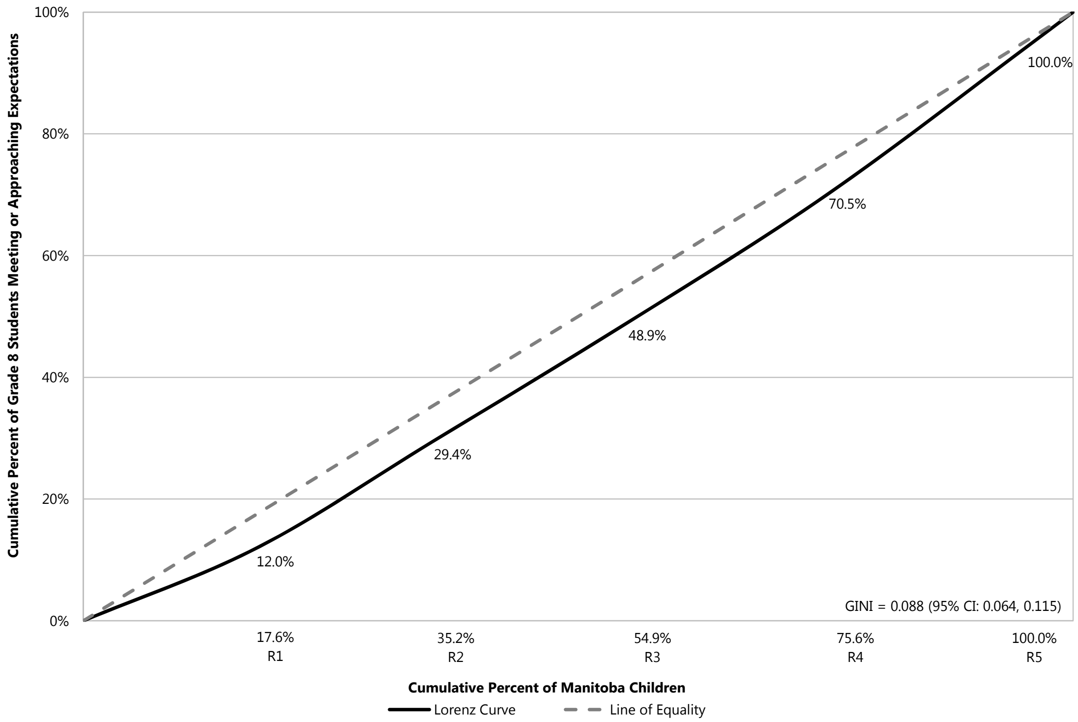
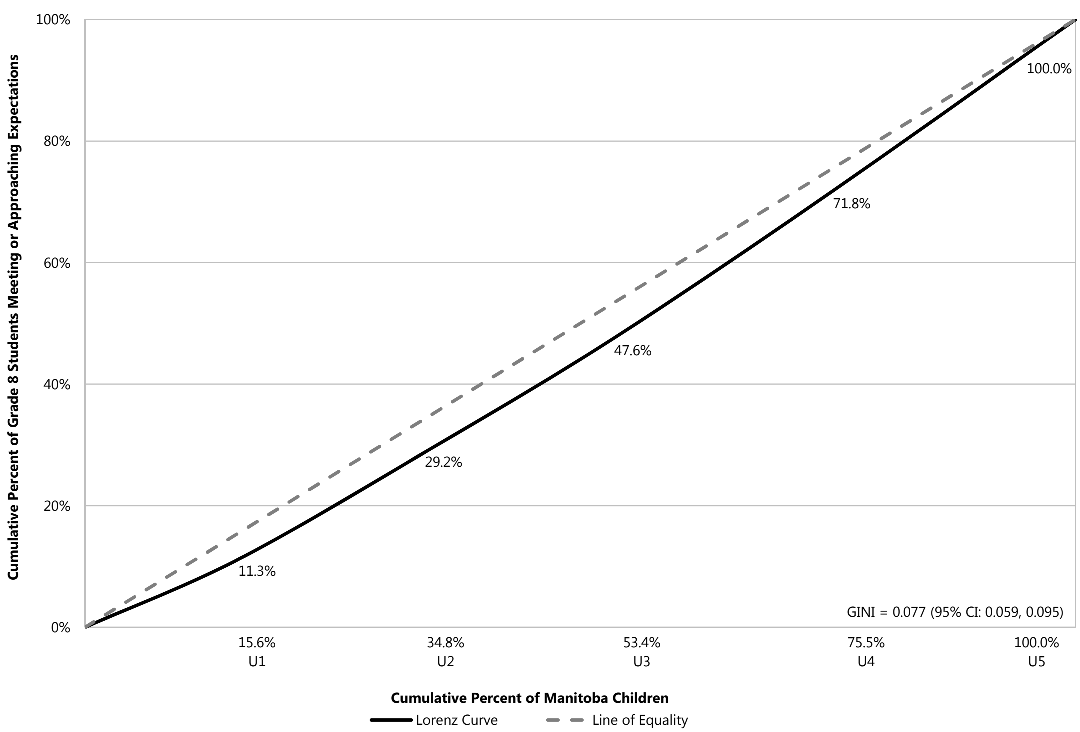


Figure 5.50: Lorenz Curve for Grade 8 Student Reading and Writing Competency in Urban Areas (Cohort Approach), 2009/10

Crude for Grade 8 students in the 1996 birth cohort meeting or approaching expectations in all six competencies



Grade 12 Standards Tests

Students in Grade 12 in Manitoba have been required to write standard provincial examinations, including Language Arts (LA) and Math tests, since 1993. Student performance on scholastic exams is a commonly used indicator of educational outcomes and has been used to make regional comparisons of relative standings (Bussière, Knighton, & Pennock, 2007; Pan-Canadian Education Indicators Program (PCEIP), Council of Ministers of Education, and Statistics Canada, 2003; Manitoba Education, 2011; Willms, 1997; Wirt et al., 2003). In addition to certifying academic achievement, these tests are used by teachers to evaluate academic instruction and to improve student learning. Standards tests are administered toward the end of the academic year or semester (Manitoba Education, 2009c). The current standard tests account for 30% of the students' final course mark, are curriculum–based, and mandatory for all students seeking credit in the required course. Adaptations available for many special needs students and exemptions are made for individual students as required. The annual Standards Tests are "locally marked" by the school divisions and assess Mathematics and Language Arts in separate tests. When a student rewrites a standards test, the higher result is kept on record (Manitoba Education, 2011).

Following previous reports (Brownell et al., 2004; Brownell et al., 2008), rather than looking only at the performance of those students present to write these tests, we selected nine cohorts of children born in Manitoba and included only those individuals who were also living in Manitoba at the age of 18 in the school year they should have written these standards tests if they had progressed through the school system in the expected fashion. In this way, we were able to measure not only the percent of the cohort that passed or failed these standards tests "on time", but also the percent who were absent or did not complete the test, who were in Grade 11 or lower (i.e., repeated at least one year), and who had **withdrawn from school**. All children born in 1984 and living in Manitoba in the 2001/02 school year made up the cohort in time 1[30]; children born in 1992 and living in Manitoba in the 2009/10 school year comprised the cohort in time 9.

Using the Language Arts and Mathematics standards tests scores, Roos and colleagues (2008, 2011) have developed achievement indices for Manitoba youths. Information about these indices and their validation can be found in Appendix 7.

In this report, rates by area represent where students live rather than where they attend school. Because of incomplete information from First Nations schools, children in First Nations schools (including those administered by Frontier School Division under an education agreement) have been removed from these analyses. Students attending non–funded independent schools and students who were home schooled were also removed.

Some students in French Immersion and Français write Language Arts tests in both English and French. In cases where students do both and there are discrepancies in scores, the highest scores are included for analysis.

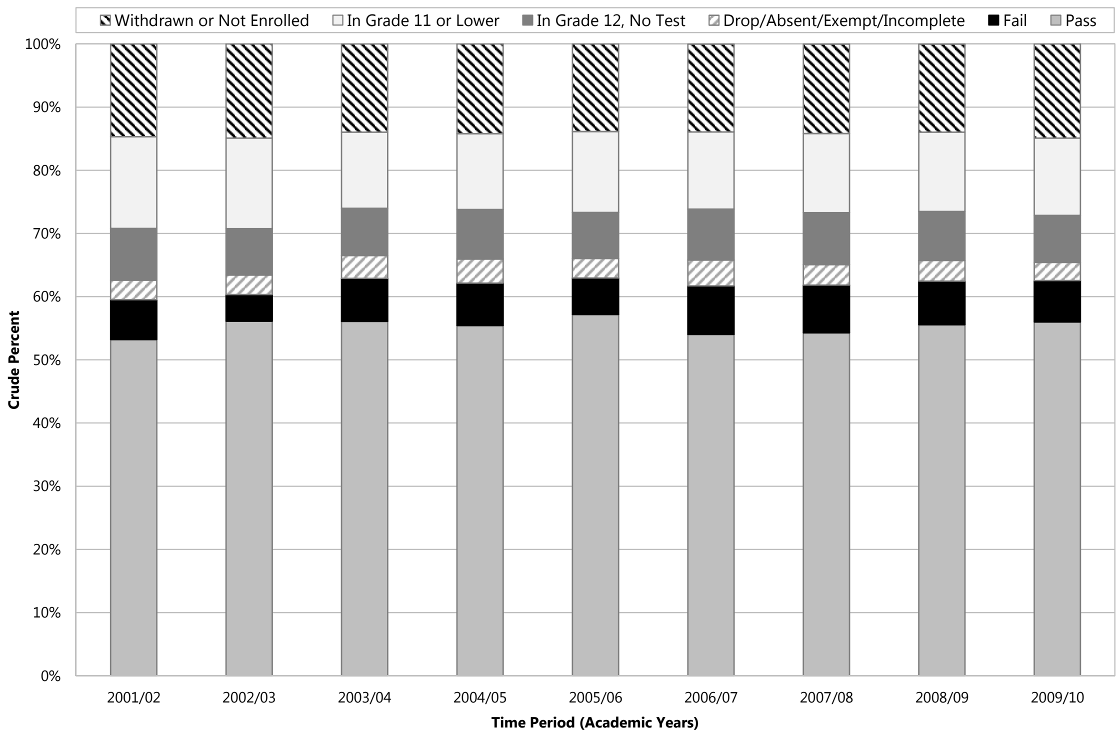
Grade 12 Language Arts Standards Test

Figure 5.51 shows the percent of youths that fall into each of the following categories for Language Arts (LA) tests, for each of the nine years examined: pass, fail, drop/absent/exempt/incomplete, in Grade 12 but no test, in Grade 11 or lower, and withdrawn. The percent of youths in each of the categories is similar across the nine years. In 2009/10, 56.0% of the children from the 1992 birth cohort passed the LA standards test on time; 6.6% failed; 2.9% had either dropped the course, were absent the day of the test, were exempt, or had an incomplete test; 7.4% were in Grade 12 but had no LA standards test score;

30 We were unable to use the 1983 birth cohort because standards tests results for 2000/01 are incomplete.

12.2% were in grade 11 or lower; and 14.9% of students had withdrawn from school. Previous reports (e.g., Brownell et al., 2004; Brownell et al., 2008) show that these categories tend to vary according to region and socioeconomic status, with a greater percent of youths who were in grade 11 or lower and who had withdrawn associated with lower socioeconomic status.

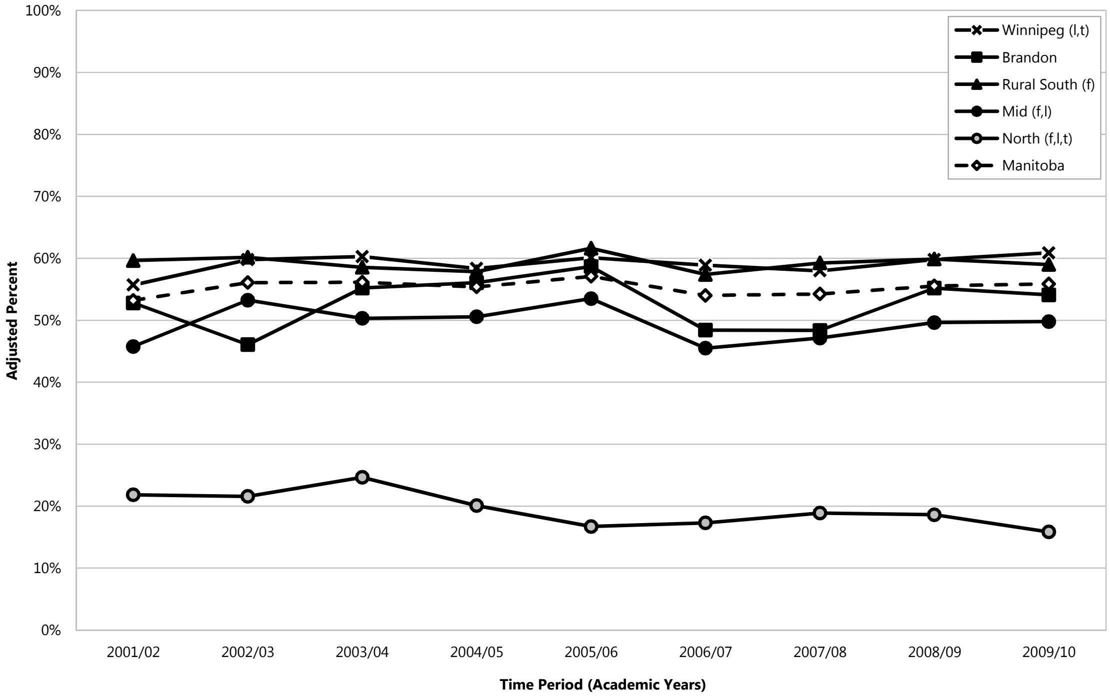
Figure 5.51: Grade 12 Language Arts Standards Test Performance, 2001/02-2009/10
Crude percent of 1984-1992 birth cohorts



Regional Trends Over Time

Figure 5.52 shows the sex–adjusted percent of youths passing the LA test on time by aggregate regions for 2001/02 through 2009/10 (corresponding to 1984 through 1992 birth cohorts). For the Manitoba average, 53.2% of the youths passed the test on time in the first time period and 55.9% passed on time in the final time period. The change over time was not statistically significant. Winnipeg and the North showed significant changes in the percent of youths passing the test on time over the study period, with an increase in the percent of youths in Winnipeg (55.7% in time 1 and 60.9% in time 9) and a decrease in the North (from 21.8% in time 1 to 15.8% in time 9). The percent of youths passing the test on–time in Winnipeg was significantly higher than the Manitoba average in the last time period, whereas the percent of youths in the North was significantly lower than the Manitoba average in both time periods. The percent of youths passing the test on time in Rural South (59.6%) in the first time period was higher than the Manitoba average, and the percent of youths in Mid (45.8% in time 1 and 49.8% in time 9) was significantly lower than the Manitoba average in both time periods.

Figure 5.52: Grade 12 Language Arts Standards Test by Aggregate Region, 2001/02–2009/10
Sex–adjusted percent of 1984-1992 birth cohorts passing the standards test on time



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

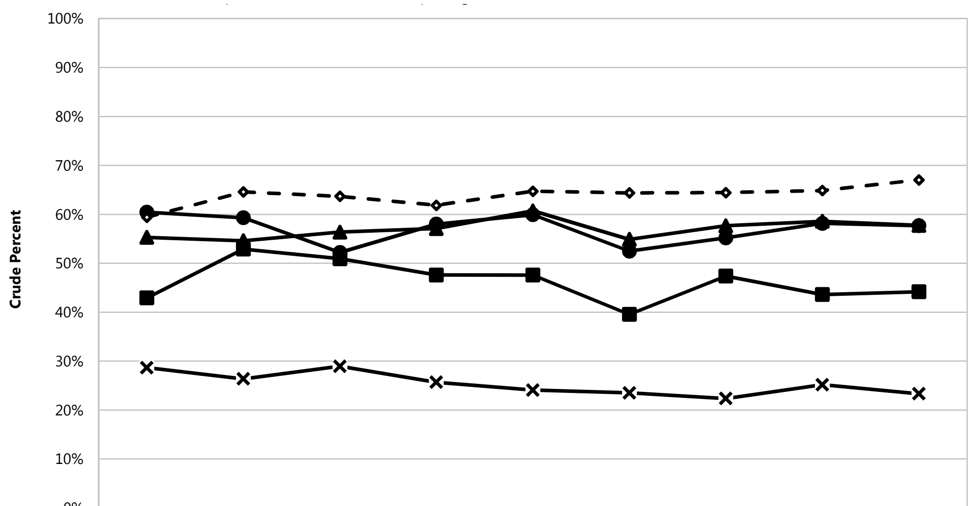
Trends by Socioeconomic Status

Figure 5.53 shows the crude percent of youths passing the LA test on time by rural income quintiles, for 2001/02 through 2009/10. There are statistically significant gradients across income quintiles in each of the years examined, with a lower percent of youths passing the LA test on time associated with lower income areas. For example, in 2009/10, 23.3% of the youths in R1 (lowest) passed the test on time compared to 57.7% of the students in R3 (middle) and 67.0% of the youths in R5 (highest). There was a significant decrease over the study period in the percent of youths in R1 who passed the LA test on time (going from 28.7% in 2001/02 to 23.3% in 2009/10.

Figure 5.54 shows the crude percent of youths passing the LA test on time by urban income quintiles for 2001/02 through 2009/10. As was found in the rural areas, there were statistically significant gradients across urban income quintiles for all years examined, with lower percent of youths passing the LA test on time associated with lower income areas. For example, in 2009/10, 28.3% of the youths in U1 (lowest) passed the test on time compared to 65.2% of youths in U3 (middle) and 81.0% of youths in U5 (highest). Significant increases in the percent of youths passing the test on time were found in U2 (44.9% in 2001/02 to 52.4% in 2009/10) and U3 (53.4% in 2001/02 and 65.2% in 2009/10).

Figure 5.53: Grade 12 Language Arts Standards Test by Rural Income Quintile, 2001/02–2009/10

Crude percent of 1984-1992 birth cohorts passing the standards test on time



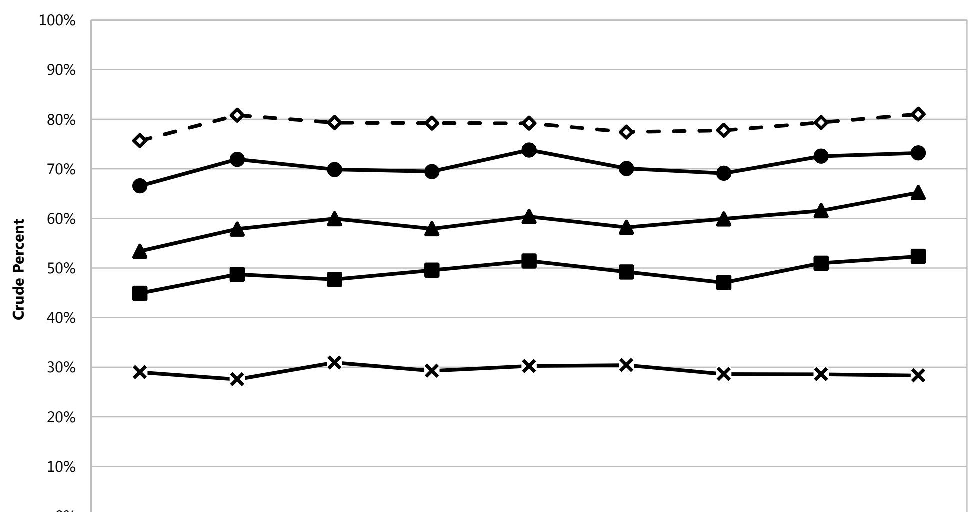
	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown	17.65%	9.47%	10.11%	22.14%	23.21%	16.39%	17.69%	16.80%	17.75%
R1 – Lowest Income (t)	28.67%	26.37%	28.96%	25.67%	24.08%	23.51%	22.35%	25.18%	23.33%
R2	42.93%	52.89%	50.93%	47.61%	47.58%	39.56%	47.38%	43.61%	44.18%
R3	55.29%	54.61%	56.36%	57.09%	60.71%	54.88%	57.66%	58.58%	57.74%
R4	60.44%	59.32%	52.20%	58.01%	59.91%	52.48%	55.19%	58.15%	57.68%
R5 – Highest Income	59.41%	64.58%	63.69%	61.84%	64.73%	64.37%	64.44%	64.86%	67.02%
Linear trend across R1–R5	*	*	*	*	*	*	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 5.54: Grade 12 Language Arts Standards Test by Urban Income Quintile, 2001/02–2009/10

Crude percent of 1984-1992 birth cohorts passing the standards test on time



	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown	17.65%	9.47%	10.11%	22.14%	23.21%	16.39%	17.69%	16.80%	17.75%
U1 – Lowest Income	28.98%	27.55%	30.92%	29.26%	30.23%	30.41%	28.61%	28.57%	28.32%
U2 (t)	44.90%	48.72%	47.68%	49.55%	51.43%	49.20%	47.06%	50.96%	52.35%
U3 (t)	53.39%	57.86%	59.95%	57.92%	60.39%	58.21%	59.91%	61.56%	65.21%
U4	66.58%	71.92%	69.87%	69.45%	73.81%	70.08%	69.11%	72.55%	73.22%
U5 – Highest Income	75.66%	80.81%	79.33%	79.21%	79.19%	77.40%	77.76%	79.33%	81.02%
Linear trend across U1–U5	*	*	*	*	*	*	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 5.55 and 5.56 show the inequities in the percent of youths passing the LA standards tests on time by rural income quintiles for 2001/02 and 2009/10. The percent of youths passing the test on time is lower than expected in R1 given the population. In 2001/02, only 11.2% of the youths passing the test on time were from the 19.4% of the population comprising R1. The Gini coefficient was 0.125, indicating a moderate degree of inequity. In 2009/10, only 10.3% of the youths passing the test on time were from the 21.9% of the population comprising R1. The Gini coefficient was 0.170, also indicating a moderate degree of inequity. The increase in the Gini coefficient over time was statistically significant, indicating that disparity in the percent of youths passing the LA test on time in rural areas increased over time.

Figures 5.57 and 5.58 show the inequities in the percent of youths passing the LA standards tests on time by urban income quintiles for 2001/02 and 2009/10. As was found in rural areas, the percent of youths passing the LA test on time is lower than expected in U1, given the population. In 2001/02, only 7.1% of the youths passing the test on time were from the 14.0% of the population comprising U1. The Gini coefficient was 0.152, indicating a moderate degree of disparity. In 2009/10, only 6.8% of the youths passing the test on time were from the 15.1% of the population comprising U1. The Gini coefficient was 0.149, also indicating a moderate degree of disparity, but no change from the first time period. The Gini coefficient in the final time period did not differ between urban and rural areas, indicating similar levels of disparity across urban and rural areas.

Figure 5.55: Lorenz Curve for Grade 12 Language Arts Standards Test in Rural Areas, 2001/02
Crude of 1984-1992 birth cohorts passing the standards test on time

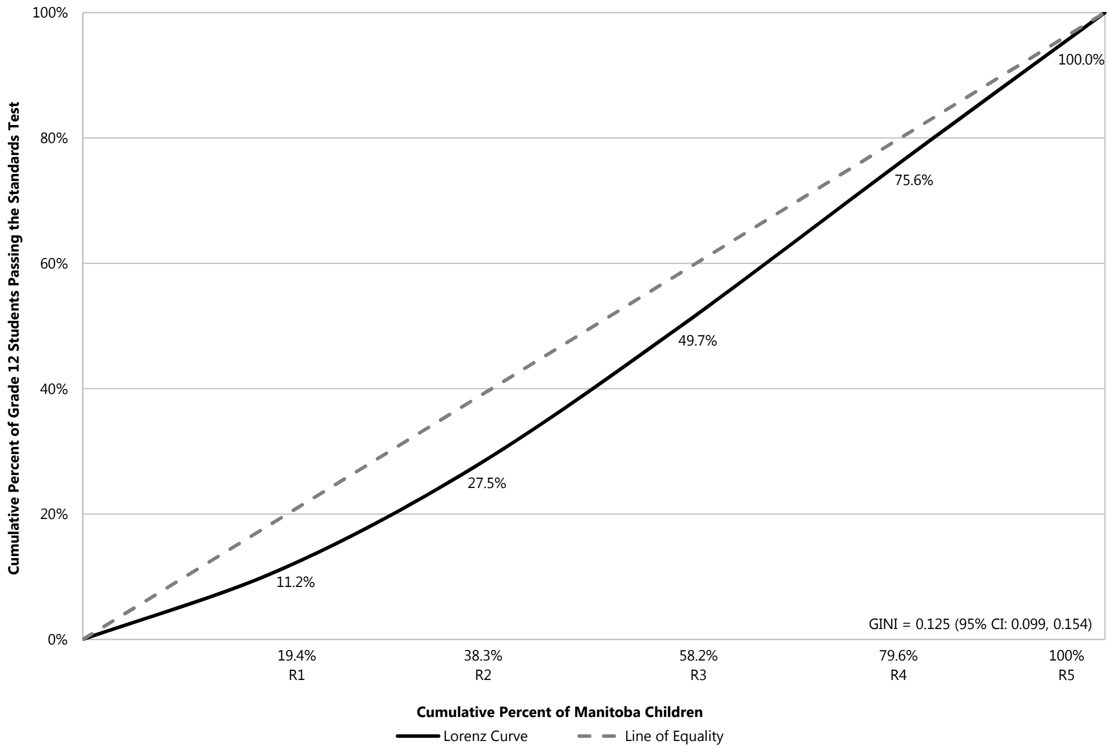


Figure 5.56: Lorenz Curve for Grade 12 Language Arts Standards Test in Rural Areas, 2009/10
Crude of 1984-1992 birth cohorts passing the standards test on time

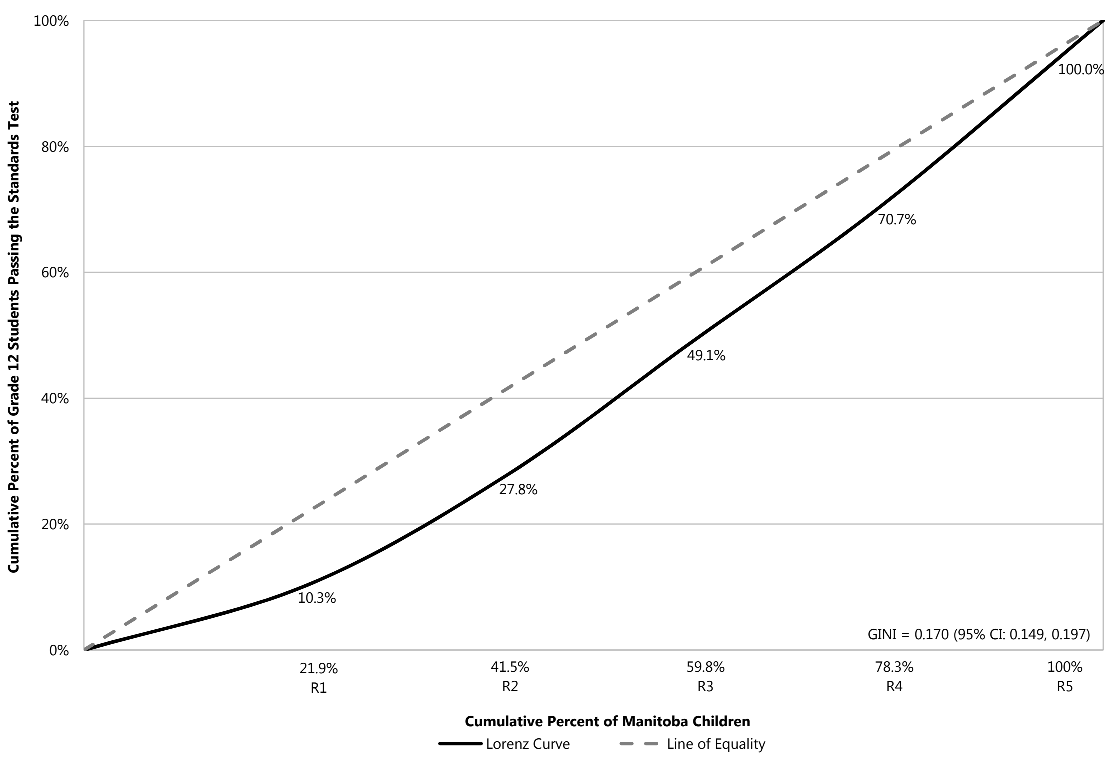


Figure 5.57: Lorenz Curve for Grade 12 Language Arts Standards Test in Urban Areas, 2001/02
Crude of 1984-1992 birth cohorts passing the standards test on time

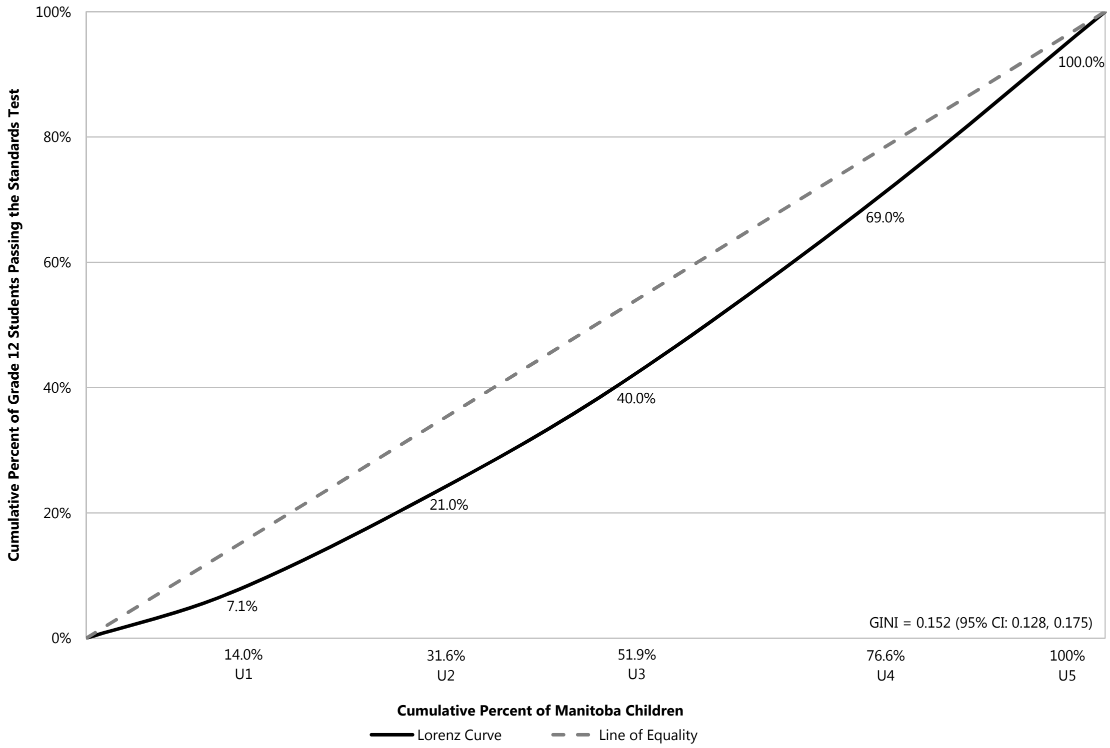
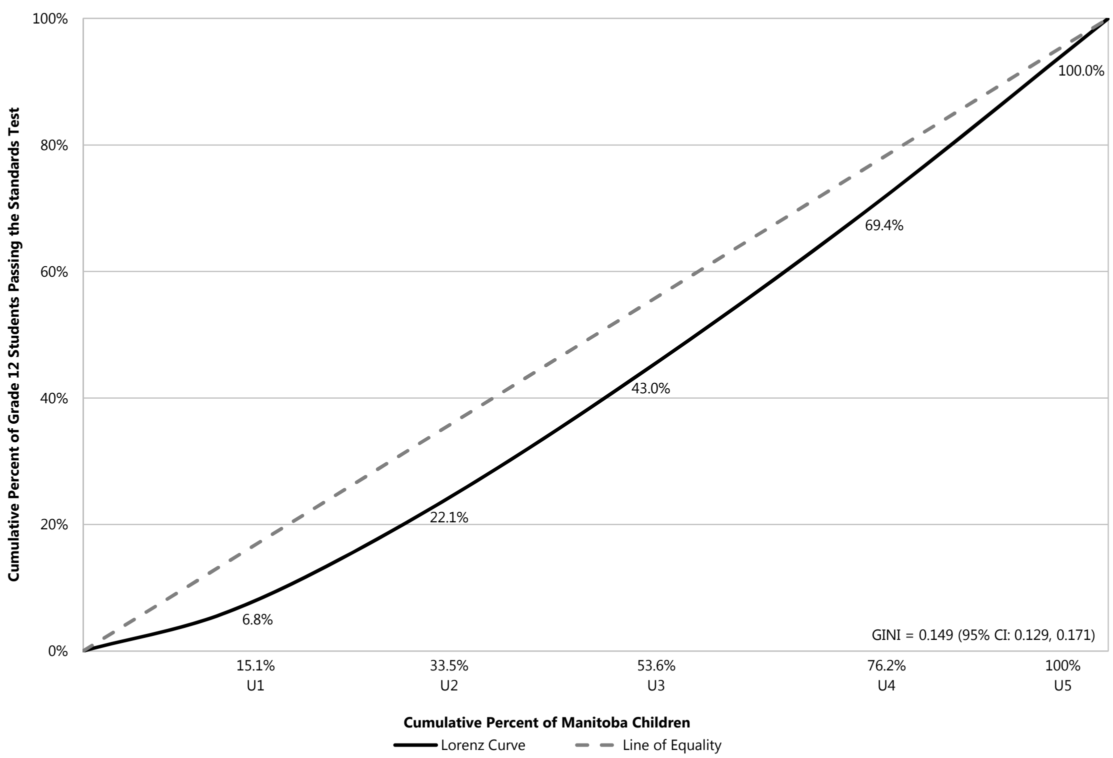


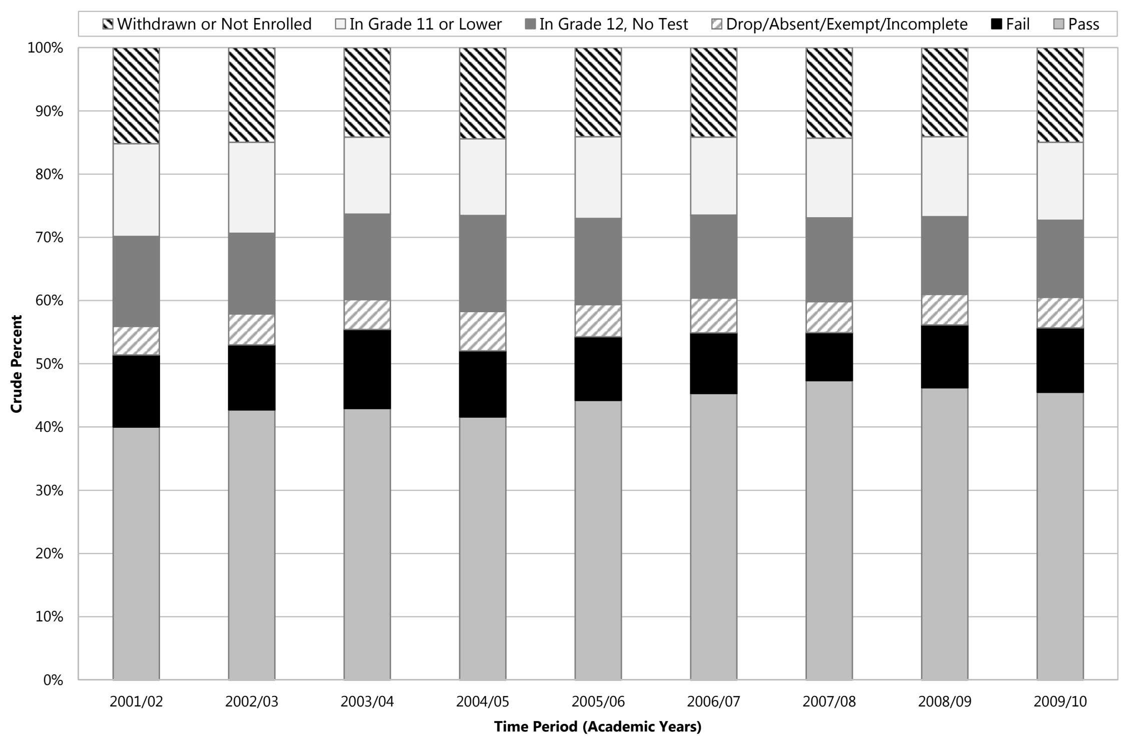
Figure 5.58: Lorenz Curve for Grade 12 Language Arts Standards Test in Urban Areas, 2009/10
Crude of 1984-1992 birth cohorts passing the standards test on time



Grade 12 Mathematics Standards Tests

The **Grade 12 standards test** in mathematics is mandatory for students who are registered in Grade 12 courses in Applied, Consumer, and/or Pre–calculus Mathematics. Figure 5.59 shows the **Grade 12 standards test performance** in Math as indicated by the percent of youths that fall into each of the following categories, for each of the nine years examined: pass, fail, drop/absent/exempt/incomplete, in Grade 12 but no Math test, in Grade 11 or lower, withdrawn. The percent of youths in each of the categories is similar across the nine years. In 2009/10, 45.5% of the children from the 1992 birth cohort passed the Math standards test on time; 10.2% failed; 4.8% had either dropped the course, were absent the day of the test, were exempt, or had an incomplete test; 12.2% were in Grade 12 but had no Math standards test score; 12.3% were in Grade 11 or lower; and 15.0% of students had withdrawn from school. Previous reports (e.g., Brownell et al., 2004; Brownell et al., 2008) show that these categories tend to vary according to region and socioeconomic status, with a greater percent of youths who were in Grade 11 or lower and who had withdrawn associated with lower socioeconomic status.

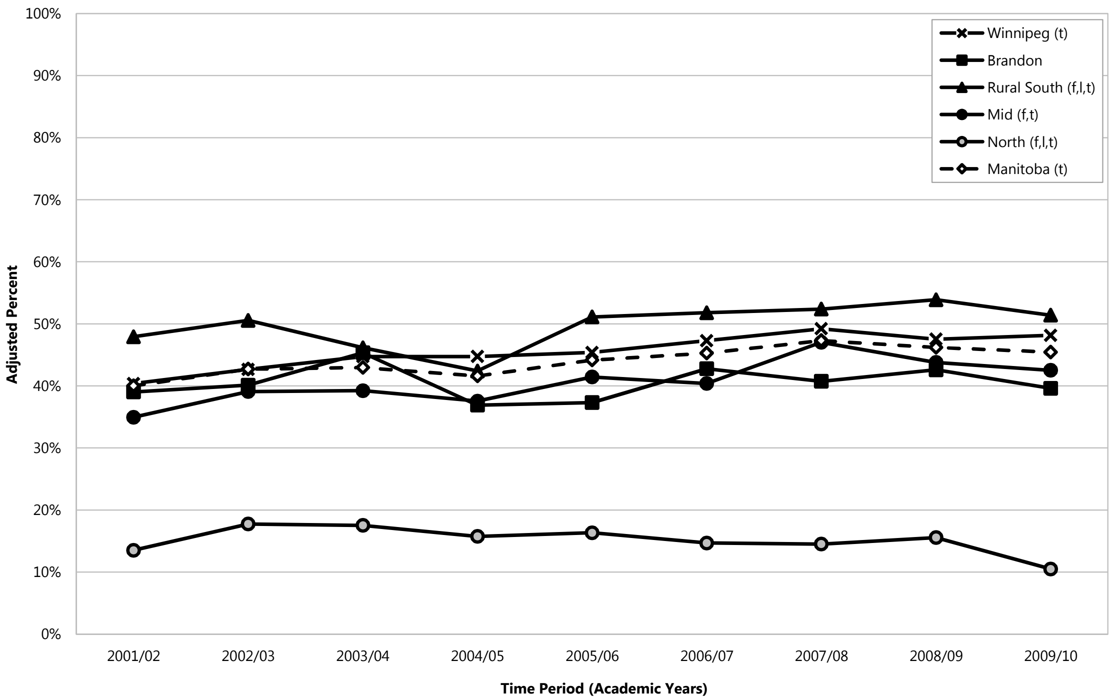
Figure 5.59: Grade 12 Math Standards Test Performance, 2001/02-2009/10
Crude percent of 1984-1992 birth cohorts



Regional Trends Over Time

Figure 5.60 shows the sex–adjusted percent of youths passing the Math test on time by aggregate regions for 2001/02 through 2009/10 (corresponding to 1984 through 1992 birth cohorts). For all Manitoba, 40.0% of the youths passed the test on time in the first time period and 45.5% passed on time in the final time period, a statistically significant increase over time. Winnipeg, Rural South, Mid, and the North showed significant changes in the percent of youths passing the test on time over the study period, with an increase in Winnipeg (40.4% to 48.1%), Rural South (47.9% to 51.4%), and Mid (35.0% to 42.5%) and a decrease in the North (from 13.5% to 10.5%). The percent of youths passing the Math test on time in Rural South (47.9% and 51.4%) was significantly higher than the Manitoba average in the first and last time period, whereas the percent of youths in the North was significantly lower than the Manitoba average in both time periods. The percent of youths passing the test on time in the first time period for Mid was lower than the Manitoba average.

Figure 5.60: Grade 12 Math Standards Test by Aggregate Region, 2001/02–2009/10
Sex–adjusted percent of 1984-1992 birth cohorts passing the standards test on time



f indicates region's rate was statistically different from Manitoba average in the first time period at $p<0.01$
l indicates region's rate was statistically different from Manitoba average in the last time period at $p<0.01$
t indicates change over time was statistically significant for that region at $p<0.05$

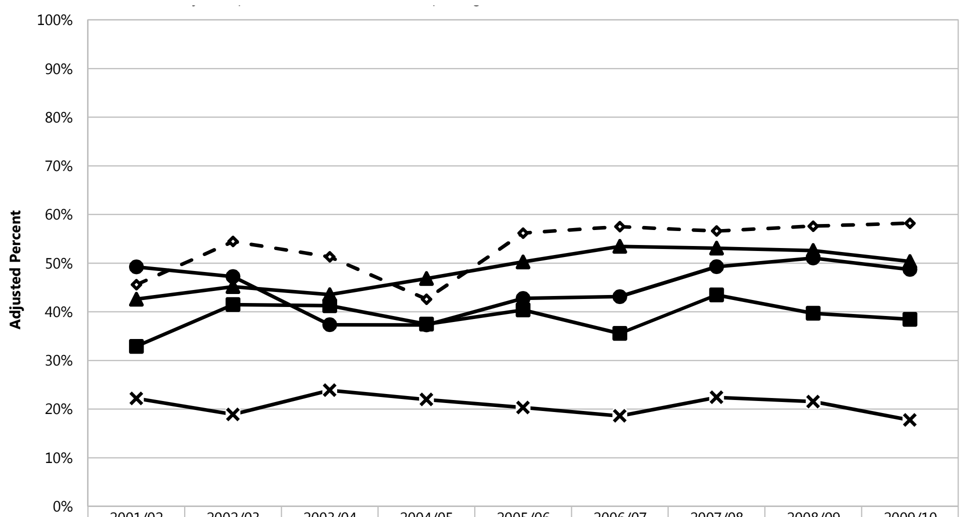
Trends by Socioeconomic Status

Figure 5.61 shows the sex–adjusted percent of youths passing the Math test on time by rural income quintiles for 2001/02 through 2009/10. There are statistically significant gradients across income quintiles in each of the years examined, with a lower percent of youths passing the Math test on time associated with lower income areas. For example, in 2009/10, 17.8% of the youths in R1 (lowest) passed the test on time compared to 50.3% of the students in R3 (middle) and 58.2% of the youths in R5 (highest). There was a significant increase over the study period in the percent of youths in R3 (42.6% to 50.3%) and in R5 (45.6% to 58.2%) who passed the Math test on time.

Figure 5.62 shows the crude percent of youths passing the Math test on time by urban income quintiles, for 2001/02 through 2009/10. As was found in the rural areas, there were statistically significant gradients across urban income quintiles for all years examined, with a lower percent of youths passing the Math test on time associated with lower income areas. For example, in 2009/10, 21.6% of the youths in U1 (lowest) passed the test on time compared to 52.5% of youths in U3 (middle) and 60.4% of youths in U5 (highest). Significant increases in the percent of youths passing the Math test on time were found for all urban quintile areas except U1—U2 (32.8% to 42.7%), U3 (41.4% to 52.5%), U4 (48.7% to 58.5%), and U5 (53.4% to 60.4%).

Figure 5.61: Grade 12 Math Standards Test by Rural Income Quintile, 2001/02–2009/10

Sex–adjusted percent of 1984-1992 birth cohorts passing the standards test on time



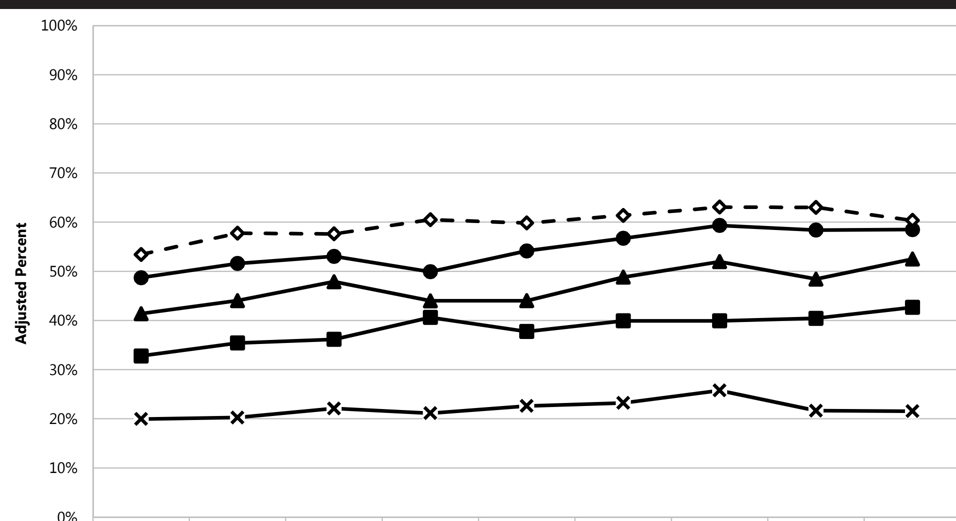
	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown	14.62%	7.41%	7.95%	16.54%	18.70%	13.06%	9.25%	10.05%	16.65%
R1 – Lowest Income	22.18%	18.91%	23.88%	21.96%	20.33%	18.60%	22.41%	21.55%	17.75%
R2	32.90%	41.49%	41.25%	37.47%	40.39%	35.56%	43.47%	39.69%	38.46%
R3 (t)	42.59%	45.17%	43.53%	46.84%	50.26%	53.45%	53.09%	52.60%	50.34%
R4	49.23%	47.24%	37.35%	37.30%	42.76%	43.13%	49.26%	51.05%	48.69%
R5 – Highest Income (t)	45.57%	54.47%	51.30%	42.59%	56.19%	57.51%	56.61%	57.61%	58.21%
Linear trend across R1–R5	*	*	*	*	*	*	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Figure 5.62: Grade 12 Math Standards Test by Urban Income Quintile, 2001/02–2009/10

Sex–adjusted percent of 1984-1992 birth cohorts passing the standards test on time



	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown	14.62%	7.41%	7.95%	16.54%	18.70%	13.06%	9.25%	10.05%	16.65%
U1 – Lowest Income	19.94%	20.24%	22.10%	21.14%	22.60%	23.22%	25.75%	21.64%	21.55%
U2 (t)	32.78%	35.42%	36.16%	40.62%	37.75%	39.93%	39.93%	40.45%	42.67%
U3 (t)	41.39%	44.05%	47.90%	44.01%	44.02%	48.81%	51.97%	48.42%	52.49%
U4 (t)	48.71%	51.59%	53.06%	49.92%	54.15%	56.70%	59.34%	58.39%	58.50%
U5 – Highest Income (t)	53.42%	57.75%	57.61%	60.51%	59.82%	61.36%	63.06%	63.00%	60.36%
Linear trend across U1–U5	*	*	*	*	*	*	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at $p<0.05$
* indicates statistically significant differences across income quintiles for that time period at $p<0.05$

Changes in Inequity Over Time

Figures 5.63 and 5.64 show the inequities in the percent of youths passing the Math standards tests on time by rural income quintiles for 2001/02 and 2009/10. The percent of youths passing the test on time is lower than expected in R1 given the population. In 2001/02, only 11.1% of the youths passing the test on time were from the 23.7% of the population comprising R1. The Gini coefficient was 0.128, indicating a moderate degree of inequity. In 2009/10, only 9.2% of the youths passing the test on time were from the 21.9% of the population comprising R1. The Gini coefficient was 0.181, also indicating a moderate degree of inequity. The increase in the Gini coefficient over time was statistically significant, indicating that disparity in the percent of youths passing the Math test on time in rural areas increased over time.

Figures 5.65 and 5.66 show the inequities in the percent of youths passing the Math standards tests by urban income quintiles for 2001/02 and 2009/10. As was found in rural areas, the percent of youths passing the test on time is lower than expected in U1, given the population. In 2001/02, only 6.7% of the youths passing the test on time were from the 14.0% of the population comprising U1. The Gini coefficient was 0.147, indicating a moderate degree of disparity. In 2009/10, only 6.6% of the students passing the test on time were from the 15.1% of the population comprising U1. The Gini coefficient was 0.137, also indicating a moderate degree of disparity, but no change from the first time period. The Gini coefficient in the final time period was significantly higher in rural compared to urban areas, indicating more disparity in the percent of youths passing the Math test on time in rural areas.

What do these results mean?

The percent of students passing the Grade 12 math standards test increased over the study period. Of particular note for this indicator is the very low percent of students in the North passing the LA and Math tests on time. There was also a moderate degree of inequity in the percent of students passing the test on time in both subjects in both urban and rural areas.The inequity in both subjects increased significantly over time in rural areas. When looking at results by income quintile, it is noteworthy that the percent of students passing the LA test on time for students in R1 decreased significantly over time. In urban areas, all income quintiles showed significant increases in the percent of students passing the Math test on time with the exception of U1. These inequities and differences across income quintiles suggest more targeted support is required for high school students in low income areas—to help them stay in school and achieve the required standards in these important subjects.

Figure 5.63: Lorenz Curve for Grade 12 Math Standards Test in Rural Areas, 2001/02
Adjusted by sex for 1984-1992 birth cohorts students passing the standards test on time

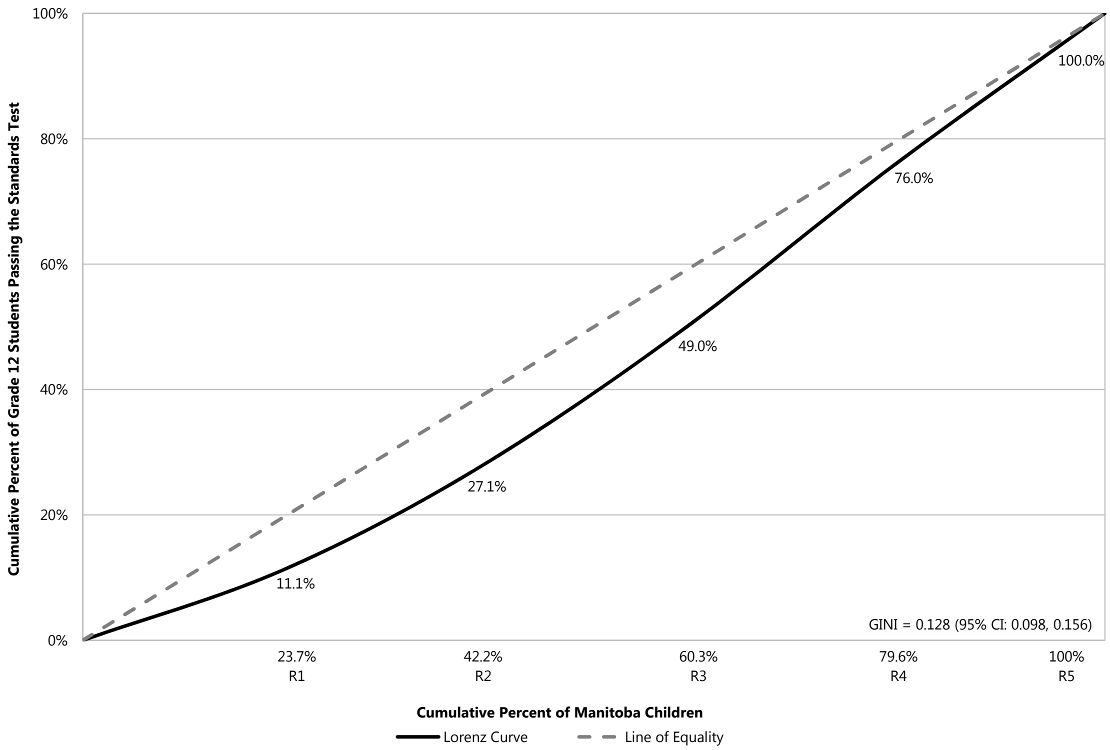


Figure 5.64: Lorenz Curve for Grade 12 Math Standards Test in Rural Areas, 2009/10
Adjusted by sex for 1984-1992 birth cohorts passing the standards test on time

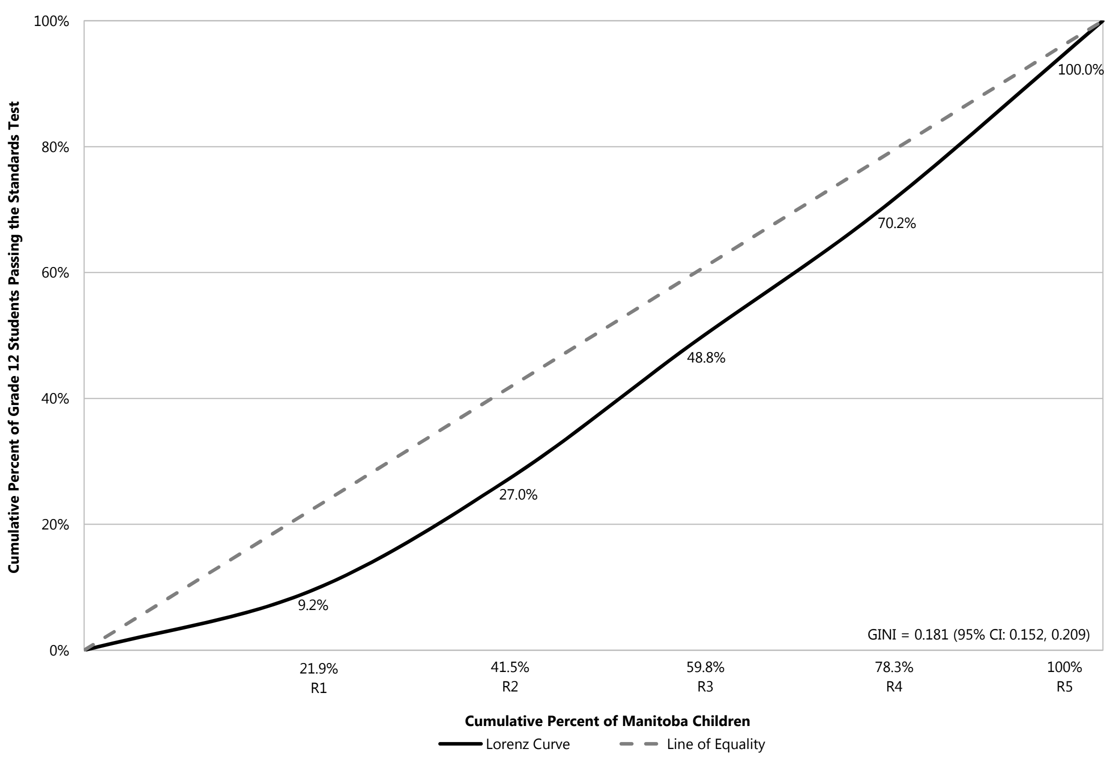


Figure 5.65: Lorenz Curve for Grade 12 Math Standards Test in Urban Areas, 2001/02
Adjusted by sex for 1984-1992 birth cohorts passing the standards test on time

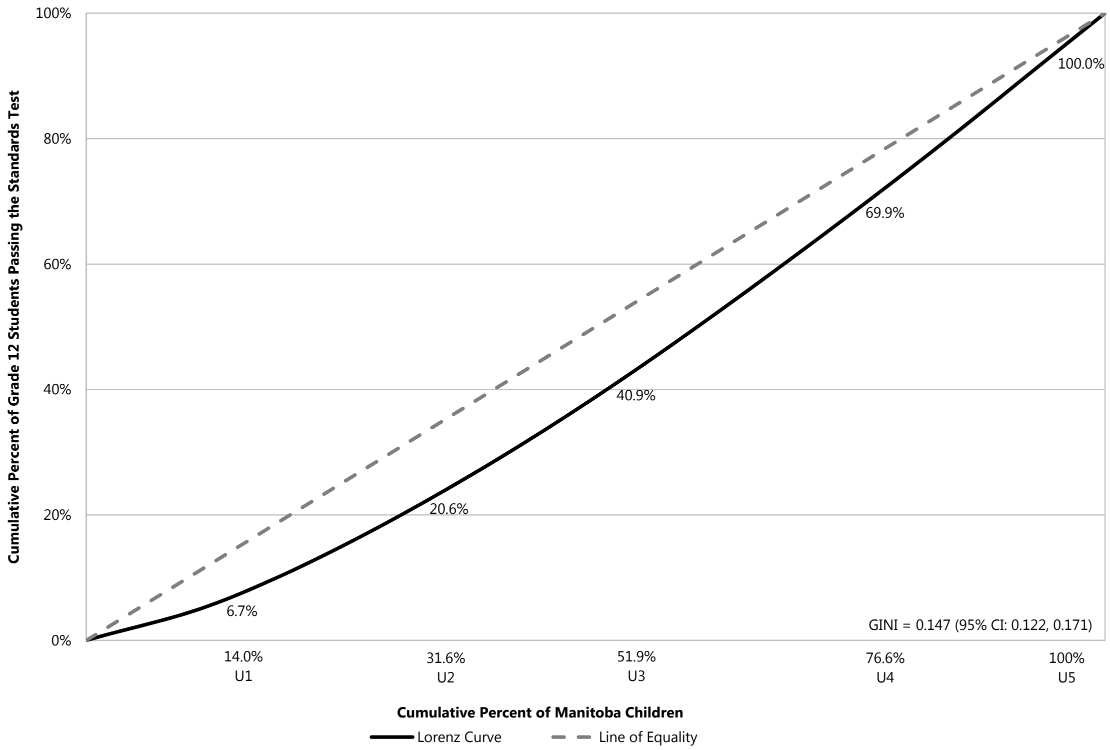
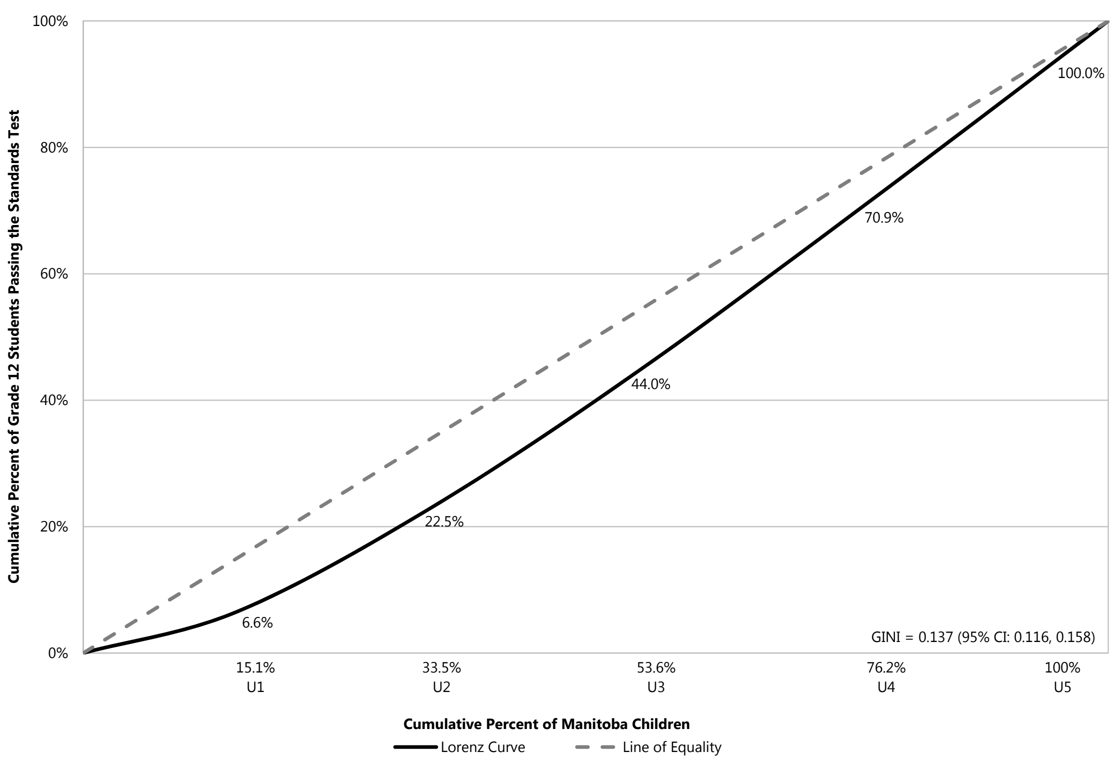


Figure 5.66: Lorenz Curve for Grade 12 Math Standards Test in Urban Areas, 2009/10
Adjusted by sex for 1984-1992 birth cohorts passing the standards test on time



High School Completion

High school completion (graduation) is an important milestone in an individual's life providing the bridge for further opportunities such as post–secondary education and training and employment. High school graduation alone no longer guarantees employment opportunities, particularly in our increasingly knowledge–based economy. Nonetheless, the lack of a high school diploma remains a significant predictor of negative outcomes: lower earnings, higher rates of unemployment, poorer health, higher rates of reliance on social assistance and higher rates of teen motherhood (Backlund, Sorlie, & Johnson, 1999; Brownell, Roos, MacWiliam, & Fransoo, 2007; Rumberger & Lamb, 2003).

There are different ways to calculate high school completion, which may result in somewhat different results.[31] In this report we use a cohort approach, where we follow a cohort of Grade 9 students for six years to determine whether they completed high school within that time. The majority of students will finish high school within four years of entering Grade 9, but this approach takes into consideration that some students will take longer to complete high school. Students who move into the province after Grade 9 are not included in the calculation of high school completion, nor are students who move away from the province.

Education records include a "year–end status" variable which indicates whether a student has graduated, transferred, left school, or is continuing (most students in Grades 9 through 11 would have "continuing" as their year–end status). Theoretically, graduates could be identified through this year–end status variable. However, prior to 2009/10, some schools did not use this variable consistently, and so not all graduates were identified. In an attempt to compensate for this, for those Grade 12 students without "graduation" as their year–end status, we counted the number of credits they obtained throughout high school. Students who had accumulated the required number of credits for graduation[32] were considered "graduates." No attempt was made to determine whether the credits obtained were the "required" credits. We also counted as graduates any Grade 12 student who had four or more Grade 12 credits. This method of counting credits may over–estimate graduation rates if students did not have the required credits or they were short one Grade 12 credit for graduation. On the other hand, if credits are not completely recorded in the Manitoba Education records, actual graduates may be under–estimated.

First Nations schools report their enrolment data to Aboriginal Affairs and Northern Development Canada rather than Manitoba Education. Non–funded independent schools report enrolment data to Manitoba Education on a voluntary basis. Home schooled students are included in the **Education Information System** database for the purpose of issuing these students **Manitoba Education (MET) numbers**. **Adult learning centres** have a pattern of continuous enrolment and do not report enrolment to Manitoba Education. For these reasons, enrolment data for these groups of students are not complete and excluded from the calculations of high school completion.

31 For a discussion of how Manitoba Education calculates high school completion and a comparison of results using different methods of calculating this indicator, please see Appendix 8.

32 28 credits were required for graduation up to 2007/08, 29 credits were required in 2008/09, and 30 credits are required as of 2009/10.

Regional Trends Over Time

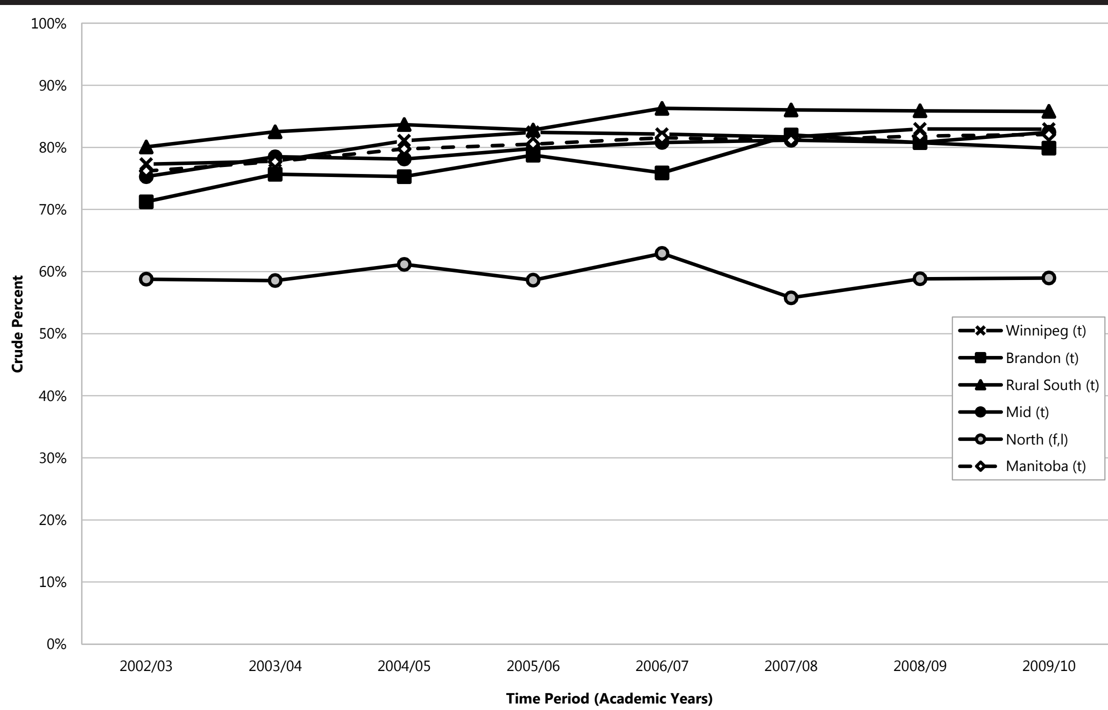
Figure 5.67 shows the crude high school completion rates by aggregate region for 2002/03 through 2009/10.[33] The Manitoba graduation rate increased significantly over the study period, from 76.2% in 2002/03 to 82.1% in 2009/10. All aggregate regions showed significant increases in high school completion rates over time with the exception of the North, where the percent of graduates remained stable over the study period. Winnipeg went from 77.3% to 82.9%, Brandon from 71.2% to 79.9%, Rural South from 80.1% to 85.8%, and Mid from 75.3% to 82.4%. In the North, the high school completion rate was significantly lower than the Manitoba average in all years; in the first time period, the rate was 58.8% and in the last time period, it was 59.0%.

Trends by Socioeconomic Status

Figure 5.68 shows the rate of high school completion across rural income quintiles for each year from 2002/03 through 2009/10. There was a significant gradient across rural income quintiles in each year studied, with lower rates of completion associated with lower income levels. For example, in 2009/10, the graduation rate was 68.4% in the lowest rural income quintile and 85.8% in the highest. Although all rural income quintiles appear to show increases in high school completion rates over time, only for R3 was this increase statistically significant.

Figure 5.69 shows the rate of high school completion across urban income quintiles for each year from 2002/03 through 2009/10. As was found for rural areas, there was a significant gradient across urban income quintiles in each year studied, with lower rates of completion associated with lower income levels. For example, in 2009/10, the graduation rate was 55.4% in U1 (lowest) and 98.5% in U5 (highest). Significant increases in high school graduation were found in U2 through U5.

Figure 5.67: High School Completion by Aggregate Area, 2002/03-2009/10
Crude percent of Grade 9 students followed for six years

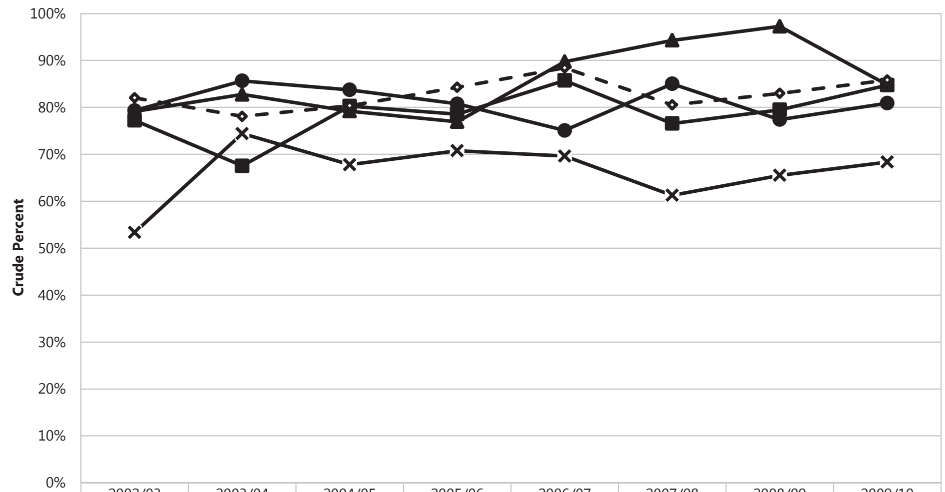


f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

33 Manitoba Education data housed at MCHP is incomplete in 1995/96 and 1996/97 precluding the calculation of graduation rates for 2000/01 and 2001/02 using the six–year cohort method.

Figure 5.68: High School Completion by Rural Income Quintile, 2002/03–2009/10

Crude percent of Grade 9 students followed for six years



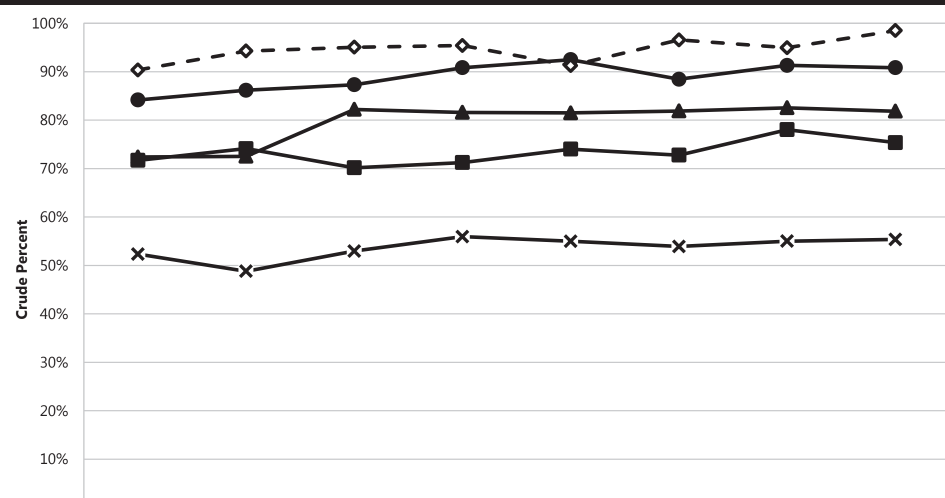
	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown	28.89%	45.45%	31.03%	25.49%	50.36%	60.23%	45.61%	44.60%
R1 – Lowest Income	53.36%	74.41%	67.79%	70.76%	69.63%	61.26%	65.52%	68.35%
R2	77.24%	67.54%	80.28%	78.56%	85.73%	76.57%	79.49%	84.74%
R3 (t)	79.13%	82.76%	79.19%	76.94%	89.74%	94.29%	97.25%	84.82%
R4	79.33%	85.66%	83.74%	80.76%	75.08%	85.03%	77.40%	80.90%
R5 – Highest Income	82.02%	78.09%	80.35%	84.28%	88.43%	80.53%	82.99%	85.82%
Linear trend across R1–R5	*	*	*	*	*	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 5.69: High School Completion by Urban Income Quintile, 2002/03–2009/10

Crude percent of Grade 9 students followed for six years



	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown	28.89%	45.45%	31.03%	25.49%	50.36%	60.23%	45.61%	44.60%
U1 – Lowest Income	52.34%	48.80%	52.97%	55.95%	55.00%	53.91%	55.01%	55.37%
U2 (t)	71.71%	74.12%	70.17%	71.25%	74.02%	72.77%	78.03%	75.37%
U3 (t)	72.38%	72.53%	82.21%	81.60%	81.49%	81.90%	82.55%	81.85%
U4 (t)	84.16%	86.17%	87.32%	90.84%	92.48%	88.46%	91.31%	90.84%
U5 – Highest Income (t)	90.35%	94.27%	95.06%	95.40%	91.25%	96.57%	94.96%	98.50%
Linear trend across U1–U5	*	*	*	*	*	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 5.70 and 5.71 show the inequities in high school completion for 2002/03 and 2009/10 for rural areas. In both time periods, there were fewer graduates than expected given the population in R1. In 2002/03, 10.0% of the graduates were from the 14.2% of the population in R1, with a Gini coefficient of 0.051 indicating a low degree of inequity. In 2009/10, 11.5% of the graduates were from the 13.8% of the population in the lowest rural income quintiles, with a Gini coefficient of 0.023 indicating very little disparity. There was no significant change in the Gini coefficients over time in rural areas.

Figures 5.72 and 5.73show the inequities in high school completion for 2002/03 and 2009/10 for urban areas. In both time periods, there were fewer graduates than expected given the population in U1. In 2002/03, 9.4% of the graduates were from the 13.9% of the population in U1. The Gini coefficient was 0.086, indicating a moderate degree of inequity. In 2009/10, 10.2% of the graduates were from the 15.3% of the population in U1. The Gini coefficient was 0.093, also indicating a moderate degree of disparity. There was no significant change in the Gini coefficients over time in urban areas. The Gini coefficient in urban areas in 2009/10 was significantly greater than the Gini coefficient in the rural areas, indicating greater disparity in high school graduation rates across income groups in urban areas.

What do these results mean?

The high school completion rate in Manitoba increased significantly over the study period. High school completion rates in the North are significantly lower than in the rest of the province and students in these areas did not experience the significant increase in high school completion observed in all other regions. Although there are significant gradients across rural income quintiles, the degree of inequity in rural areas was relatively low and decreased significantly over the study period. In urban areas, there are also significant gradients across income quintiles, but the degree in inequity is moderate. Programs in lower income urban areas and in the North that increase student engagement and performance in school could increase high school completion in these areas. As will be seen in Chapter 6, engagement of Grade 7 students in the North increased significantly between 2007/08 and 2009/10—it will be interesting to see whether this translates into increased rates of high school completion in that region.

Figure 5.70: Lorenz Curve for High School Completion in Rural Areas, 2002/03
Crude for Grade 9 students followed for six years

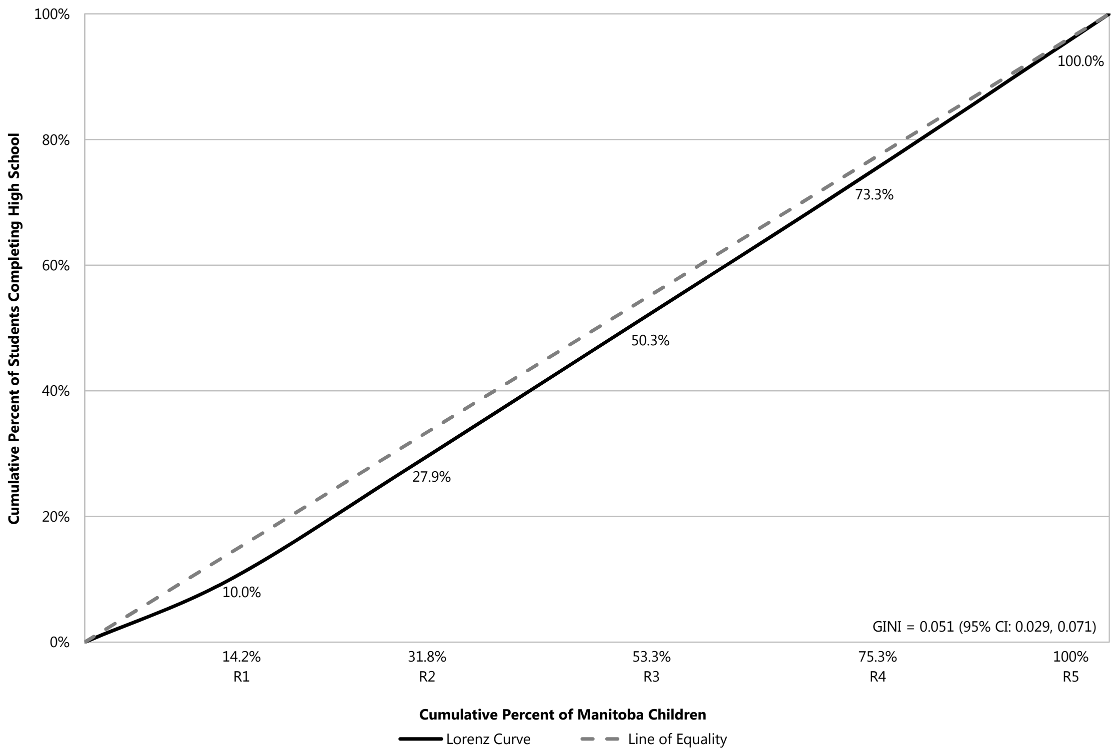


Figure 5.71: Lorenz Curve for High School Completion in Rural Areas, 2009/10
Crude for Grade 9 students followed for six years

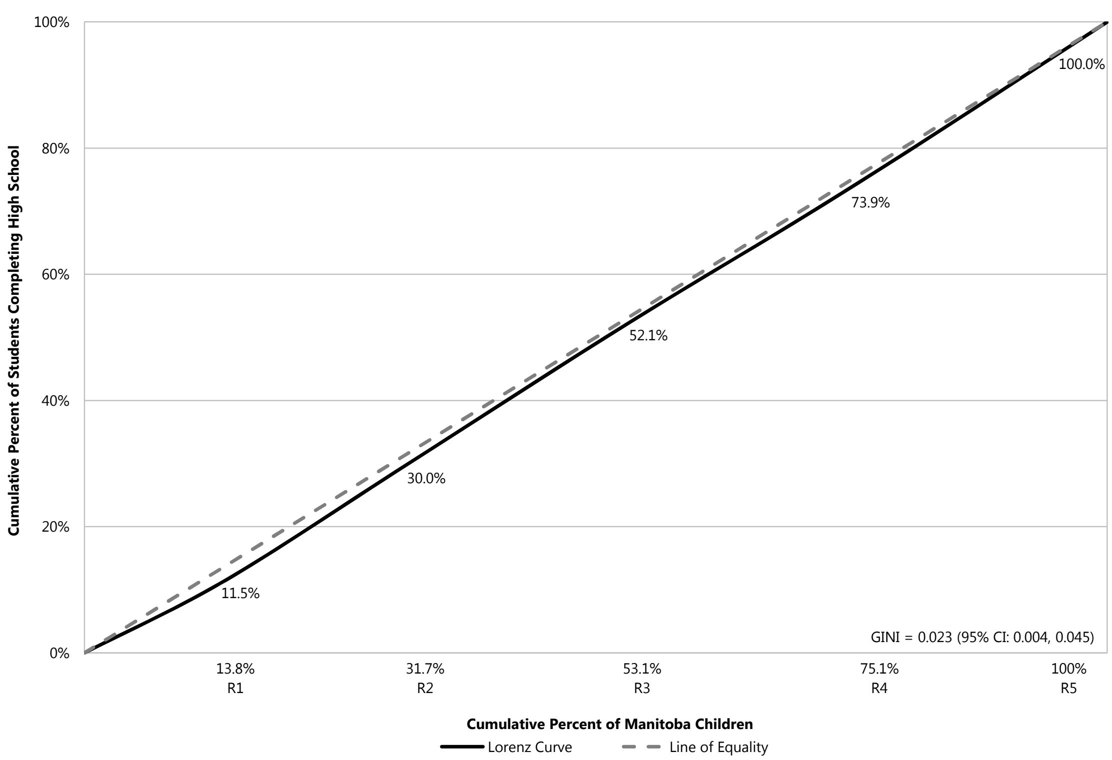


Figure 5.72: Lorenz Curve for High School Completion in Urban Areas, 2002/03
Crude for Grade 9 students followed for six years

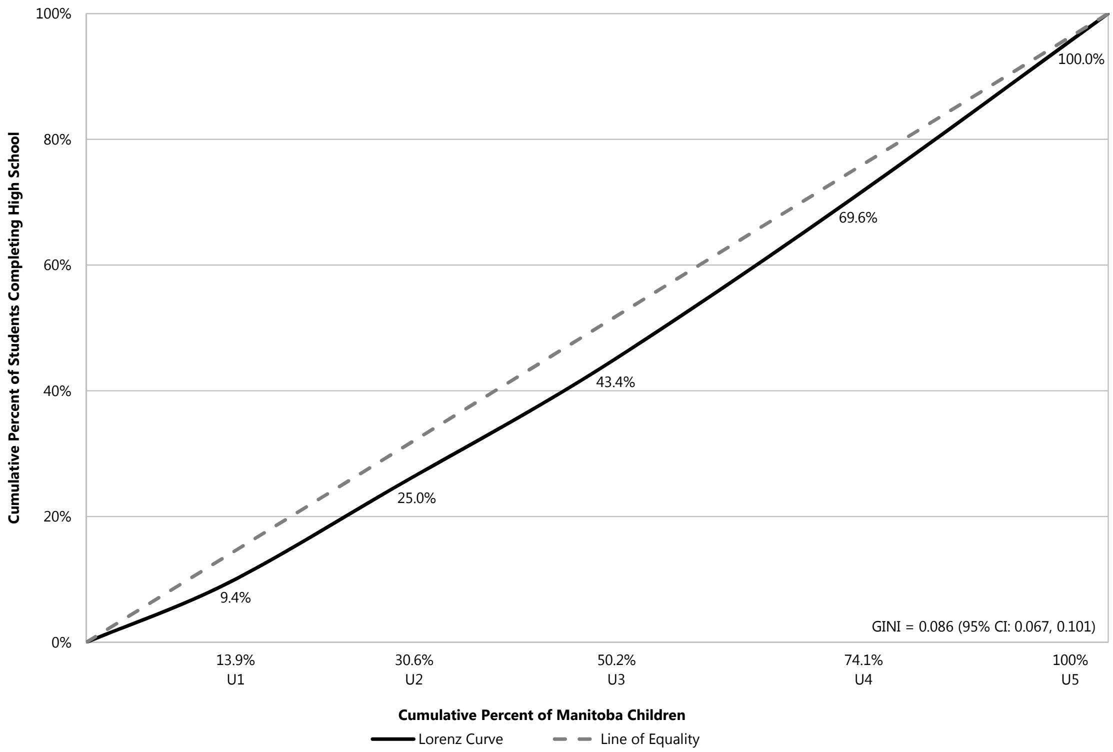
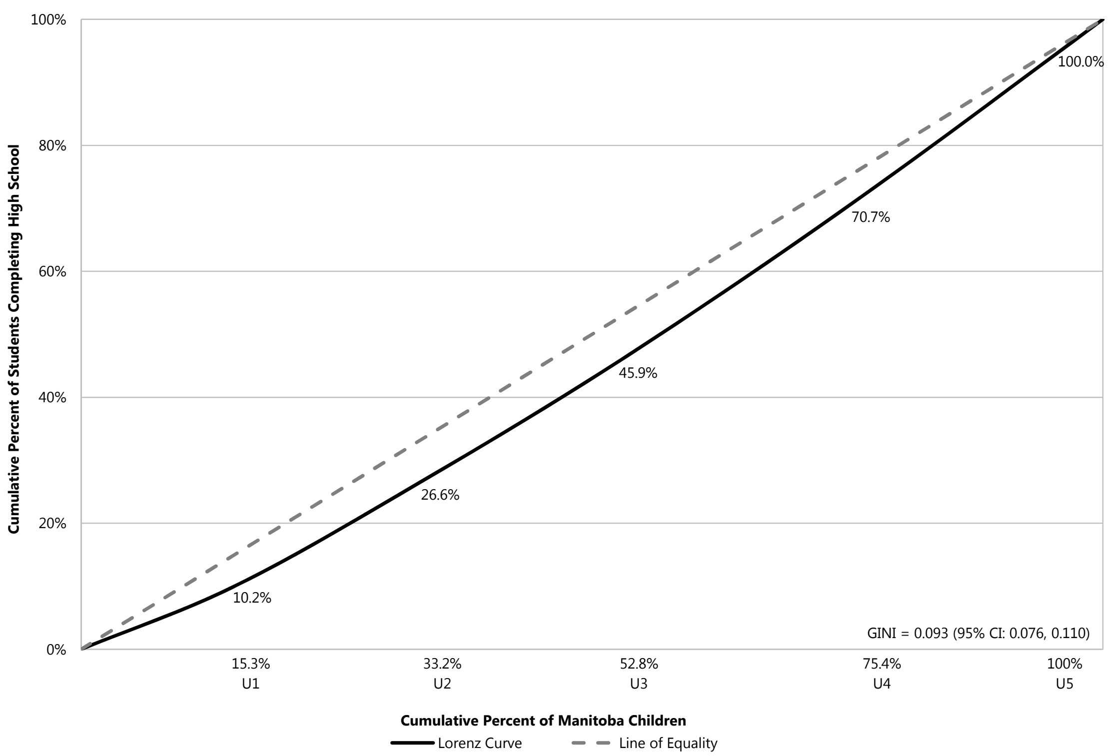


Figure 5.73: Lorenz Curve for High School Completion in Urban Areas, 2009/10
Crude for Grade 9 students followed for six years



Modeling of Successful Learning from Kindergarten to Grade 3

The preceding analyses looked at a number of indicators of successful learning and, where possible, examined trends over time. These trends help us to understand changes in the indicator at the population level over time. For example, we saw that grade repetition decreased over the study period, in part due to school district practices which have been based on the growing literature questioning the effectiveness of repetition. In another example, we saw that special funding has increased over time, perhaps reflecting both a greater awareness and recognition of particular conditions (such as Autism Spectrum Disorders) and the understanding that more support for children with special needs is required to help them achieve their full potential. In the preceding analyses, we also looked at the relationship between the indicator and area–level income, to try to understand the relationship between socioeconomic status (SES) and successful learning. For both indicators, and many others in this report, there was an SES gradient, suggesting that the outcome was related to SES. These analyses of trends over time and relationships between indicators and SES are useful for determining the impact of a single factor (in this case, area–level income) at one point in time, but they do not necessarily help us to understand the multiple factors which contribute to successful learning, nor the point(s) in time when these factors have the greatest impact. To answer these types of questions, we turn to more complex analyses, examining the same children over several key periods of development.

The analyses in this section build on the previous MCHP report "The Early Development Instrument in Manitoba (EDI): Linking Socioeconomic Adversity and Biological Vulnerability at Birth to Children's Outcomes at Age 5" (Santos et al., 2012). In that report, Santos et al. (2012) examined how biological vulnerability at birth is related to children's vulnerability at age five, as measured by the Early Development Instrument (EDI). The EDI is a population–based, community–level measure of children's development in five domains (**physical health and well–being, social competence, emotional maturity, language and cognitive development,** and **communication skills and general knowledge**) in Kindergarten (approximately age five years) (Janus & Offord, 2007). In Manitoba, the EDI is collected province–wide in all 37 public school divisions on behalf of Healthy Child Manitoba by all Kindergarten teachers regarding all of their students, providing a population–based measure of early childhood outcomes and school readiness. The EDI can be used both retrospectively, as a reflection of the first five years of life (early childhood outcomes) and prospectively, as a forecast of future outcomes in school and life (school readiness). In the EDI report, the focus was primarily on early developmental vulnerability at age five years as measured by the EDI. The standard approach for designating vulnerability on the EDI is scoring in the bottom 10th percentile of at least one domain of the EDI (Janus & Offord, 2007). This is also referred to as being "Not Ready" for school.[34] Children can also be classified as being Not Ready in a given EDI domain, again using the 10th percentile cut–off score. Not Ready is a dichotomous variable (i.e., either present or absent).

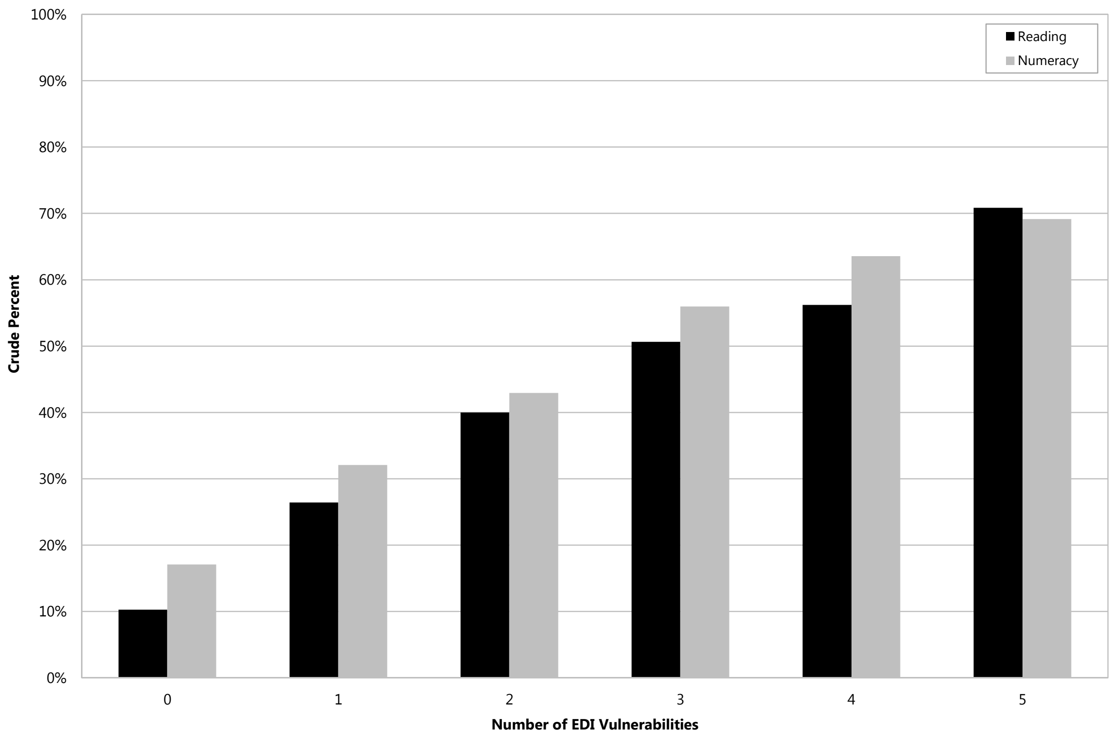
Not surprisingly, the EDI, whether using an overall or domain–specific score, has been found to predict achievement in school (Forget-Dubois et al., 2007; Lloyd & Hertzman, 2009; Lloyd, Li, & Hertzman, 2010; Lloyd, Irwin, & Hertzman, 2009). In a descriptive analysis, we looked at the relationship between level of EDI vulnerability (whether a child was vulnerable on none, one, two, three, four, or all five domains) and Grade 3 vulnerability (measured by being assessed as "needs ongoing help") and found an association with both reading and numeracy assessments. Figure 5.74 shows that with each increase in EDI vulnerability, there was an increase in the percent of students who were vulnerable on both the Grade 3 reading and numeracy assessments. For example, just over 10% of the children who were not vulnerable on any of the domains in the EDI in Kindergarten were vulnerable on the Grade 3 reading

34 The "not ready" results have been derived using Canadian Standardized cut–off scores for the bottom 10^{th} percentile.

assessment. This percent rose steadily with increasing EDI vulnerability: over 70% of the students who were vulnerable in all five domains on the EDI in Kindergarten scored as "needs ongoing help" (or vulnerable) in the Grade 3 reading assessment.

In sum, when looking at the same students over time, we found a strong relationship between performance in Kindergarten and performance in Grade 3.

Figure 5.74: Grade 3 Students Not Meeting or Approaching Reading and Numeracy Assessment Expectations by Number of Vulnerabilities on EDI in Kindergarten
Crude percent of Grade 3 students

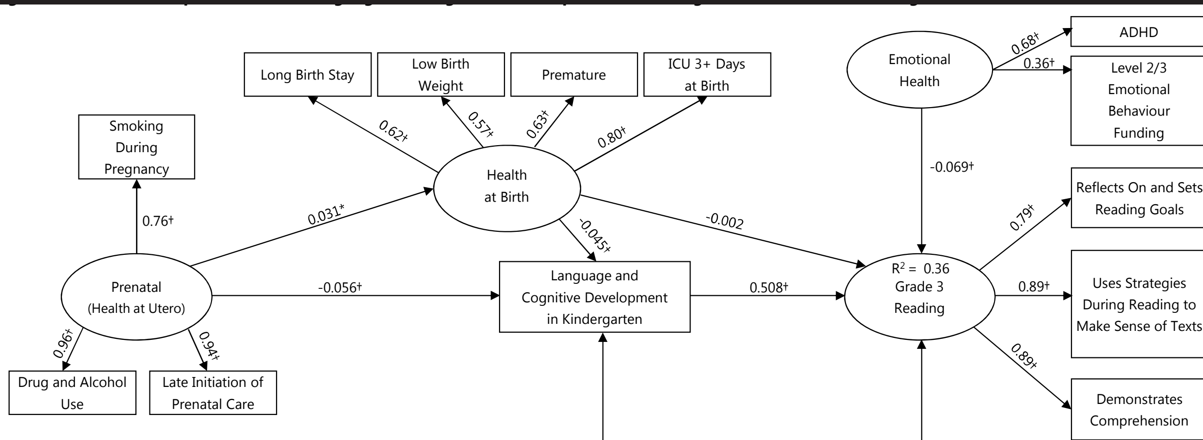


Factors Associated with Outcomes

So what factors contribute to good or poor outcomes on the EDI and on the Grade 3 assessments? In this section, we attempt to answer this question. There are many possible contributing factors to successful learning, including immediate factors, such as whether the child being assessed has an intellectual disability or lives with a depressed mother, and more distant factors, such as the child's health at birth and health in utero. There may be complex inter–relationships among some of these factors. For example, we would expect prenatal health to have an influence on health at birth, which in turn may have an influence on EDI outcomes. Thus it is possible for some variables to be both an outcome as well as a predictor of subsequent outcomes. In order to describe such complex inter–relationships, we used a statistical technique called structural equation modeling (SEM). SEMs not only allow us to describe these complex inter–relationships, they allow us to examine factors that are not directly measurable but can be estimated by a number of related variables. For example, we do not have a single, direct measure of a child's health at birth; but there are a number of related variables that can be used to estimate that health status, including birth weight, gestational age, and a long hospital stay at birth. Variables that cannot be directly measured but are estimated by related variables are known as "**latent constructs**".

In order to build our SEMs, we started with a "base model" which was very similar to the SEMs used in the EDI report (Santos et al., 2012), but also included the Grade 3 outcomes. This model is shown in Figure 5.75, using the *language and cognitive development domain* of the EDI and the Grade 3 reading assessment as an example. The model includes four different latent constructs, indicated by the ovals in the figure: prenatal health (estimated by smoking during pregnancy, drug and/or alcohol use during pregnancy, and late initiation of prenatal care); health at birth (estimated by long stay in hospital at birth, low birth weight, premature birth, and three or more days spent in the **Intensive Care Unit (ICU)** at birth); reading skill in Grade 3 (estimated by the three different competencies assessed for reading described in the section called Grade 3/4 Assessments); and emotional health (estimated by a diagnosis of attention–deficit hyperactivity disorder (ADHD) and receiving funding for emotional/behavioural disorder). The arrows moving away from these ovals show the variables used to estimate the latent constructs, and the numbers next to the arrows indicate how strong the relationship is between each of the variables and the latent construct.

Figure 5.75: Relationship Between EDI Language and Cognitive Development in Kindergarten and Grade 3 Reading Assessment (Base Model)



Child's Age at Testing	0.123†
Sex (Male)	-0.150†
4+ Children	-0.097†
Breastfeeding Initiation	0.047†
Intellectual Disability	-0.189†
Maternal Age	0.167†
In CFS	-0.121†
Maternal Depression	-0.009
Physician Visits	-0.011
90%+ Minor ADGs	-0.003

Sex (Male)	-0.019*
4+ Children	-0.062†
Breastfeeding Initiation	0.043†
Intellectual Disability	-0.058†
Maternal Age	0.104†
In CFS	-0.005
Maternal Depression	-0.016
Physician Visits	-0.020
90%+ Minor ADGs	-0.012

Statistical Significance: $*p<0.05$ $**p<0.01$ $^{†}p<0.001$
Model Fit: CFI = 0.9773, NNFI = 0.9584, RMSEA = 0.0405

Besides the latent constructs listed above, there were several additional variables included in the models—factors found in the literature to be associated with school performance. These included the child's age at EDI assessment, sex, whether the child was from a large family (four or more children), whether breastfeeding was initiated at hospital discharge, presence of an intellectual disability, the age of the mother at her first childbirth, child involvement with Child and Family Services (CFS), maternal depression, number of physician visits, and number of health contacts for particular categories of illnesses. Definitions of these variables are given in Table 5.1.

Table 5.1: Variables Used in Structural Equation Modeling

Variable Name	Definition
Prenatal Health - A latent construct that represents the child's health in utero. This construct is measured by three variables:	
Smoking during pregnancy	A dichotomous measure of whether the child's mother smoked or not during pregnancy as indicated in the Families First Screen Form
Drug and alcohol use during pregnancy	A dichotomous measure of whether the child's mother used drugs and alcohol during pregnancy as indicated in the Families First Screen Form
Late initiation of prenatal care	A dichotomous measure of whether the child's mother received prenatal care late in the pregnancy as indicated in the Families First Screen Form
Health at Birth - A latent construct that represents the child's health at birth. This construct is measured by four variables:	
Long birth stay	A dichotomous measure of whether the length of the birth hospitalization was above the 90th percentile
Low birth weight	A dichotomous measure of whether the child weighed 0-2,499 grams versus 2,500 or more at birth
Premature	A dichotomous measure of whether the child was born 'preterm' (before 37 complete weeks of gestation)
ICU 3+ days at birth	A dichotomous measure of whether the child spent three or more days in an intermediate or intensive care nursery
Emotional Health - A latent construct that represents the child's emotional health. This construct is measured by two variables:	
ADHD	A dichotomous measure of whether the child was diagnosed with attention deficit hyperactivity disorder
Level II and III emotional behaviour funding	A dichotomous measure of whether the child received level 2 or 3 emotional behavior funding during kindergarten and Grade 3
Material Deprivation - A latent construct that represents the material deprivation of the child's mother. This construct is measured by four variables:	
On income assistance	A dichotomous measure of whether the child's family member received income assistance
Labour force participation	An area level measure of the proportion of people who lived in a family that is not in the labor force
No high school education	An area level measure of the proportion of people who have not completed high school
Live in poor neighbourhood	A dichotomous measure of whether the child lived in a poor neighbourhood (Q1 and Q2 income quitiles)
Grade 3/4 Numeracy - A latent construct that represents the mathematics skill level of children in Grade 3, as measured by four numeracy competencies:	
Predicts an element in a repeating manner	A continuous measure of the child's score for this numeracy competency in the Grade 3 assessment
Understands that the equal symbol represents an equality of terms found on either side of the symbol	A continuous measure of the child's score for this numeracy competency in the Grade 3 assessment
Understands that a given whole number may be represented in a variety of ways	A continuous measure of the child's score for this numeracy competency in the Grade 3 assessment
Uses various mental math strategies to determine answers to addition and subtraction questions	A continuous measure of the child's score for this numeracy competency in the Grade 3 assessment
Grade 3/4 Reading - A latent construct that represents the reading skill level of children in Grade 3, as measured by three reading competencies:	
Reflects on and sets reading goals	A continuous measure of the child's score for this reading competency in the Grade 3 assessment
Uses strategies during reading to make sense of texts	A continuous measure of the child's score for this reading competency in the Grade 3 assessment
Demonstrates comprehension	A continuous measure of the child's score for this reading competency in the Grade 3 assessment

Variable Name	Definition
Child's Age at Testing	The child's exact age in years as of the EDI testing
Sex	Sex of child (female=0, male=1)
4+ Children	A dichotomous measure of whether the child's mother had four or more children as of the child's 4th birthday
Breastfeeding Initiation	A dichotomous measure of whether breastfeeding (exclusive or partial) was initiated during birth hospitalization
Intellectual Disability	A dichotomous measure of whether the child was diagnosed with an intellectual disability by the child's 4th or 8th birthday when the child was in Kindergarten or Grade 3, respectively
Maternal Age at First Birth	The exact age of the child's mother at the birth of her first child
In CFS	Involvement with Child and Family Services until the child's 4th or 8th birthday when the child was in Kindergarten or Grade 3, respectively
Maternal Depression*	A dichotomous measure of whether the mother had at least one diagnosis for depression from the child's birth to their 4th or 8th birthday when the child is in Kindergarten or Grade 3, respectively
Physician Visits	A continuous measure of the number of times the child had an 'ambulatory visit' with a physician (GP or specialist) from birth discharge until the child's 4th or 8th birthday when the child is in Kindergarten or Grade 3, respectively
90%+ Minor ADGs†	A dichotomous measure of whether the child accumulated more than the 90th percentile value (24) of Minor ADG-years from birth to their 4th or 8th birthday when the child is in Kindergarten or Grade 3, respectively

* See Glossary for details about **maternal depression**

† Aggregated Diagnostic Groups™ (ADGs™) – a grouping of diagnosis codes based on similarities of severity and likelihood of health condition persistence over time. ADGs™ were created using The Johns Hopkins Adjusted Clinical Group® (ACG®) Case-Mix System version 9 (The John Hopkins University Bloomberg School of Public Health, 2011). Please see Glossary for more information and Appendix 9 for the codes used in this study.

It is important to emphasize that the analyses are correlational in nature (and cannot be assumed to be causal), albeit ordered in a sequence over time. Statistical analyses provided estimates of "goodness of fit" between the conceptual model and the observed data. As noted earlier (see Chapter 1), all of our SEMs met conventional standards of goodness of fit. It is also important to recognize that while we believe our model includes many variables that influence Kindergarten and Grade 3 outcomes, some variables that may have important influences on outcomes were not available for analysis (e.g., genetic predispositions, child temperament, parenting style, family functioning).

Analyses in this section focused on a single birth cohort—children who were born in 2001. These were children who should have been in Kindergarten in 2006/07 and in Grade 3 in 2009/10. Children who did not have a Families First[35] screen form (which is where we obtained prenatal information) were excluded, as were children without EDI and/or Grade 3 assessments. Because Families First screening was not conducted on families living in First Nations communities and because EDI and Grade 3 assessments are not complete for children attending First Nations schools, children living in First Nations communities are not included in this analysis.

Table 5.2 shows the percent of children in the 2001 birth cohort with each of the factors included in the SEMs (first column of numbers). Also shown is the percent of children with each of the factors for three at–risk groups of children. The analyses using these specific groups of children are discussed later in the chapter.

35 In 2001, the Families First program was known as "BabyFirst", however we have used the newer name "Families First" when referring to the screen associated with this program.

Table 5.2: Proportion of Children in Each Category Used in Structural Equation Modeling (SEM)

Category	All Children in the 2001 Birth Cohort (n=9,298)	Children at Risk		
		Children in a Family Receiving Services from Child and Family Services (n=546)	Children in a Family on Income Assistance (n=2,196)	Children Born to a Mother Who Was a Teen at First Birth (n=2,152)
Male	50.79	52.93	51.50	50.93
Living in a family with 4 or more children	15.37	54.58	29.55	32.67
Breastfeeding initiation at hospital discharge	82.50	54.21	68.94	68.40
Having an intellectual disability in Kindergarten	1.55	4.40	2.55	1.39
Having an intellectual disability in Grade 3	2.03	4.58	3.23	1.95
Any involvement with CFS up to 4th birthday	5.87	100.00	22.72	18.17
Any involvement with CFS up to 8th birthday	8.04	na	na	na
Being a teen mother at first birth	23.17	71.74	61.07	100.00
Having a mother that is depressed at any point by the child's 4th birthday	11.54	28.39	20.45	16.73
Having at least 90% minor ADGs	11.03	21.79	17.26	14.64
Prenatal health*				
Drug and alcohol use	21.91	44.32	30.65	32.62
Smoking during pregnancy	31.60	60.44	51.96	51.63
Late initiation of prenatal care	21.53	38.64	28.60	31.60
Health at birth				
Long birth stay	11.54	19.60	12.48	10.50
Low birth weight	4.84	9.52	6.42	5.20
Premature	7.21	14.29	9.06	8.83
In ICU at birth for at least 3 days	4.86	11.36	6.51	6.04
Emotional health				
Diagnosed with ADHD	4.09	14.65	8.06	6.27
Receiving level II or III funding for emotional behaviour disabilities	1.08	5.49	2.82	2.32
Socio-economic status and material deprivation				
On income assistance up to 4th birthday (individual level)	23.62	91.39	100.00	62.04
Live in poor neighbourhood (area-level) **	44.70	76.92	69.40	63.75
No high school education (area-level) **	40.16	49.47	45.22	46.52
No labour force participation (area-level) **	7.38	13.49	10.64	11.21
Performance in Early Developmental Assessment in Kindergarten †				
Communication skills & general knowledge score	8.75	5.63	6.25	6.88
Emotional maturity score	8.17	7.00	7.67	7.83
Language skills & cognitive development score	8.85	6.54	7.69	8.08
Physicical health & well-being score	9.23	8.08	8.08	8.33
Social competence score	8.85	7.00	7.88	8.27
Predicts Repeating Elements in Grade 3 Numeracy				
Out of range and developing	8.59	23.81	17.49	14.36
Approaching expectations	41.49	46.15	47.27	48.37
Meeting expectations	49.91	30.04	35.25	37.27
Understands Equality of Terms in Grade 3 Numeracy				
Out of range and developing	17.78	38.64	30.28	26.02
Approaching expectations	37.95	35.16	39.89	40.57
Meeting expectations	44.27	26.19	29.83	33.41

Category	All Children in the 2001 Birth Cohort (n=9,298)	Children at Risk		
		Children in a Family Receiving Services from Child and Family Services (n=546)	Children in a Family on Income Assistance (n=2,196)	Children Born to a Mother Who Was a Teen at First Birth (n=2,152)
Understands Variety of Representation in Grade 3 Numeracy				
Out of range and developing	11.11	26.92	22.04	19.70
Approaching expectations	29.07	42.86	39.57	36.80
Meeting expectations	59.82	30.22	38.39	43.49
Uses Mental Math Strategies in Grade 3 Numeracy				
Out of range and developing	16.43	42.49	30.46	25.88
Approaching expectations	36.75	39.19	42.35	41.40
Meeting expectations	46.82	18.32	27.19	32.71
Sets Reading Goals in Grade 3 Reading				
Out of range and developing	12.54	31.68	26.41	23.23
Approaching expectations	30.36	37.36	37.89	38.01
Meeting expectations	57.10	30.95	35.70	38.75
Makes Sense of Text in Grade 3 Reading				
Out of range and developing	13.73	33.88	27.05	23.19
Approaching expectations	23.82	29.30	30.65	30.76
Meeting expectations	62.44	36.81	42.30	46.05
Demonstrates Comprehension in Grade 3 Reading				
Out of range and developing	13.30	32.97	26.41	22.91
Approaching expectations	28.08	33.70	35.79	35.22
Meeting expectations	58.61	33.33	37.80	41.87

na Not assessed

* The values for these variables include children who scored positive on these variables and children who had a missing value for these items. Preliminary analyses suggested that those with missing values for these items had outcomes similar to those with a positive value

** Number represents mean percent of children in each category

† Number represents median score for children in each category

Relationship Between Language and Cognitive Development in Kindergarten and Grade 3 Reading

Returning to Figure 5.75, it is evident that there is a significant direct relationship between prenatal health and health at birth, with poorer prenatal health associated with poorer health at birth (indicated by the statistically significant coefficient associated with the arrow from prenatal health to health at birth: 0.031, p<0.05). There is also a significant direct relationship between prenatal health and *language and cognitive development* at Kindergarten, with poorer prenatal health associated with lower EDI scores (indicated by the statistically significant coefficient associated with the arrow from prenatal health to *language and cognitive development* in Kindergarten: –0.056, p<0.001). The effect of prenatal health on Grade 3 reading is mediated through health at birth and *language and cognitive development* at Kindergarten (–0.03, p<0.001, not shown in figure). Health at birth is also significantly and directly related to *language and cognitive development* at Kindergarten, with poorer health at birth associated with lower EDI scores (–0.045, p<0.001). Health at birth was not directly related to Grade 3 reading, but mediated through *language and cognitive development* at Kindergarten. In other words, the relationship between health at birth and Grade 3 reading outcomes is indirect through the influence of health at birth on *language and cognitive development* at Kindergarten. EDI was significantly directly related to Grade 3 reading, with higher EDI scores on language and cognition associated with a better assessment in Grade 3 reading (0.508, p<0.001). The direct influence of *language and cognitive development* at Kindergarten on Grade 3 reading accounted for almost three–quarters of the total variance explained in Grade 3 reading scores. Also significantly directly related to Grade 3 reading is emotional health, with poor emotional health associated with poor assessment in Grade 3 reading (–0.069, p<0.001).

There are a number of additional factors that we expected to be related to both EDI and to Grade 3 reading and these are indicated in the boxes at the bottom of the figure. The following variables were significantly related to better performance on the *language and cognitive development* domain on the EDI: children who were older on the assessment date, females, children who were not from large families, children who were breastfed, children without intellectual disabilities, children whose mothers were older at their first birth, and children not involved with child welfare services. Maternal depression, number of physician visits, and having minor illnesses in the preschool period were not significantly related to the *language and cognitive development* domain on the EDI.

The following variables were significantly related to better outcomes on Grade 3 reading: female children, children not in large families, children who were breastfed, children without an intellectual disability, and children whose mothers were older at first birth. The other variables—involvement with child welfare, maternal depression, number of physician visits, and minor illnesses in the preschool period—were not significantly related to Grade 3 reading in this model.

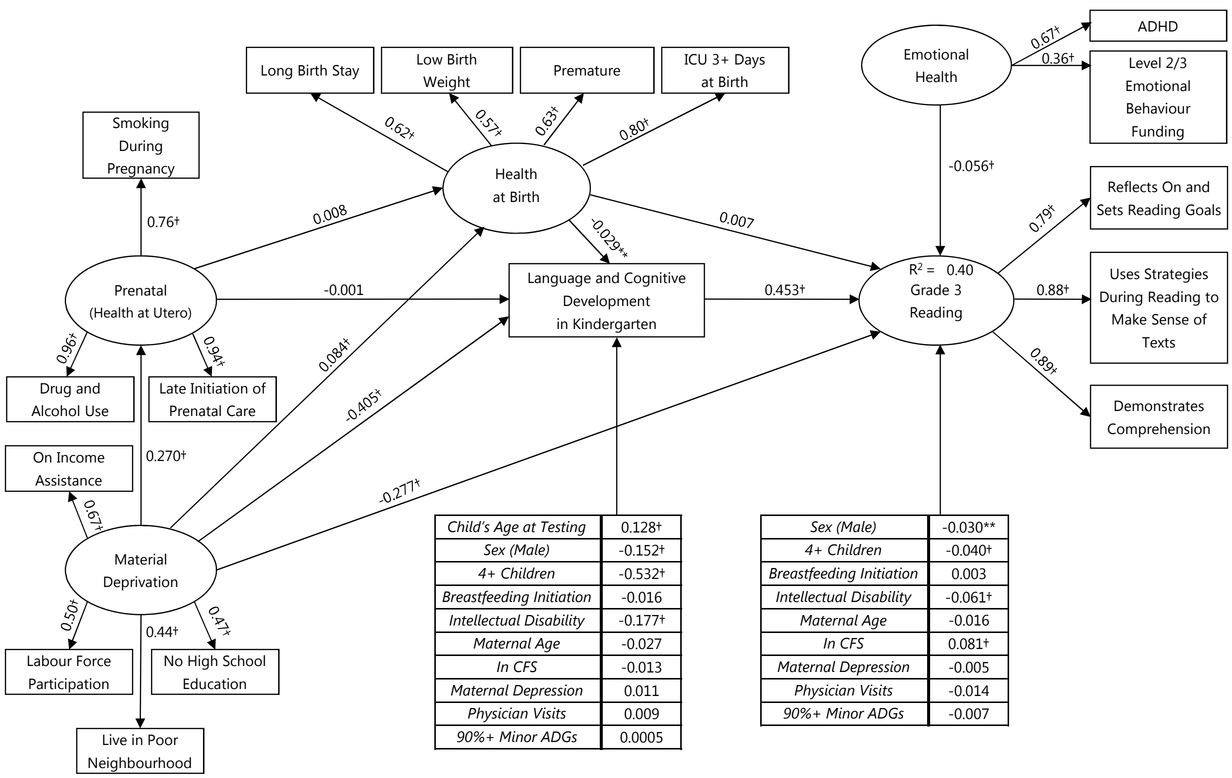
Beyond health factors at different stages in development, we were interested in determining the relative importance of deprivation factors on outcomes in Kindergarten and Grade 3. Specifically, we were interested in the importance of material deprivation (or the absence of factors such as adequate income and employment) and social deprivation (or the absence of factors such as social connections) on child development. In the past it has been common to combine measures of material and social deprivation into a single index of SES (Martens, Frohlich, Carriere, Derksen, & Brownell, 2002). However, Townsend and colleagues (1987, 1988) proposed that there are multiple types of deprivation and emphasized examining material and social deprivation separately. Work in Quebec (Pampalon & Raymond, 2000; Philibert, Pampalon, Thouez, & Loiselle, 2002) and at MCHP (Chateau, Metge, Prior, & Soodeen, 2012; Metge et al., 2009) has used factor analysis to separate SES variables into two distinct categories of material and social deprivation. We decided to apply these to our SEMs in order to determine whether each type of deprivation had an influence on child outcomes. What we found was that these two types of deprivation were strongly related to each other and that their influence on outcomes did not operate independently. Having both types of deprivation in the model actually reduced how well the model explained the outcomes at Kindergarten and Grade 3. When looked at alone, social deprivation had very minimal influence on the other factors in the model, and the model fit was not adequate.[36] On the other hand, with only material deprivation in the model, the model fit increased and material deprivation was strongly related to other factors in the model. It was therefore decided to include only material deprivation in our final models.

Figure 5.76 shows the SEM model for *language and cognitive development* at Kindergarten and Grade 3 reading, with material deprivation added in. By comparing to the "base model" in Figure 5.75, it is clear that material deprivation has a significant direct effect on prenatal health, health at birth, *language and cognitive development* at Kindergarten, and reading at Grade 3 (indicated by the arrows going from material deprivation to these factors and the statistically significant coefficients next to the arrows). A comparison of the two models also reveals that the direct effects of prenatal health on health at birth and on *language and cognitive development* at Kindergarten are no longer statistically significant once material deprivation is added to the model (the coefficients next to these arrows are no longer statistically significant). Taken together these findings suggest that material deprivation is strongly

36 This does not mean that social deprivation is not an important determinant of children's outcomes, but may reflect that the measure of social deprivation used in this analysis, which has been used to examine the impact of this variable on adult health, was not the most appropriate measure of this concept for families with children.

related to our measure of prenatal health (0.270, p<0.001). It is actually not a surprise that poverty (measured by being on income assistance) and low SES are related to smoking during pregnancy, alcohol or drug use during pregnancy, and late initiation of prenatal care, as these relationships have been demonstrated before (Heaman, Green, Newburn-Cook, Elliott, & Helewa, 2007; Smith et al., 2006; Weitzman, Byrd, Aligne, & Moss, 2002). This model also suggests that material deprivation plays a more important role in health at birth and *language and cognitive development* at Kindergarten than does prenatal health. There was no significant indirect effect of material deprivation on health at birth, suggesting that the relationship between material deprivation and health at birth is not mediated through prenatal health.

Figure 5.76: Relationship Between EDI Language and Cognitive Development in Kindergarten and Grade 3 Reading Assessment (Full Model)



Child's Age at Testing	0.128†
Sex (Male)	-0.152†
4+ Children	-0.532†
Breastfeeding Initiation	-0.016
Intellectual Disability	-0.177†
Maternal Age	-0.027
In CFS	-0.013
Maternal Depression	0.011
Physician Visits	0.009
90%+ Minor ADGs	0.0005

Sex (Male)	-0.030**
4+ Children	-0.040†
Breastfeeding Initiation	0.003
Intellectual Disability	-0.061†
Maternal Age	-0.016
In CFS	0.081†
Maternal Depression	-0.005
Physician Visits	-0.014
90%+ Minor ADGs	-0.007

Statistical Significance: **p<0.05 **p<0.01 †p<0.001*
Model Fit: CFI = 0.9587, NNFI = 0.9351, RMSEA = 0.0458

Material deprivation not only had significant direct effects on Grade 3 reading, but also significant indirect effects. That is, some of the relationship between material deprivation and Grade 3 reading is accounted for by the direct influence of material deprivation on Grade 3 outcomes (–0.277, p<0.001), whereas some of this relationship is mediated through prenatal health, health at birth and *language & cognitive development* at Kindergarten.

As with the base model, the model in Figure 5.75 shows that health at birth was directly and significantly related to *language and cognitive development* at Kindergarten, with poorer health status at birth related to lower EDI scores. In the model with material deprivation added, health at birth was also not directly related to Grade 3 reading but mediated through *language and cognitive development* at Kindergarten.

Language and cognitive development at Kindergarten had a significant direct effect on Grade 3 reading (0.453, $p<0.001$). Recall that the direct influence of *language and cognitive development* at Kindergarten accounted for almost three–quarters of the total variance explained in Grade 3 reading in the base model. Once material deprivation is added into the model, *language and cognitive development* accounts for less of the variance in Grade 3 scores. Thus some of the relationship between outcomes in Kindergarten and in Grade 3 is explained by the role of material deprivation. As with the base model, once material deprivation is added into the model, emotional health has a significant direct relationship to Grade 3 reading, with poor emotional health associated with poor assessment in Grade 3 reading.

The following variables were significantly related to better performance on the *language and cognitive development* domain on the EDI: children who were older on the testing date, females, children who were not from large families, and children without intellectual disabilities. In contrast to the base model, children who were breastfed, born to mothers who were older at first birth, and not involved in child welfare services were not significantly related to better performance on the EDI once material deprivation was added into the model. This does not mean that these factors are not important. However, because of the strong relationship of these factors with material deprivation, they appear less important when material deprivation is added. As with the base model, maternal depression, number of physician visits, and having minor illnesses in the preschool period were not significantly related to the *language and cognitive development* domain on the EDI.

The following variables were significantly related to better outcomes on Grade 3 reading: female children, children not in large families, and children without an intellectual disability. In contrast to the base model, once material deprivation was added, there was no longer a significant relationship between being breastfed and Grade 3 reading, nor between maternal age at first birth and reading; but there was a significant relationship between child welfare involvement and Grade 3 reading.[37] The other variables—maternal depression, number of physician visits, and minor illnesses in the preschool period—were not significantly related to Grade 3 reading.

These models suggest that variations in Grade 3 reading performance are strongly influenced by variations already evident in Kindergarten. Both the performance in Kindergarten and Grade 3 are influenced by a number of different factors, including early biological vulnerability, measured by prenatal health and health at birth. However, the effect of early biological vulnerability is eclipsed by the impact of material deprivation at every stage of development.

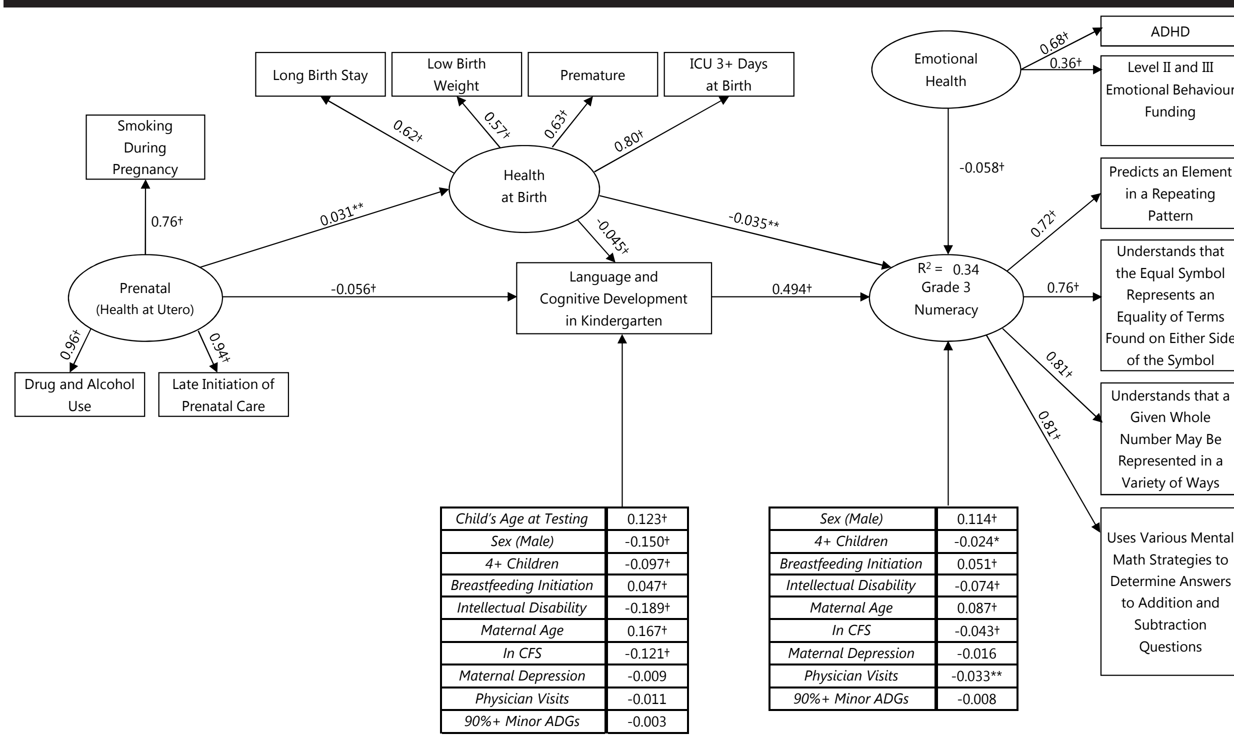
What this means from a modeling perspective is that material deprivation accounts for more of the variance in Kindergarten and Grade 3 performance than the factors it displaces, like prenatal health and breastfeeding—but these latter factors are still important. What this means from a policy perspective is that macro–level policies to reduce socioeconomic disparities are necessary in order to make population–level improvements in school outcomes. While we should never lose sight of the importance of socioeconomic factors in contributing to child health and development, working on things more amenable to change, such as improving prenatal health and encouraging breastfeeding, will also contribute to better school performance.

37 This relationship is in an unexpected direction: with material deprivation added into the model, CFS involvement is associated with *higher* Grade 3 reading scores. This is in contrast to previous research which suggests children involved with CFS have poorer educational outcomes (Brownell et al., 2010; Santos et al., 2012). This finding bears further exploration.

Relationship Between Language and Cognitive Development in Kindergarten and Grade 3 Numeracy

Figure 5.77 suggests that the relationships between prenatal health and health at birth, and between prenatal health and *language and cognitive development* in Kindergarten are the same for Grade 3 numeracy as seen in Figure 5.75 for Grade 3 reading. Differences in the models emerge in the relationships with the Grade 3 outcomes. As with the results for Grade 3 reading, the effect of prenatal health on Grade 3 numeracy is mediated through health at birth and *language and cognitive development* at Kindergarten (–0.03, p<0.001, not shown in figure). The numeracy results are also similar to results for Grade 3 reading in that health at birth is significantly and directly related to *language and cognitive development* at Kindergarten, with poorer health at birth associated with lower EDI scores. Unlike the reading results, the results for Grade 3 numeracy suggest that health at birth is directly related to Grade 3 numeracy (–0.035, p<0.01). In other words, the relationship between health at birth and Grade 3 numeracy outcomes is both direct and indirect through the influence of health at birth on *language and cognitive development* at Kindergarten. EDI language and cognitive development was significantly directly related to Grade 3 numeracy, with higher EDI scores on language and cognition associated with a better assessment in Grade 3 numeracy. Similar to the reading results, the direct influence of *language and cognitive development* at Kindergarten on Grade 3 numeracy accounted for over two–thirds of the total variance explained in Grade 3 numeracy scores. Emotional health is also significantly and directly related to Grade 3 numeracy with poor emotional health associated with poor assessment in Grade 3 numeracy.

Figure 5.77: Relationship Between EDI Language and Cognitive Development in Kindergarten and Grade 3 Numeracy Assessment (Base Model)



Child's Age at Testing	0.123†
Sex (Male)	-0.150†
4+ Children	-0.097†
Breastfeeding Initiation	0.047†
Intellectual Disability	-0.189†
Maternal Age	0.167†
In CFS	-0.121†
Maternal Depression	-0.009
Physician Visits	-0.011
90%+ Minor ADGs	-0.003

Sex (Male)	0.114†
4+ Children	-0.024*
Breastfeeding Initiation	0.051†
Intellectual Disability	-0.074†
Maternal Age	0.087†
In CFS	-0.043†
Maternal Depression	-0.016
Physician Visits	-0.033**
90%+ Minor ADGs	-0.008

Statistical Significance: **p<0.05 **p<0.01 †p<0.001*
Model Fit: CFI = 0.9764, NNFI = 0.9588, RMSEA = 0.0388

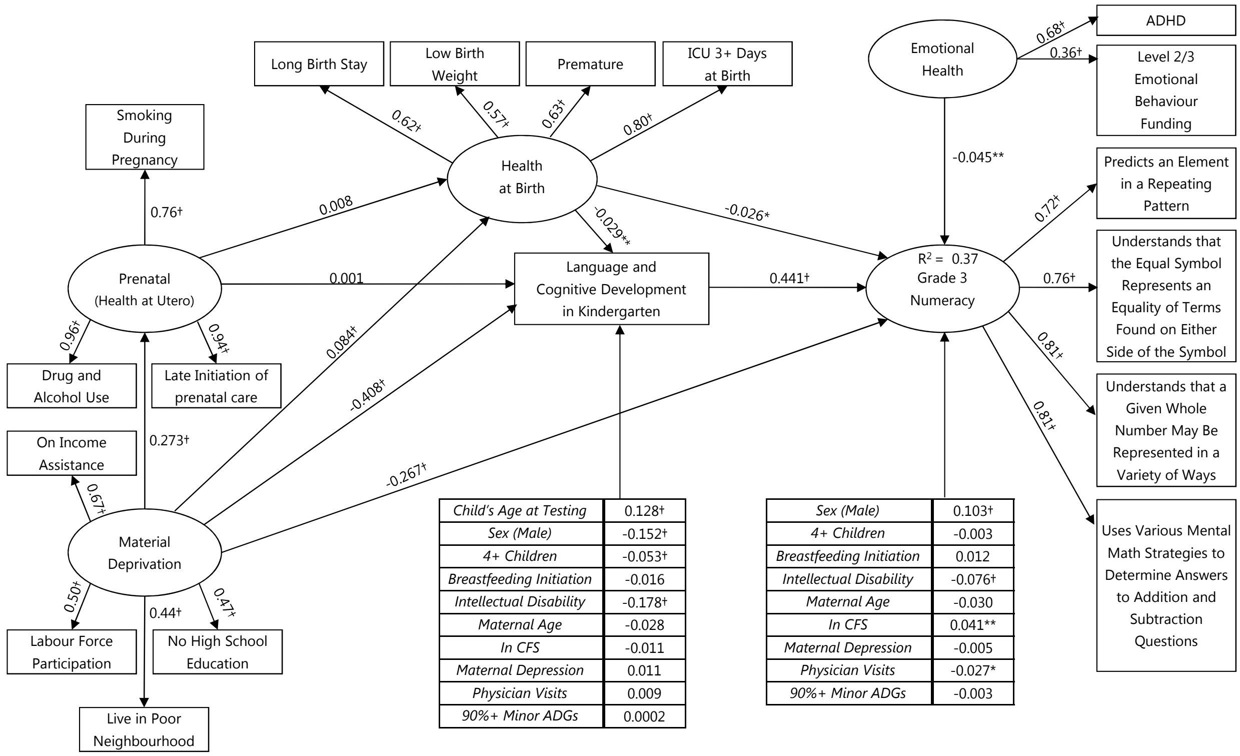
As with the Grade 3 reading scores, there are a number of additional factors that we expected to be related to both EDI and to Grade 3 numeracy and these are indicated in the boxes at the bottom of the figure. The relationships of these factors with the *language and cognitive development* domain at Kindergarten are similar to the relationships found for Grade 3 reading. Thus, the following variables were significantly related to better performance on the *language and cognitive development* domain on the EDI: children who were older on the assessment date, females, children who were not from large families, children who were breastfed, children without intellectual disabilities, children whose mothers were older at their first birth, and children not involved with child welfare services. Maternal depression, number of physician visits, and having minor illnesses in the preschool period were not significantly related to the *language amd cognitive development* domain on the EDI.

There were some differences in the variables significantly related to Grade 3 numeracy compared to the Grade 3 reading results. Recall that for reading, female children had better scores compared to males. For numeracy, male children had better scores on the Grade 3 numeracy assessments than girls. As with reading, breastfeeding initiation and maternal age were positively associated with Grade 3 numeracy, whereas having an intellectual disability and having four or more children in the family were negatively associated with numeracy outcomes. Unlike the reading results, being involved with Child and Family Services and having more physician visits (an indicator of health concerns) were negatively associated with numeracy outcomes. Similar to the reading results, maternal depression and having minor illness during the preschool period were not significantly related to Grade 3 numeracy.

As with the models using Grade 3 reading as the outcome, we added material deprivation to the numeracy model to examine the relationship of material deprivation with other factors in the model and outcomes for Grade 3 numeracy. Figure 5.78 shows the SEM model for *language and cognitive development* at Kindergarten and Grade 3 numeracy, with material deprivation added in. A comparison with the "base model" in Figure 5.77 suggests that the Grade 3 numeracy model with material deprivation shares similarities with the model for reading. These similarities include a significant direct effect of material deprivation on prenatal health, health at birth, *language and cognitive development* at Kindergarten, and numeracy at Grade 3 (indicated by the arrows going from material deprivation to these factors and the statistically significant coefficients next to the arrows). In addition, a comparison of the two models for numeracy reveals that the direct effects of prenatal health on health at birth and *language and cognitive development* at Kindergarten are no longer statistically significant when material deprivation is added to the model (the coefficients next to these arrows are no longer statistically significant). This suggests that material deprivation plays a larger role in health at birth and on *language and cognitive development* at Kindergarten, than does prenatal health.[38] Since there was no significant indirect effect of material deprivation on health at birth, the relationship between material deprivation and health at birth is likely not mediated through prenatal health.

38 This may be due to the strong relationship between material deprivation and our measures used in our construct of prenatal health: maternal smoking during pregnancy, maternal alcohol and/or drug use during pregnancy, and late initiation of prenatal care

Figure 5.78: Relationship Between EDI Language and Cognitive Development in Kindergarten and Grade 3 Numeracy Assessment (Full Model)



Statistical Significance: *p<0.05 **p<0.01 †p<0.001
Model Fit: CFI = 0.9584, NNFI = 0.9367, RMSEA = 0.0437

As with the reading model, material deprivation not only had significant direct effects on Grade 3 numeracy, but also significant indirect effects. Therefore, the relationship between material deprivation and Grade 3 numeracy is accounted for in part by the direct influence of material deprivation on Grade 3 outcomes (–0.267, p<0.001) and in part by an indirect effect mediated through prenatal health, health at birth, and *language and cognitive development* at Kindergarten.

As with the base model for numeracy, the model in Figure 5.78 shows that health at birth was significantly and directly related to *language and cognitive development* at Kindergarten, with poorer health status at birth related to lower EDI scores. Health at birth was also directly related to Grade 3 numeracy in the model with material deprivation; this result differed from the model for Grade 3 reading, in which there was no direct relationship between health at birth and Grade 3 outcomes.

Language and cognitive development at Kindergarten had a significant direct effect on Grade 3 numeracy (0.441, p<0.001). In the Grade 3 numeracy base model, the direct influence of *language and cognitive development* at Kindergarten accounted for about three–quarters of the total variance explained. When material deprivation is added into the model, *language and cognitive development* accounts for less of the variance in Grade 3 scores (just over 50%). Similar to the base model, the model with material deprivation shows a significant direct relationship between emotional health and Grade 3 numeracy, with poor emotional health associated with poor assessment in Grade 3 numeracy.

In the model with material deprivation, the following variables were significantly related to better performance on the *language and cognitive development* domain on the EDI: children who were older on the testing date, females, children who were not from large families and children without intellectual disabilities. In contrast to the base model, breastfeeding initiation, maternal age at first birth, and involvement with CFS were no longer significantly related to the EDI in the model with material deprivation. This result does diminish the importance of these factors, but reflects the strong relationship between these variables and material deprivation. As with the base model, maternal depression, number of physician visits, and having minor illnesses in the preschool period were not significantly related to the *language and cognitive development* domain on the EDI.

The following variables were significantly related to better outcomes on Grade 3 numeracy: male children, children without an intellectual disability, involvement with CFS, and children with fewer physician visits. In contrast to the base model, there was no longer a significant relationship between being breastfed and Grade 3 numeracy or maternal age and Grade 3 numeracy; but there was a significant relationship between CFS and Grade 3 numeracy, and number of physician visits and Grade 3 numeracy, with CFS involvement associated with higher numeracy scores[39] and a higher number of physician visits associated with lower numeracy scores. The other variables—maternal depression, and minor illnesses in the preschool period—were not significantly related to Grade 3 numeracy.

The results of these numeracy models confirm our findings for the reading models and suggest that variations in Grade 3 numeracy performance are strongly influenced by variations already evident in Kindergarten. Both the performance in Kindergarten and Grade 3 are influenced by a number of different factors, including early biological vulnerability as measured by prenatal health and health at birth. Again, though, early biological vulnerability is eclipsed by the impact of material deprivation at every stage of development.

To reiterate the implications from the reading models, what this means from a policy perspective is that we cannot forget the importance of socioeconomic factors and the need for macro–level policies aimed at reducing disparities in improving child health and development. In the meantime, it is important to work on factors more immediately amenable to change in order to improve children's outcomes, such as improvements in prenatal health and birth outcomes.

SEMs with Other EDI Domains

The results discussed above are for a single domain of the EDI: *language and cognitive development*. Models were run for the remaining four domains (*communication skills and general knowledge*, *emotional maturity*, *social competence*, and *physical health and well–being*) as well as for "not ready in 1 or more EDI domains". Base models and full models for the other four EDI domains, as well as "not ready in 1 or more EDI domains" can be found in the online Appendix. A table summarizing the results can be found in Appendix 10. The main results of these models were the same across all domains and across models of reading and numeracy—in the base models, prenatal health was positively associated with health at birth and negatively associated with EDI at Kindergarten; but when material deprivation was added to the models, these relationships disappeared. Material deprivation was strongly associated with outcomes at each stage (prenatal health, health at birth, EDI, and Grade 3 assessments), and performance at Kindergarten was strongly associated with performance in Grade 3 regardless of whether material deprivation was included in the model or not. For all models with Grade 3 reading, there was no direct relationship between health at birth and Grade 3 assessment, for both base and material deprivation models. A different pattern emerged for Grade 3 numeracy, where there was a significant direct relationship between health at birth and numeracy in Grade 3, for both base and material deprivation models. For all models, girls performed better than boys in Grade 3 reading, whereas boys performed better than girls in Grade 3 numeracy.

39 See note 37

There were some differences across models. For example, for most models, health at birth was directly related to EDI; however, for the models of *emotional maturity* by Grade 3 reading and numeracy and for *social competence* by Grade 3 reading and numeracy, this relationship disappeared when material deprivation was added to the models. Some of the additional factors measured in the models at Kindergarten and Grade 3 differed across domains. For example, maternal depression was associated with poorer EDI scores for *emotional maturity*, *social competence*, and *physical health and well–being*, even once material deprivation was added to the models. For *language and cognitive development* and *communication skills and general knowledge*, no significant relationships with maternal depression were evident. These differences in maternal depression by domain of development suggest that maternal depression may negatively affect some domains of development but not others.

Modeling of Successful Learning from Kindergarten to Grade 3 for Children at Risk

Previous research at MCHP (Brownell et al., 2010; Santos et al., 2012) has identified three risk factors in children and youths that are associated with poor health and educational outcomes: being born to a mother who was a teen at her first birth, being in a family on income assistance, and being involved with Child and Family Services (CFS). As shown in Table 5.2, there were 546 children from the 2001 birth cohort who were involved with CFS at any time up till their fourth birthday; there were 2,196 children living in families on income assistance for at least one month at any time up until their fourth birthday, and; there were 2,152 children whose mothers were teens when their first child was born. We know from previous work that almost a third of children born in Manitoba will have at least one of these risk factors before their fourth birthday and that some children will have more than one of these risk factors, with about one in 10 children having all three risk factors (Santos et al., 2012).

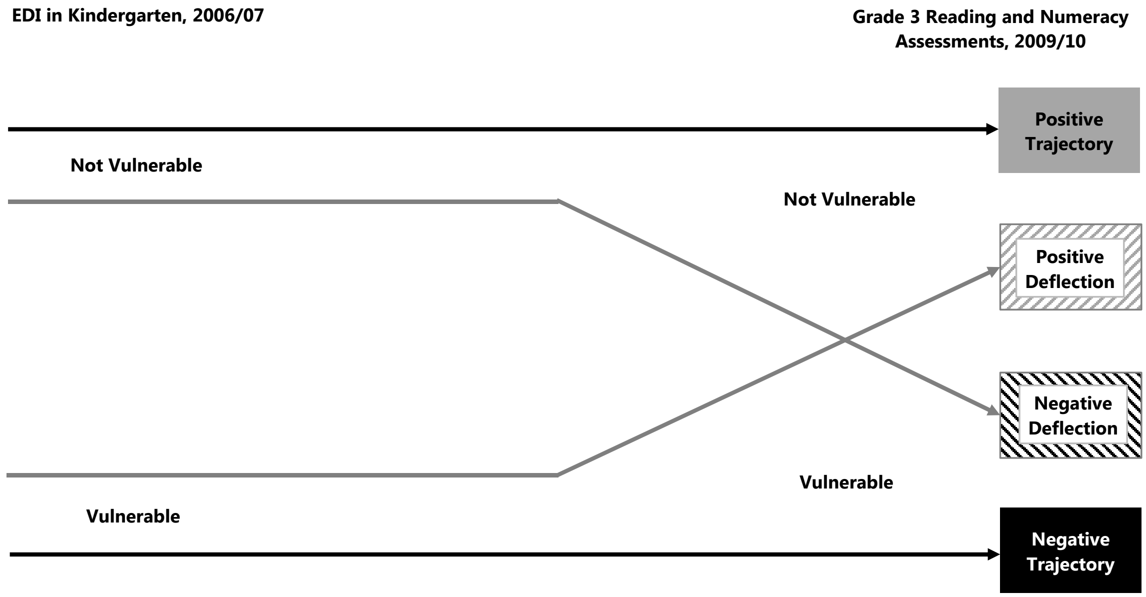
Results for the SEMs for these groups of at risk children were similar to those discussed in the previous section. These results are shown in the online Appendix of this report.

EDI to Grade 3 Pathways

Following Lloyd and Hertzman (2009), we categorized children into four different "pathways" according to their performance in Kindergarten and in Grade 3 (Figure 5.79).

a. Children who were not vulnerable on any EDI domain and were meeting or approaching expectations in Grade 3 were considered to be on a *positive trajectory* over time
b. Children who were not vulnerable on any EDI domain but were not meeting or approaching expectations in Grade 3 were considered to have a *negative deflection* over time
c. Children who were vulnerable on at least one EDI domain but were meeting or approaching expectations in Grade 3 were considered to have a *positive deflection* over time
d. Children who were vulnerable on at least one EDI domain and also not meeting or approaching expectations on the Grade 3 assessment were considered to be on a *negative trajectory* over time.

Figure 5.79: Academic Trajectories of Children from Kindergarten to Grade 3, 2006/07-2009/10



Reading

Looking first at the pathways between EDI and Grade 3 reading assessments, we found that 63.8% of children had a positive trajectory and 11.6% had a negative trajectory (Figure 5.80). A quarter of children had deflections, with 17.1% showing positive deflections and 7.6% showing negative deflections.[40] These deflection pathways suggest that, even though academic trajectories are established early (as demonstrated in our SEMs), the trajectories are not written in stone. Children who enter school "not ready" on one or more domains *can* be deflected to a positive trajectory, a finding that suggests that efforts to provide extra support to children who may be struggling early on can pay off with positive outcomes in subsequent years. On the other hand, the presence of negative deflections suggests the need to explore factors that may contribute to this type of trajectory, in order to prevent this pathway from occurring.

One factor associated with the different pathways is SES. To illustrate this association, Figure 5.81 shows the percent of children with each of these four pathways (for Grade 3 reading assessments) by rural and urban income quintiles. In this figure, it is evident that the percent of children with positive trajectories tends to increase as income quintile increases, whereas the percent of children with negative trajectories tends to decrease as income increases. Also evident in the figures, the percentages of both positive and negative deflections are highest in the lower income quintiles and decrease as income increases. Close to a third of children in both R1 and U1 (lowest rural and urban income quintiles) have deflection pathways, and the majority of those (around 20% of the total) are positive deflections. Whether these positive pathways are due to specific programs or education strategies is not something we could determine from our data, but warrants further exploration.

40 This analysis uses the same cohort used in the SEMs. Recall that only children with a Families First screen, EDI scores, and Grade 3 assessments are included. These assessments are not administered to all children living in First Nations communities and, therefore, this group of children is not included in these analyses.

Figure 5.80: Pathways from EDI (in One or More Domains) to Grade 3 Reading
Crude percent of children 4–8 years from the 2001 birth cohort

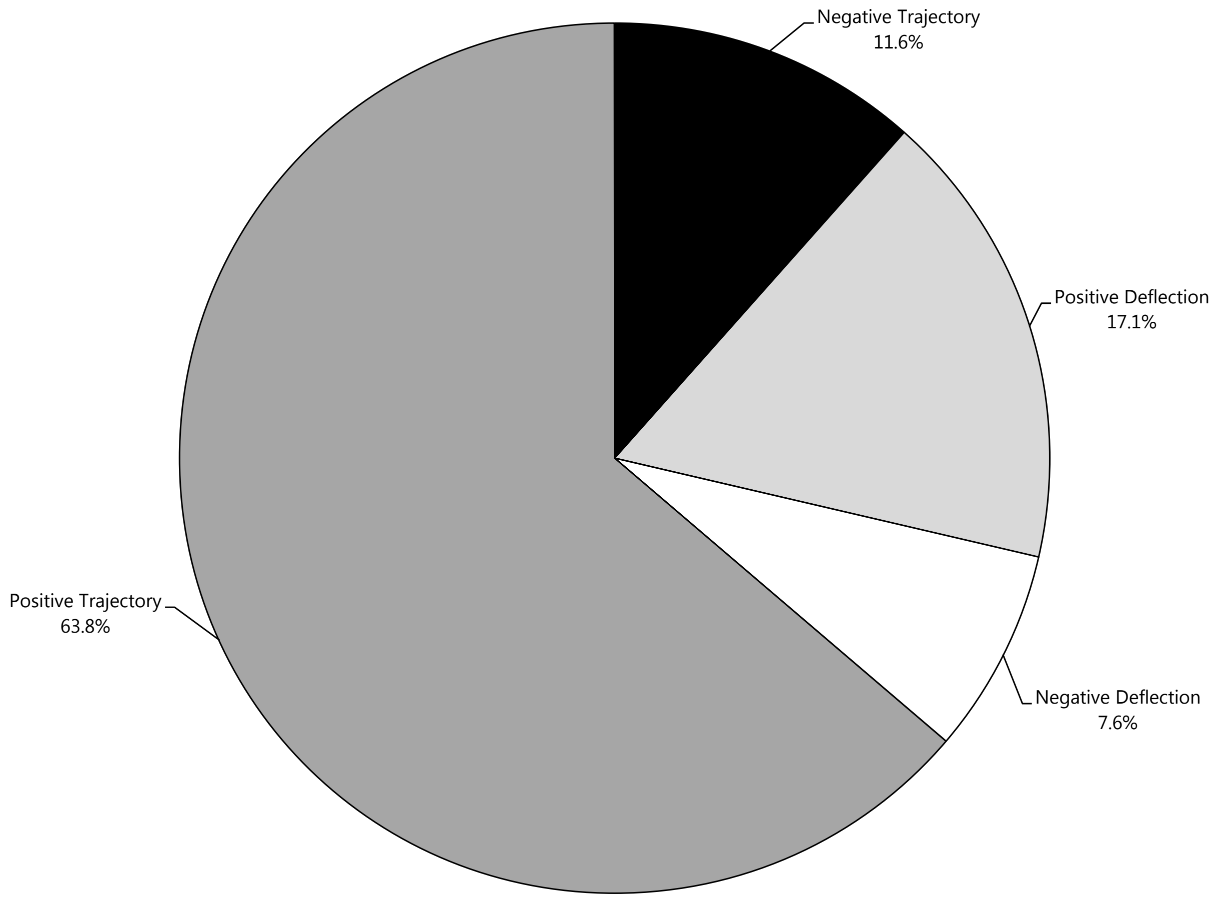
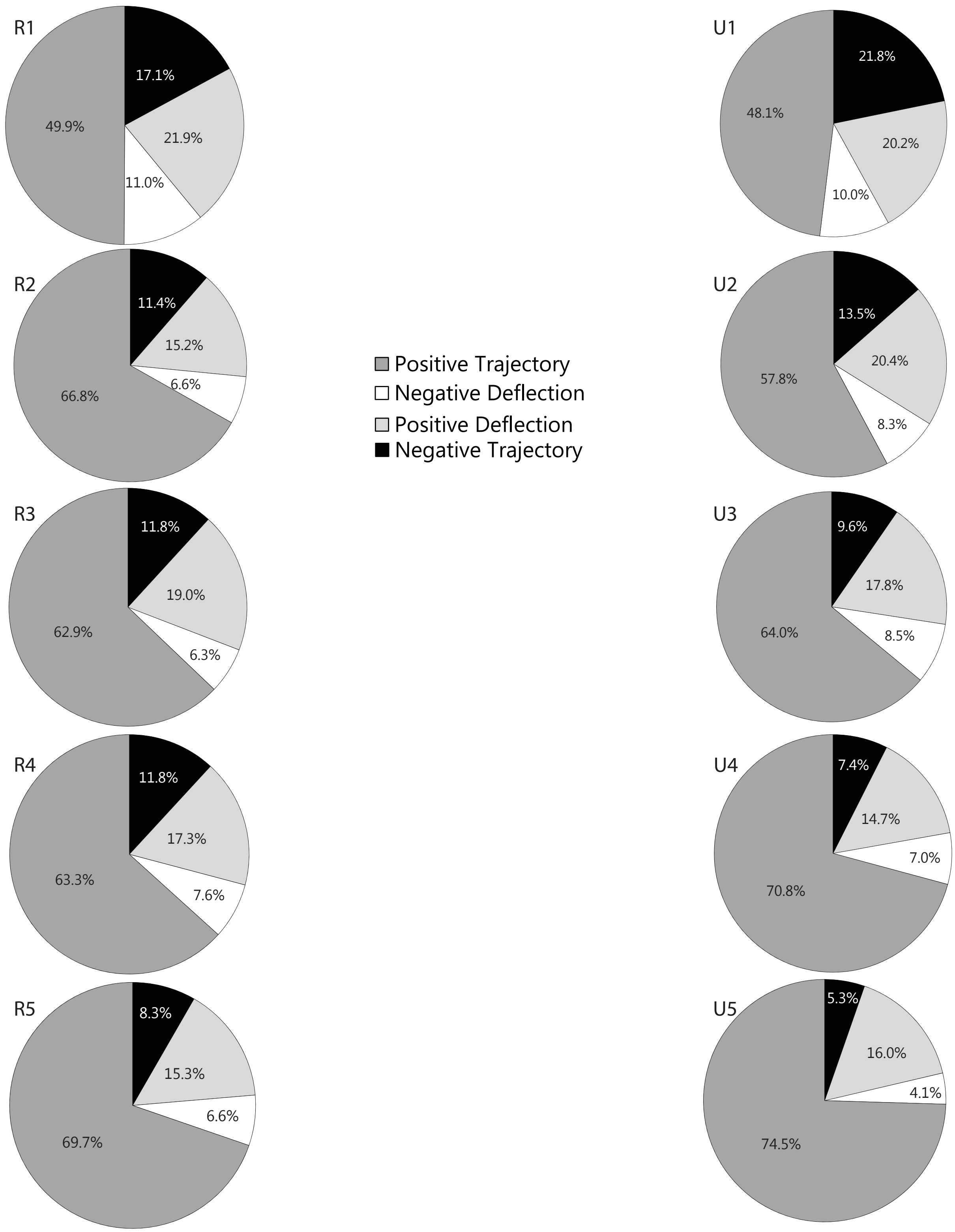


Figure 5.81: Pathways from EDI (in One or More Domains) to Grade 3 Reading for Children by Rural (R1-R5) and Urban (U1-U5) Income Quintiles
Crude percent of children 4–8 years from the 2001 birth cohort



We were able to explore some of the factors associated with the different pathways. Besides area–level income, which is illustrated in Figure 5.81, we looked at a number of different characteristics (known as predictor variables) that might be associated with children's developmental trajectories: sex, age and having an intellectual disability. Following from Brownell et al. (2010) and Santos et al., (2012), we wanted to determine whether three particular risk factors or combinations of these risk factors were related to the different trajectories: being in families who were on income assistance (IA) at any time up to the child's fourth birthday, being involved with Child and Family Services (CFS) at any time up to the child's fourth birthday, and being born to a mother who was a teenager at her first childbirth (teen mom). Due to relatively low numbers, we could not look at each of these risk factors and combinations of the risk factors separately, but combined into three categories: one risk, which included children who were in the IA, CFS, or teen mom group; two risks, which included children who had two of the risks (IA + CFS, IA + teen mom, or CFS + teen mom); and children with all three risks.

We ran separate logistic regressions for each trajectory. (**Multinomial regressions** which included the same predictor variables but included all four trajectories in the same model were also run and resulted in a similar pattern of results described below. The results for the multinomial regressions can be found in the online Appendix.)

Table 5.3 shows the **Odds Ratios** (and 95% confidence intervals) associated with each of the predictor variables for each of the four different trajectories (between not ready on one or more EDI domains and Grade 3 reading assessment). A relationship was found between having a positive trajectory and all of the predictor variables. The odds ratio for sex was 0.46 which means that males were less likely to be in the positive trajectory group than females. Put another way, females had 2.16[41] times the odds of being in the positive trajectory group for reading than males. Having one, two of three of the risk factors (IA, CFS, teen mom) also reduced the odds of being in the positive trajectory group, and the odds were reduced more with multiple risks. Each increase in age was associated with a 71% increase in odds of being in the positive trajectory group. Children without an intellectual disability had 16.7[42] times the odds of being in the positive trajectory group as children with an intellectual disability.

Table 5.3: Factors Associated with Trajectories from EDI (Not Ready in One or More Domains) to Grade 3 Reading Assessment

Predictor Variables	Odds Ratio by Trajectory (95% Confidence Interval)			
	Positive Trajectory	Negative Deflection	Positive Deflection	Negative Trajectory
Sex (Male vs Female)	0.46 (0.42, 0.51)	ns	1.93 (1.72, 2.16)	1.91 (1.66, 2.19)
1 Risk (IA, CFS, or Teen Mom)*	0.41 (0.37, 0.46)	1.56 (1.27, 1.90)	1.68 (1.46, 1.94)	2.56 (2.15, 3.06)
2 Risks (2 of IA, CFS, Teen Mom)	0.24 (0.21, 0.27)	1.95 (1.58, 2.40)	1.65 (1.41, 1.93)	5.30 (4.48, 6.28)
3 Risks (IA and CFS and Teen Mom)	0.13 (0.10, 0.17)	1.96 (1.39, 2.75)	2.63 (2.07, 3.35)	6.68 (5.18, 8.60)
Age	1.71 (1.50, 1.94)	ns	0.61 (0.52, 0.71)	0.66 (0.55, 0.79)
Intellectual Disability (vs. None)	0.06 (0.04, 0.11)	ns	ns	15.41 (10.74, 22.12)

* Children with a family that receive income assistance (IA), children with a family involved with Child and Family Services (CFS), children with a mother that was in the teens at first birth

ns indicates that the correlation between the model variables is not statistically significant at p<0.05, p<0.01 or p<0.001

41 1/0.464
42 1/0.06

For children in the negative deflection category, having one, two or three of the risk factors was associated with higher odds of being in this category than children with none of these risk factors. Unlike the results for the other three trajectory categories, the odds of being in the negative deflection category are essentially the same for children with one risk factor as for children with two or three risk factors. Targeting children with these risk factors for extra support in school may help to keep them on a positive trajectory. There were no other predictor variables that were significantly associated with being in the negative deflection category.

For children in the positive deflection category, all of the predictor variables except intellectual disability were significant. Males had 1.93 times the odds of being in this category than females. Children with one or two of the risk factors had about 1.7 times the odds of having a positive deflection trajectory, and children with three of the risk factors had 2.63 times the odds of being in this category. With each increase in the child's age, there was a decrease in the odds of having a positive deflection trajectory.

For children in the negative trajectory category, all of the predictors were significant. Males had almost twice the odds of being in this category as females. Children with the risk factors were also more likely to be in this category, with the odds of having a negative trajectory increasing with the number of risk factors. As age increased, the odds of having a negative trajectory decreased. Children with an intellectual disability had 15.4 times the odds of having a negative trajectory than children without an intellectual disability. While it may be challenging to alter the academic trajectories of children with intellectual disabilities, these results suggest that additional support may benefit certain groups of children.

Numeracy

Looking now at the pathways between EDI and Grade 3 numeracy assessments, we found that 59.0% of children had a positive trajectory and 13.0% had a negative trajectory (Figure 5.82). The percent of positive trajectories for numeracy was slightly lower than that found for reading (63.8%), and the percent negative trajectories was slightly higher (reading was 11.6%). Over one quarter of children had deflections, with 15.7% showing positive deflections and 12.4% showing negative deflections. The positive deflections in numeracy were slightly lower than was found for reading (17.1%) and the percent of negative deflections was quite a bit higher than that found for reading (7.6%). As with the reading results, these deflection pathways suggest that, even though academic trajectories are established early, the trajectories are not fixed.

To illustrate the association between the trajectories and SES, Figure 5.83 shows the percent of children with each of the four pathways (between not ready on one or more EDI domain and Grade 3 numeracy assessments) by rural and urban income quintiles. As was found with reading, the percent of children with positive trajectories tends to increase as income quintile increases although the pattern in rural areas is not as definite as the pattern in urban areas, with the three middle income quintiles in the rural areas showing similar percentages of positive trajectories. Likewise, the percent of children with negative trajectories tends to decrease as income increases, but again the pattern is not as strong in rural compared to urban areas. As well, the patterns for numeracy for positive and negative deflections do not show the same graded patterns as was found with reading. For example, although R1 does have the highest percent of negative deflections, the lowest percent is found in R3 (7.9%) as opposed to R5 (12.1%). As was found with reading though, children living in the lowest rural and urban quintiles had the highest percent of deflection pathways (positive + negative) at over a third of children. Targeting children living in lower income areas for additional supports would be beneficial because of the potential for improvement or deterioration is this group. Whether the positive pathways observed are due to specific programs or education strategies is not something we could determine from our data, but warrants further exploration.

Figure 5.82: Pathways from EDI (in One or More Domains) to Grade 3 Numeracy
Crude percent of children 4–8 years from the 2001 birth cohort

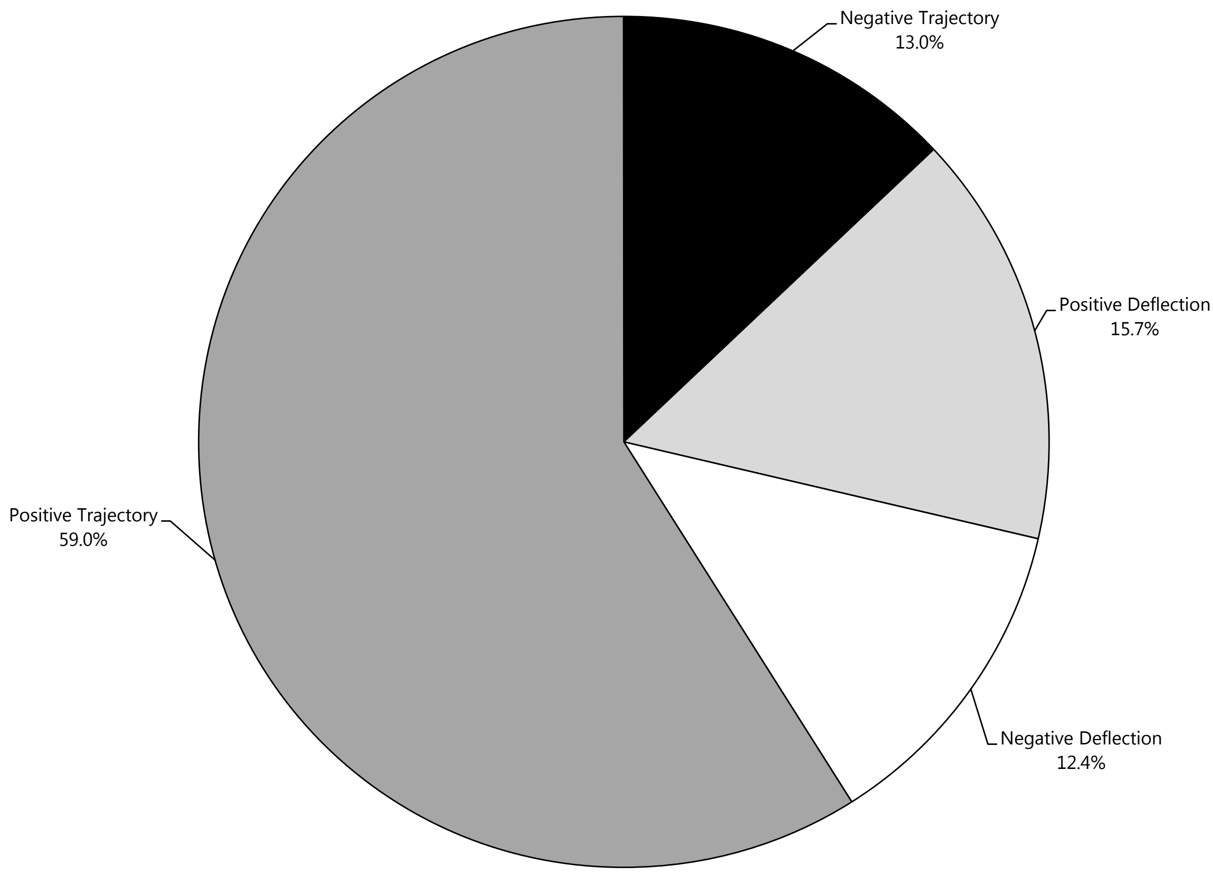
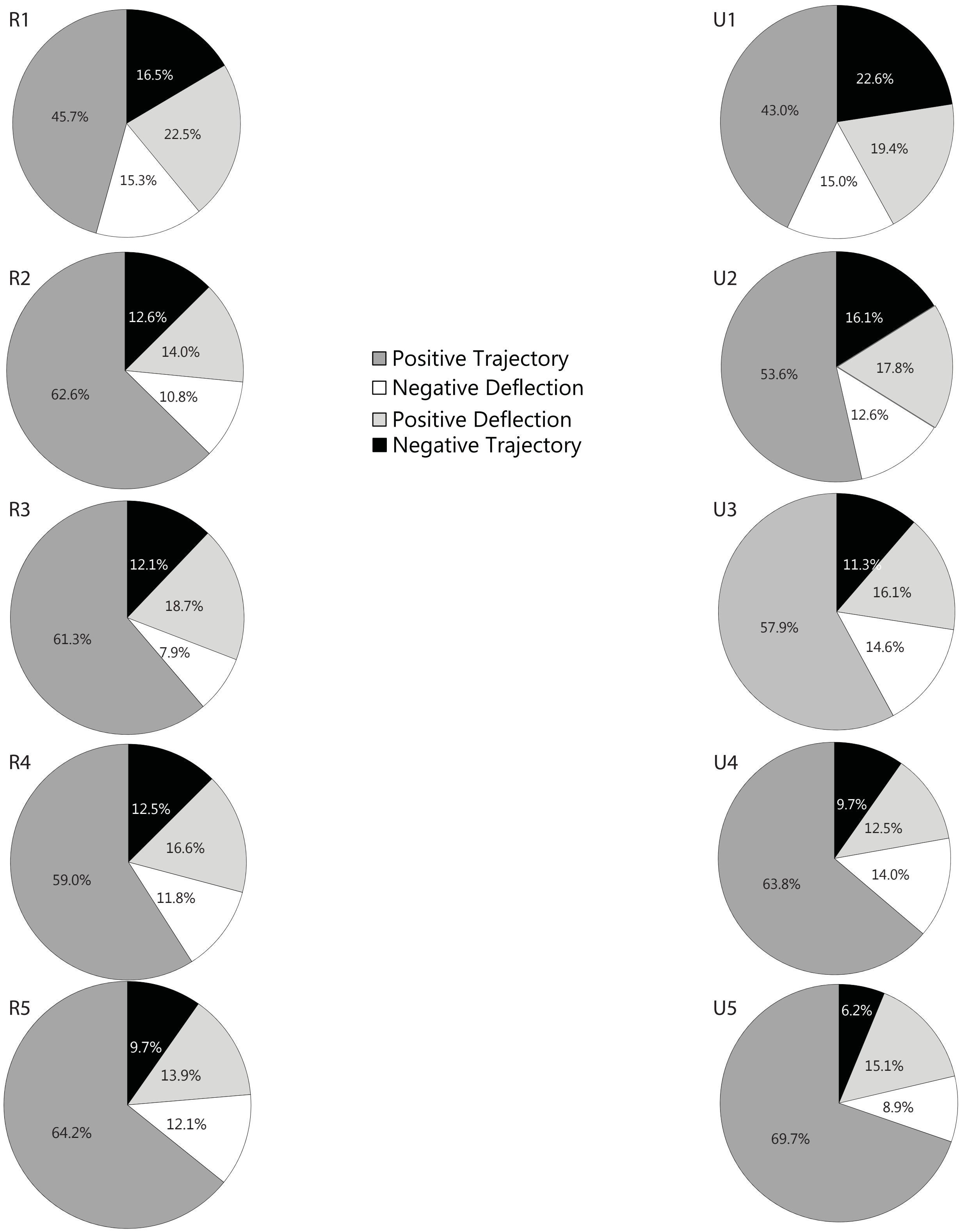


Figure 5.83: Pathways from EDI (in One or More Domains) to Grade 3 Numeracy for Children by Rural (R1-R5) and Urban (U1-U5) Income Quintile
Crude percent of children 4–8 years from the 2001 birth cohort



As with the reading analyses, we ran separate logistic regressions for each trajectory, using the same predictor variables. (Multinomial regressions which included the same predictor variables but included all four trajectories in the same model were also run and resulted in a similar pattern of results described below. The results of the multinomial regressions can be found in the online Appendix.)

Table 5.4 shows the Odds Ratios (and 95% confidence intervals) associated with each of the predictor variables for each of the four different trajectories (between not ready on one or more EDI domains and Grade 3 numeracy assessment). As was the case for reading, all of the predictor variables were significant for the positive trajectory for numeracy. Odds ratios were similar to those found in the reading regressions, although the odds ratios for sex were not as strong as for reading. Having one, two or three of the risk factors decreased the odds of being in this category. Increases in age were associated with increased odds of being in this category. Having no intellectual disability was associated with 14.3[43] times the odds of having a positive trajectory than children with an intellectual disability.

Table 5.4: Factors Associated with Trajectories from EDI (Not Ready in One or More Domains) to Grade 3 Numeracy Assessment

Predictor Variables	Odds Ratio by Trajectory (95% Confidence Interval)			
	Positive Trajectory	Negative Deflection	Positive Deflection	Negative Trajectory
Sex (Male vs Female)	0.62 (0.57, 0.68)	0.66 (0.58, 0.75)	2.21 (1.97, 2.49)	1.60 (1.41, 1.83)
1 Risk (IA, CFS, or Teen Mom)*	0.43 (0.38, 0.48)	1.35 (1.15, 1.59)	1.78 (1.54, 2.06)	2.25 (1.90, 2.66)
2 Risks (2 of IA, CFS, Teen Mom)	0.26 (0.23, 0.30)	1.48 (1.24, 1.77)	1.64 (1.39, 1.93)	4.77 (4.06, 5.60)
3 Risks (IA and CFS and Teen Mom)	0.16 (0.13, 0.21)	ns	2.28 (1.77, 2.95)	6.82 (5.37, 8.68)
Age	1.79 (1.58, 2.02)	ns	0.55 (0.47, 0.65)	0.73 (0.62, 0.88)
Intellectual Disability (vs. None)	0.07 (0.04, 0.11)	0.47 (0.24, 0.93)	ns	13.86 (9.69, 19.83)

* Children with a family that receive income assistance (IA), children with a family involved with Child and Family Services (CFS), children with a mother that was in the teens at first birth

ns indicates that the correlation between the model variables is not statistically significant at $p<0.05$, $p<0.01$ or $p<0.001$

For children in the negative deflection category, there were some differences in the numeracy regressions compared to the regressions looking at trajectories to Grade 3 reading. Sex was significant with males less likely to have a negative deflection for numeracy than females. Having an intellectual disability decreased the odds of having a negative deflection trajectory. And although having one or two of the risk factors increased the odds of being in this category, having all three risk factors was not a significant predicator of having a negative deflection trajectory.

Results for the positive deflection trajectory were very similar for numeracy and reading. All of the predictor variables except intellectual disability were significant. For numeracy, males had 2.21 times the odds of being in this category than females, which was somewhat higher than the odds found in the regression with reading (1.93).

Results for the negative trajectory were also similar for numeracy and reading. All of the predictors were significant. Males had 1.60 the odds of being in this category as females, which was slightly lower than the odds for the regression with reading (1.91).

We also ran separate logistic regressions by trajectory category and multinomial regressions for each of the five EDI domains by Grade 3 reading and numeracy. The results of these regressions can be found in the online Appendix.

43 1/0.07

What do these results mean?

Taken together, the models of successful learning from Kindergarten to Grade 3 tell us that children's developmental trajectories are set early and are influenced by a number of different factors, including prenatal health, health at birth, both individual and family–level factors in the preschool period, and socioeconomic factors at all stages of development. The models suggest that it is essential to address socioeconomic disparities in order to improve child outcomes at the population level, and they also identify specific factors that contribute to better outcomes, which can be the focus for interventions. Although developmental trajectories are set early, they are not necessarily fixed; many children showed patterns of positive deflection, meaning they started on a "vulnerable" trajectory in Kindergarten but their path was deflected in a positive direction so that by Grade 3 they were no longer vulnerable. Further research should seek to identify what school– and community–level factors contribute to these positive changes, particularly for children who are more at risk of having negative trajectories, such as children with low socioeconomic status. Determining "what works" for improving educational outcomes for Manitoba children could ultimately contribute to improving population health and reducing inequities.

Chapter 6: Social Engagement and Responsibility

Grade 7 Assessment of Student Engagement

As part of the Middle Year Assessment program, students in Grade 7 are assessed on their engagement with school. In the *Middle Year Assessment: Grade 7 Student Engagement* document from Manitoba Education, the following quote from Dr. Ben Levin (former Deputy Minister of Education for Manitoba) provides a description of what is meant by student engagement:

> Student engagement refers to the degree to which students are actively involved in and take responsibility for their education; whether, in short they see schooling as "theirs." A considerable body of research, as well as educators' own experience, shows that students' sense of involvement in their education is vital to their effort and success. Moreover, engagement with learning is critical to students' capacity to be lifelong learners and is likely to be predictive of their ability to take on new challenges after they leave school (2004).

Grade 7 students are assessed on five measures of engagement (six for French Immersion and seven for Français students): 1) demonstrates an interest in his/her learning, 2) engages in self–assessment, 3) aware of learning goals as a unit of study and/or personal learning goals, 4) participates in lessons, 5) accepts responsibility for assignments. French Immersion students are assessed on the above five measures as well as: 6) uses French as a tool for personal and social growth. Français students are also assessed on the first five measures and as well as: 6) Se situer face aux réalités linguistiques et culturelles francophones de son milieu et d'ailleurs and 7) Exprimer dans son milieu certaines valeurs et manifester certains comportements qui témoignent de la manière dont Il'élève vit sa francophonie. For the purposes of this report, only the first five measures were included, so that all students were assessed on the same five measures.

For each of the measures, students are categorized according to one of five levels of engagement: 1) established, which is for students who nearly always demonstrate the described behaviour; 2) developing, which is for students who frequently demonstrate the described behaviour; 3) emerging, which is for students who only occasionally demonstrate the described behaviour; 4) inconsistent, which is for students who demonstrate the described behaviour in some settings but not all; and 5) out of scope, for instances where the student has a profound mental health concern, cognitive disability, or other condition so severe that the engagement behaviour being measured is not applicable to the student. In this report, we present the percent of students who were assessed as "established" or "developing" engagement on all five measures. Bar graphs showing each of the five categories of engagement for students for each of the five measures separately can be found in the online appendix.

Rates by area represent where students live rather than where they attend school. Some First Nations schools do not participate in the **Grade 7 assessments of student engagement**, so for this reason, children in First Nations schools have been removed from these analyses.

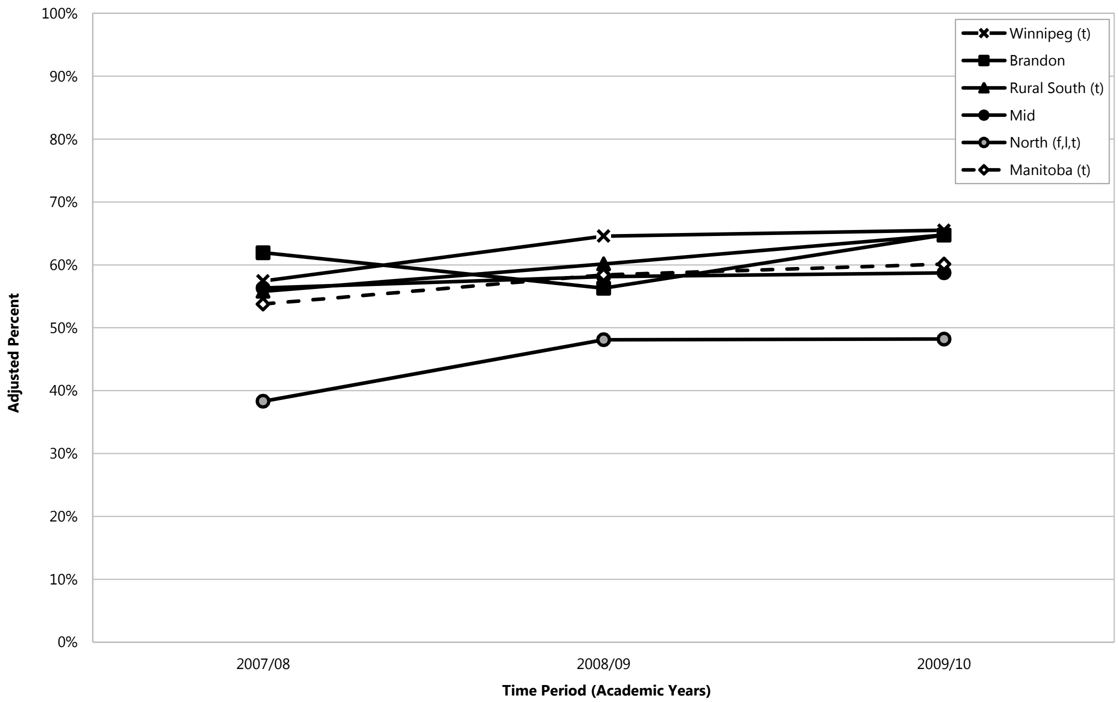
Only three years of Grade 7 engagement data were available for analysis in this report. Data are analyzed in two different ways: first, all students with engagement scores in 2007/08, 2008/09, and 2009/10 are included in the analysis and second, all students born in 1997 and living in Manitoba in 2009/10 are included in the analysis. This second approach is a cohort approach and provides more of a population–based analysis of Grade 7 outcomes for the final year. It includes, as not "established" or not "developing" engagement, children from the cohort who have not yet reached Grade 7, who may no longer be attending school, or who were enrolled but not assessed.

Regional Trends Over Time

Figure 6.1 shows the percent of students with established or developing engagement behaviours in all five measures described previously by aggregate regions for the 2007/08 through 2009/10 school years. The Manitoba average was 53.8% in the first time period and 60.1% in the last time period, an increase that was statistically significant. Three aggregate regions also showed increases in engagement over the three years: Winnipeg went from 57.4% to 65.5%, Rural South from 55.8% to 64.8%, and the North went from 38.3% to 48.2%. The rates in the North were significantly lower than the Manitoba average in all three years.

Figure 6.1: Grade 7 Student Engagement by Aggregate Region, 2007/08–2009/10

Age– and sex–adjusted percent of Grade 7 students establishing or developing in all five competencies



f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates statistically significant difference between first and last time periods for that region at p<0.05

Trends by Socioeconomic Status

Figure 6.2 shows the percent of Grade 7 students demonstrating engagement behaviours in all five measures by rural income quintile for 2007/08 through 2009/10. There was a significant SES gradient in each year, with the lowest percent of children with established or developing engagement behaviours in the lowest income quintiles and increasing engagement as income level increases. For example, in 2009/10, 50.1% of the Grade 7 students in R1 had established or were developing engagement on all five measures, compared to 61.5% in R5. Rates of engagement increased significantly over time for students in R1 (41.2% to 50.1%), R2 (49.9% to 56.6%), R3 (51.9% to 58.9%), and R5 (55.1% to 61.5%).

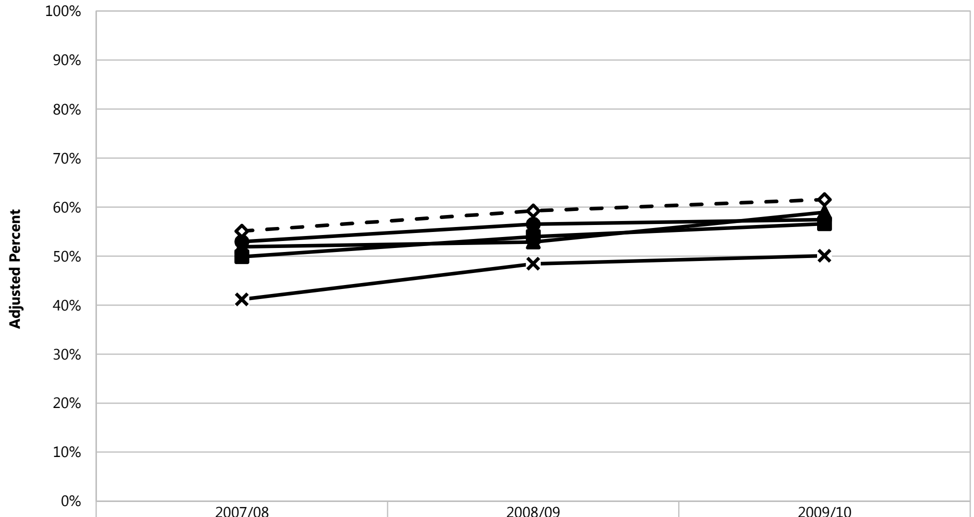
Figure 6.3 shows the percent of Grade 7 students demonstrating engagement behaviours on all five measures by urban income quintile for 2007/08 through 2009/10. There were significant SES gradients in all three years, with the lowest percent of children with established or developing engagement behaviours in the lowest income quintiles and increasing engagement as income level increased. For example, in 2009/10 in U1, 48.0% of the students had established or were developing engagement in all five measures compared to 71.7% of those from U5. Rates of engagement increased significantly over time for students in U1 (37.7% to 48.0%), U2 (51.1% to 60.4%), and U4 (59.7% to 66.6%).

Changes in Inequity Over Time

Figures 6.4 and 6.5 show the inequities in Grade 7 engagement in 2007/08 and in 2009/10 for rural areas. In both time periods, the percent of Grade 7 students who had established or were developing engagement behaviours in all five measures was lower than expected in R1 given the proportion of the population comprising R1. For example, in 2007/08, R1 comprised 15.6% of the population but accounted for 12.6% of the engaged students. The Gini coefficient was 0.044, indicating a low degree of disparity across rural income quintiles. In 2009/10, R1 comprised 14.5% of the population but accounted for 12.6% of the engaged students in Grade 7, with a Gini coefficient of 0.030, also indicating low disparity. The Gini coefficient did not change significantly over the three years, indicating no change in disparity in rural areas over the study period.

Figure 6.6 and 6.7 show the disparities in Grade 7 student engagement for urban areas. As was the case in rural areas, the percent of students in U1 who were engaged in both 2007/08 and 2009/10 was lower than expected given the size of the population. In 2007/08, U1 comprised 17.5% of the population but accounted for only 11.7% of the students who had established or were developing engagement in school. In 2009/10, U1 comprised 17.6% of the population but accounted for only 13.5% of the students who were engaged with school. The Gini coefficient in the first time period was 0.098; and in the final time period, it was 0.067, indicating a moderate degree of disparity in both time periods. The Gini coefficient decreased significantly over time, indicating a decrease in disparity over the study period. A comparison of the Gini coefficients in the last time period indicated that there was more inequity in student engagement in urban than in rural areas.

Figure 6.2: Grade 7 Student Engagement by Rural Income Quintile, 2007/08–2009/10
Age– & sex–adjusted percent of Grade 7 students establishing or developing in all five competencies

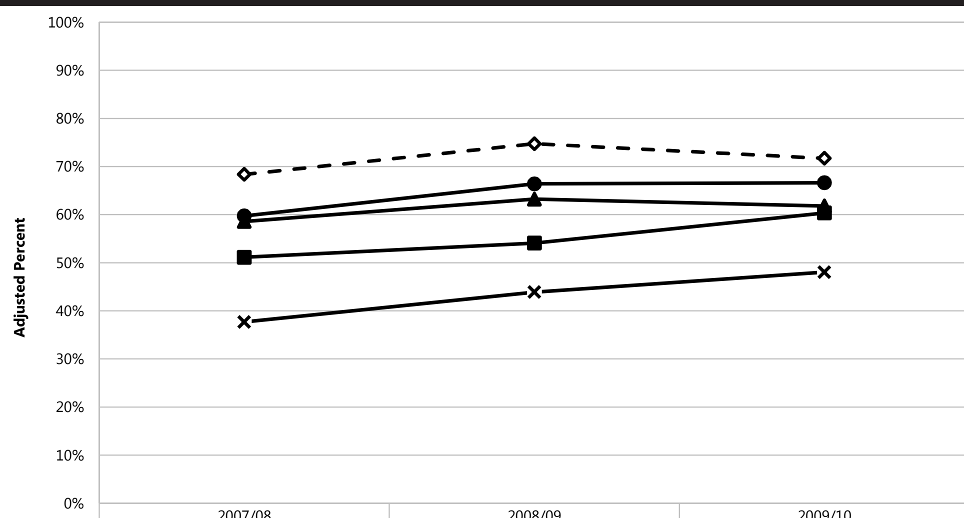


	2007/08	2008/09	2009/10
Income Unknown	29.71%	32.52%	39.00%
R1 – Lowest Income (t)	41.15%	48.42%	50.07%
R2 (t)	49.88%	53.97%	56.61%
R3 (t)	51.90%	52.88%	58.93%
R4	52.95%	56.51%	57.43%
R5 – Highest Income (t)	55.08%	59.22%	61.54%
Linear trend across R1–R5	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 6.3: Grade 7 Student Engagement by Urban Income Quintile, 2007/08–2009/10
Age– & sex–adjusted percent of Grade 7 students establishing or developing in all five competencies



	2007/08	2008/09	2009/10
Income Unknown	29.71%	32.52%	39.00%
U1 – Lowest Income (t)	37.68%	43.90%	48.04%
U2 (t)	51.13%	54.09%	60.36%
U3	58.58%	63.22%	61.80%
U4 (t)	59.74%	66.39%	66.64%
U5 – Highest Income	68.37%	74.74%	71.71%
Linear trend across U1–U5	*	*	*

Time Period (Academic Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 6.4: Lorenz Curve for Grade 7 Student Engagement in Rural Areas, 2007/08
Adjusted by age & sex for Grade 7 students establishing or developing in all five competencies

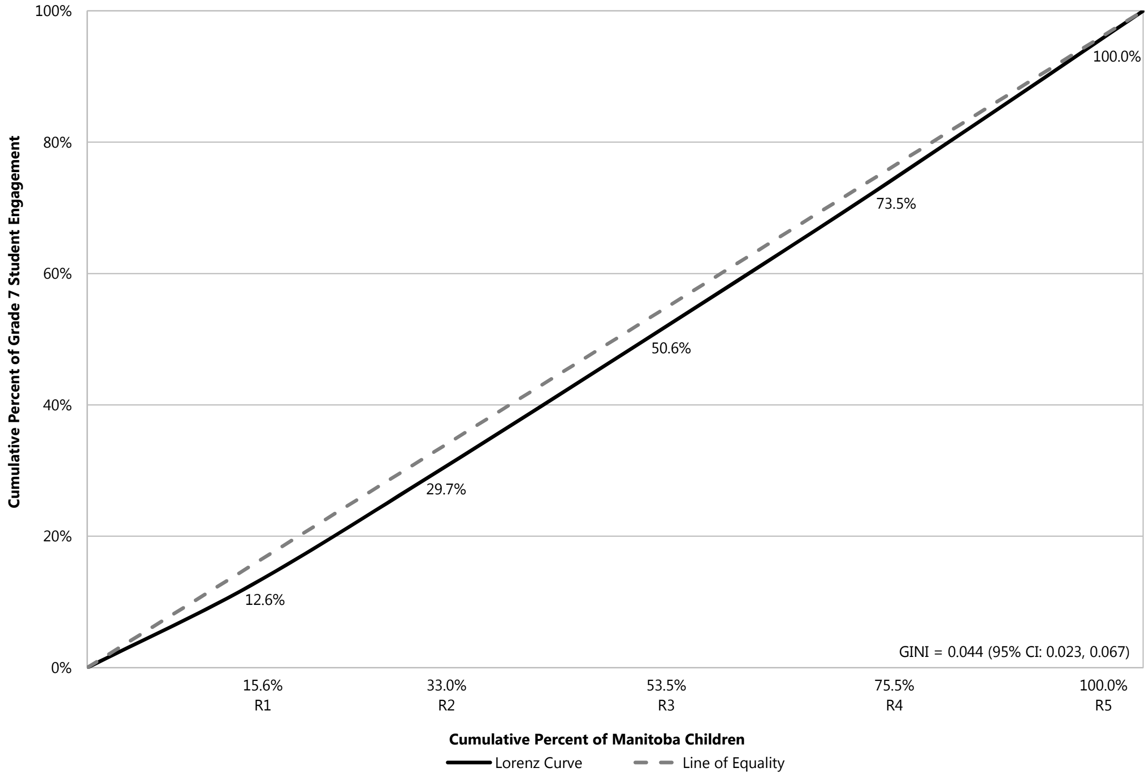


Figure 6.5: Lorenz Curve for Grade 7 Student Engagement in Rural Areas, 2009/10
Adjusted by age & sex for Grade 7 students establishing or developing in all five competencies

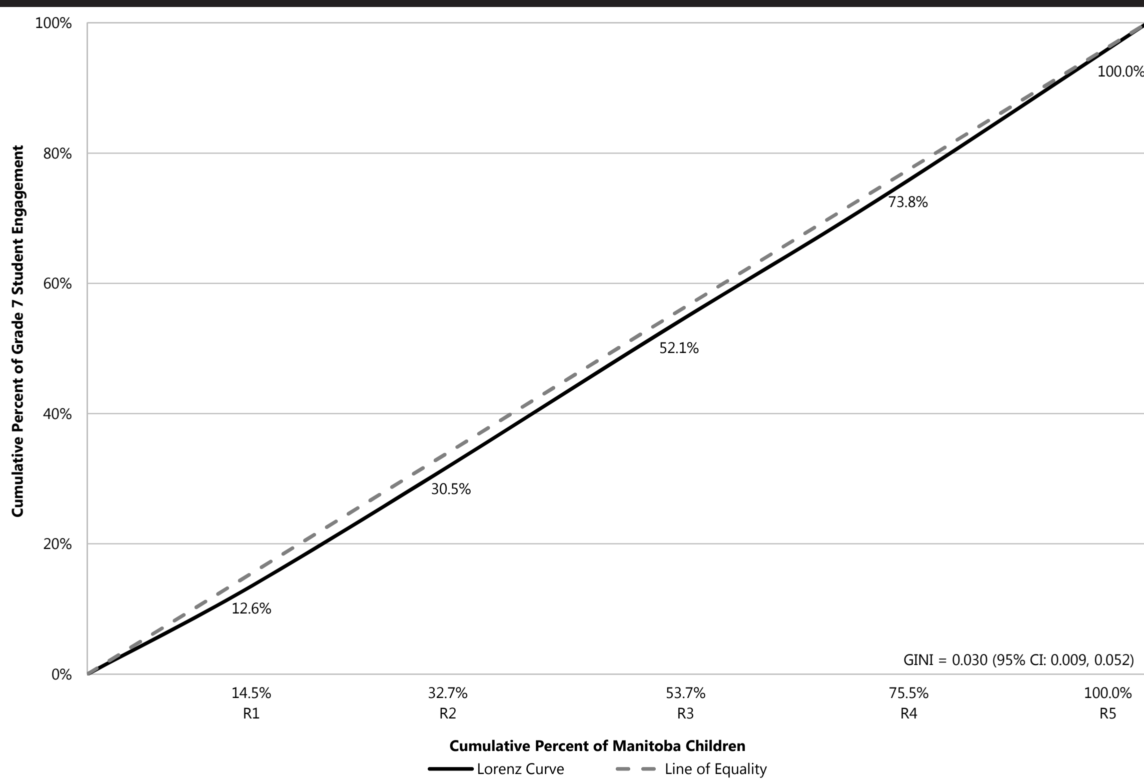


Figure 6.6: Lorenz Curve for Grade 7 Student Engagement in Urban Areas, 2007/08
Adjusted by age & sex for Grade 7 students establishing or developing in all five competencies

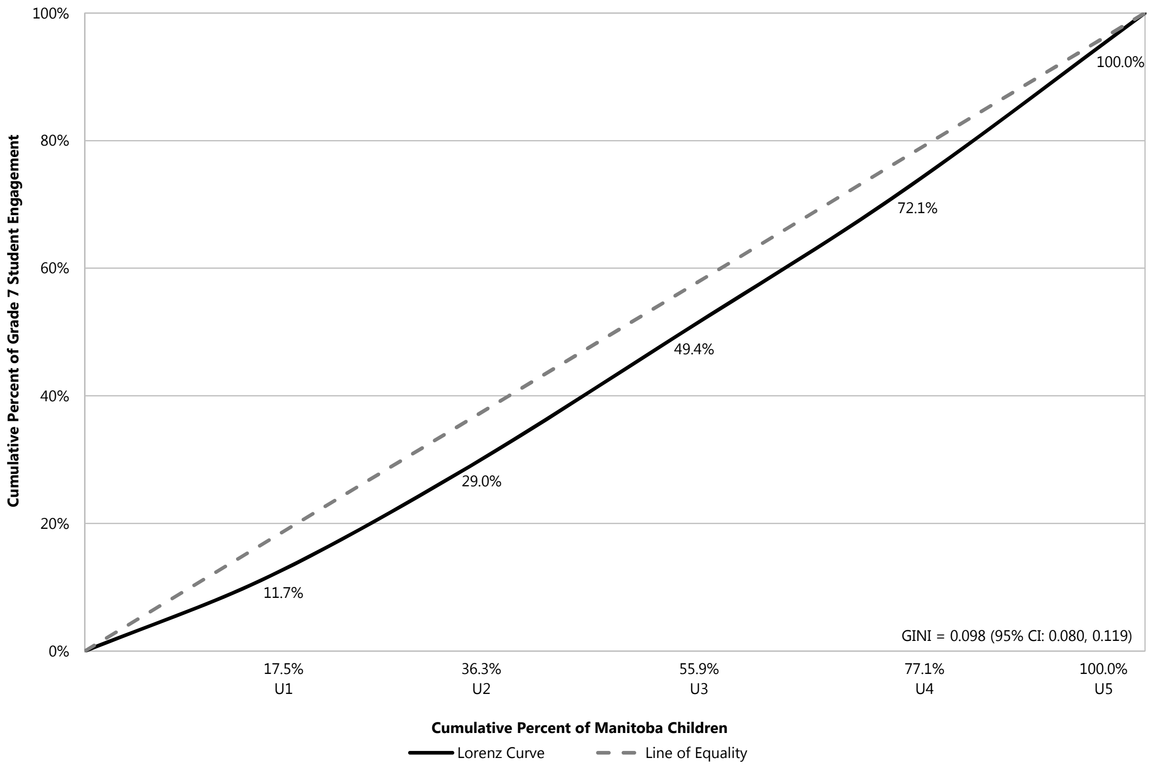
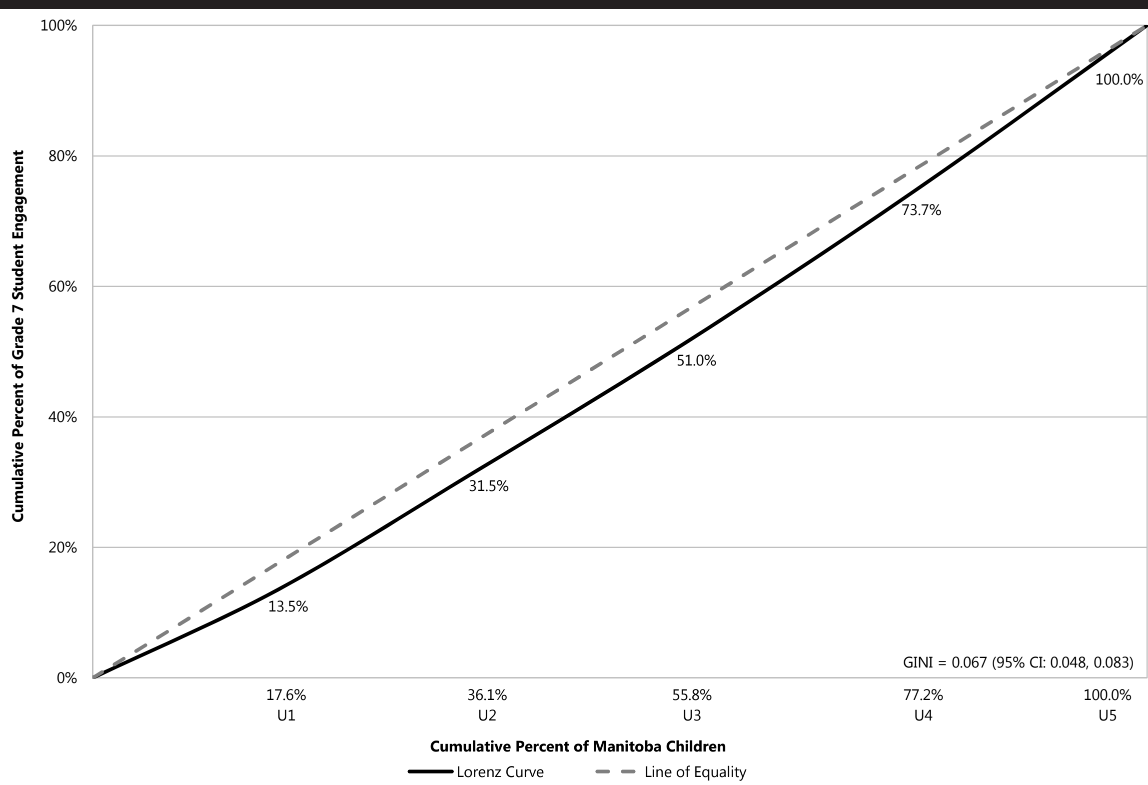


Figure 6.7: Lorenz Curve for Grade 7 Student Engagement in Urban Areas, 2009/10
Adjusted by age & sex for Grade 7 students establishing or developing in all five competencies



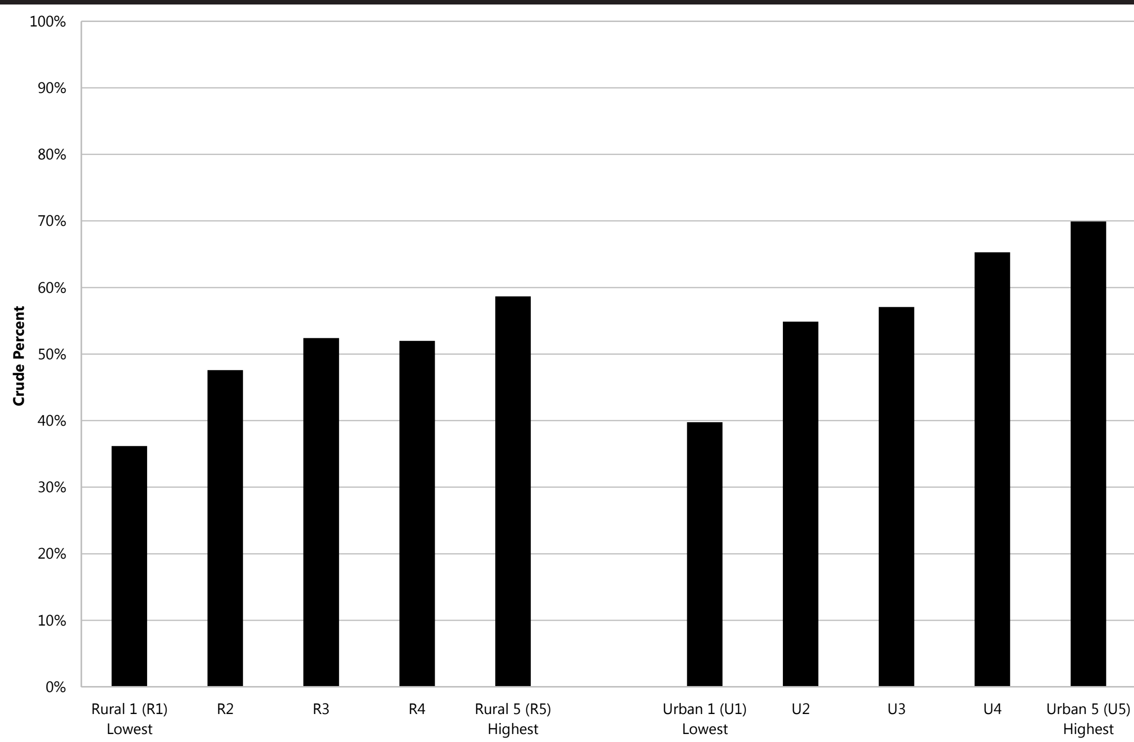
Cohort Approach to Grade 7 Assessment of Student Engagement

The preceding analysis used all students with Grade 7 engagement assessments in 2007/08–2009/10. As described for Grades 3, 7, and 8 assessments in reading and numeracy, we repeated the analysis by SES using a cohort approach for the most recent year (2009/10). In this analysis, all students born in 1997 and living in Manitoba in 2009/10 were included. This is the cohort that would be expected to be in Grade 7 and being assessed on engagement had they progressed through the school system in the expected manner. Students without assessments were not included in the categories "established" or "developing". Students who moved away from the province were excluded from the cohort.

Trends by Socioeconomic Status

Figure 6.8 shows the percent of Grade 7 students assessed as established or developing on all five measures of school engagement, by rural and urban income quintile for 2009/10, using this cohort approach. The Manitoba average for the percent of Grade 7 students "engaged" is slightly lower (54.7%) using the cohort approach compared to the results, which used all students in Grade 7 with engagement scores (60.1%). In Figure 6.8, gradients are statistically significant in both rural and urban areas, with the lowest percent of children established or developing engagement in the lowest income quintiles, and increasing engagement as income level increases. Comparing Figure 6.8 to 6.2 and 6.3, it is clear that gradients are steeper using the cohort approach.

Figure 6.8: Grade 7 Student Engagement by Income Quintile* (Cohort Approach), 2009/10
Crude percent of Grade 7 students in the 1997 birth cohort establishing or developing in all five competencies



* Rural areas: indicates statistically significant differences across rural income quintiles for that time period at p<0.05
Urban areas: indicates statistically significant differences across urban income quintiles for that time period at p<0.05

Inequity

Figure 6.9 shows the inequities in Grade 7 engagement in the 2009/10 school year for rural areas using the cohort approach. The lowest income quintile (R1) had a lower percent of children established or developing engagement than expected given the proportion of the population. In 2009/10, the 17.0% of the population in R1 accounted for only 12.2% of the Grade 7 students who were engaged in school. The Gini coefficient was 0.076, which was larger than the Gini coefficient using only children in Grade 7 with assessment information (0.030), and indicates a moderate degree of disparity. The cohort approach may provide a more accurate picture of disparities (Brownell et al., 2006; Roos et al., 2006) as it includes children who have fallen behind, who were not assessed, or who may not be attending school.

Figure 6.10 shows similar disparities in Grade 7 student engagement for urban areas using the cohort approach. In 2009/10, the 16.1% of the population in U1 accounted for only 10.9% of the Grade 7 students who had established or were developing student engagement. The Gini coefficient was 0.092, indicating a moderate degree of disparity and also more disparity than the approach including only children in Grade 7 in 2009/10 with assessments (0.067).

Does Grade 7 Engagement Predict High School Progression?

Given the importance of student engagement to subsequent success, we wondered whether the Grade 7 engagement assessment would predict completion of high school. Unfortunately, because this assessment began in 2007/08 and the most recent year of education data we had available for assessing high school completion was 2009/10, we did not yet have a cohort of students who had been assessed in Grade 7 and had progressed completely through high school.

We could follow the 2007/08 cohort through to Grade 9, however, and decided to determine whether there was a relationship between Grade 7 engagement and completion of eight or more credits in Grade 9. The completion of eight or more credits in the first year in Grade 9 has been found to be a predictor of high school completion (King, Warren, Boyer, Chin, & Social Program Evaluation Group, 2007), and in fact, our own analysis confirms this. Figure 6.11 shows the percent of youths who completed high school according to how many credits they earned in their first year in Grade 9[44]. Students who were in Grade 9 but had no declared number of credits were categorized as "Not Declared." As can be seen in the figure, there is an increase in percent completing high school as number of Grade 9 credits increases. For example, about 50% of students who earn six credits in Grade 9 will complete high school within four years, compared to about 70% of students who earn seven credits, 80% of students who earn 7.5 credits and over 90% who earn eight credits.[45]

44 Credits earned in grade 9 could be from courses at any level (grades 9 to 12).
45 The patterns are similar if we follow grade 9 students for five and six years.

Figure 6.9: Lorenz Curve for Grade 7 Student Engagement in Rural Areas (Cohort Approach), 2009/10
Crude for Grade 7 students in the 1997 birth cohort developing or establishing in all five competencies

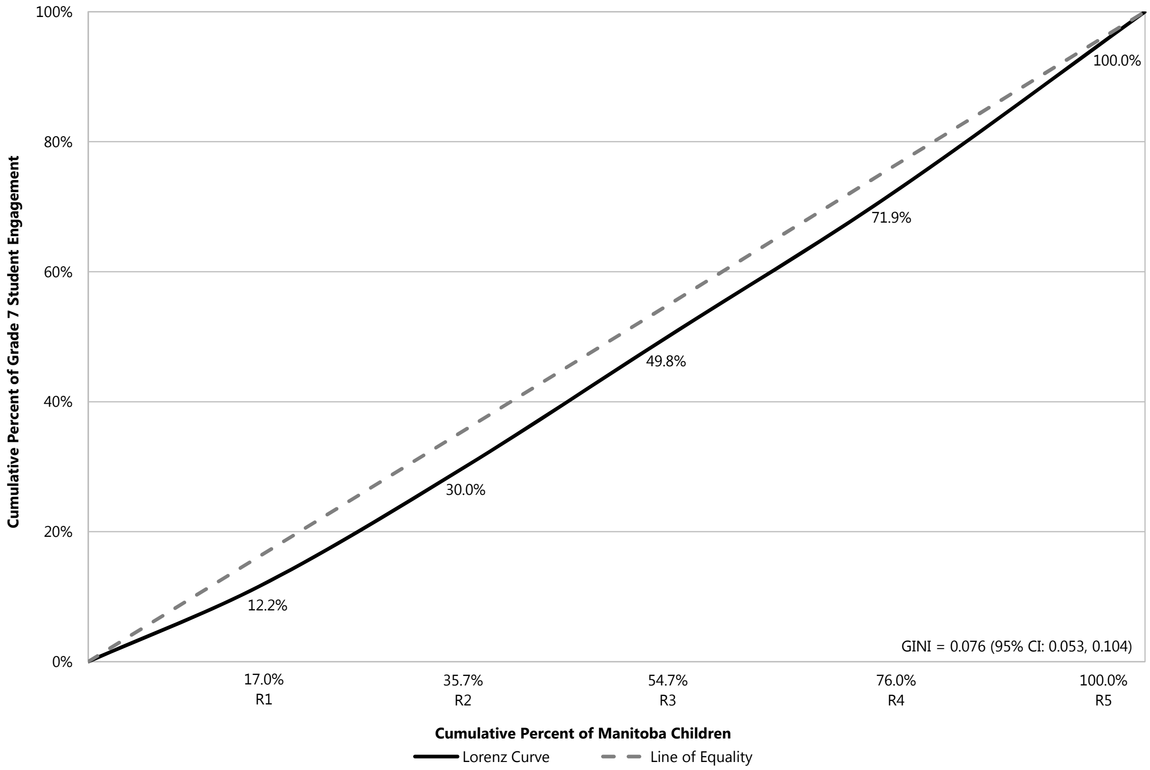


Figure 6.10: Lorenz Curve for Grade 7 Student Engagement in Urban Areas (Cohort Approach), 2009/10
Crude for Grade 7 students in the 1997 birth cohort developing or establishing in all five competencies

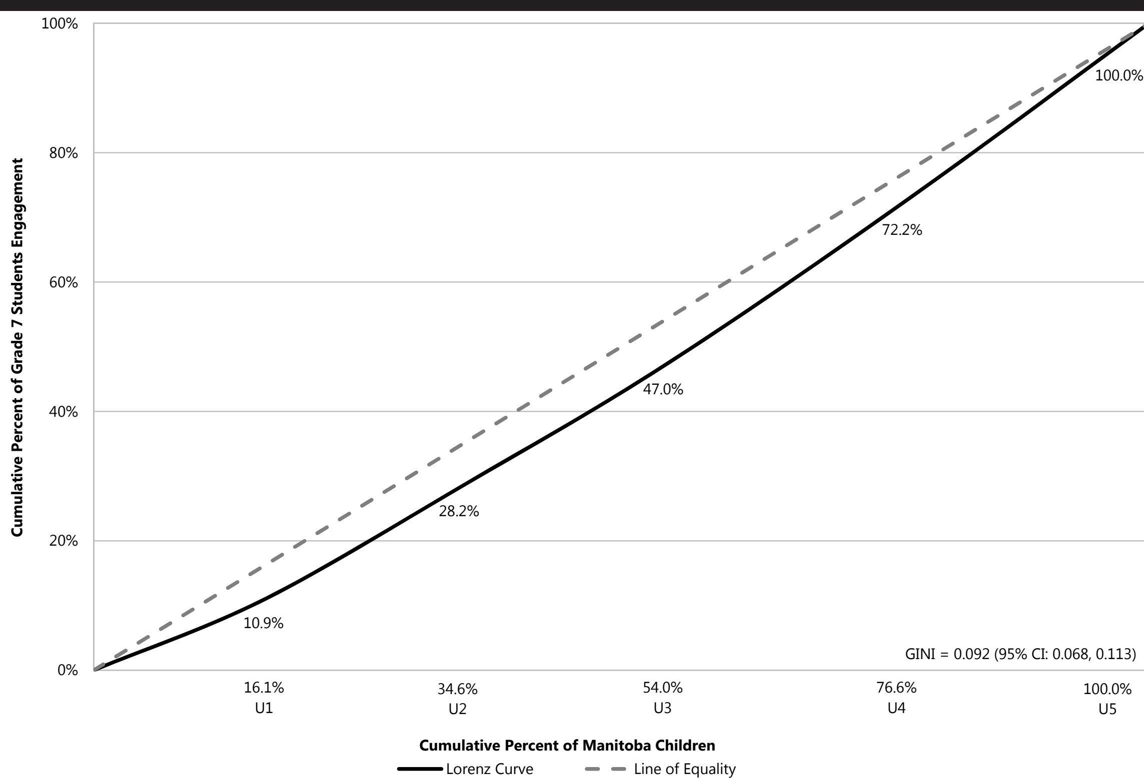
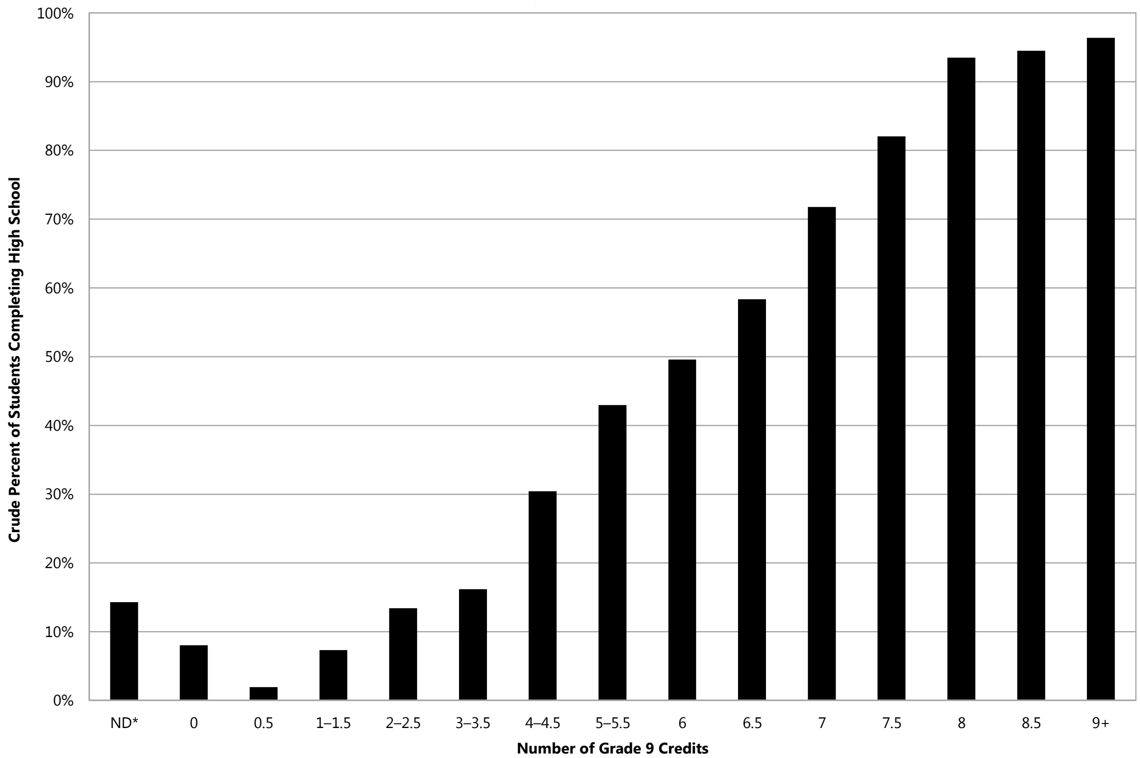


Figure 6.11: High School Completion in Four Years by Number of Credits Earned in First Year of Grade 9 (Cohort Approach)
Crude percent of students



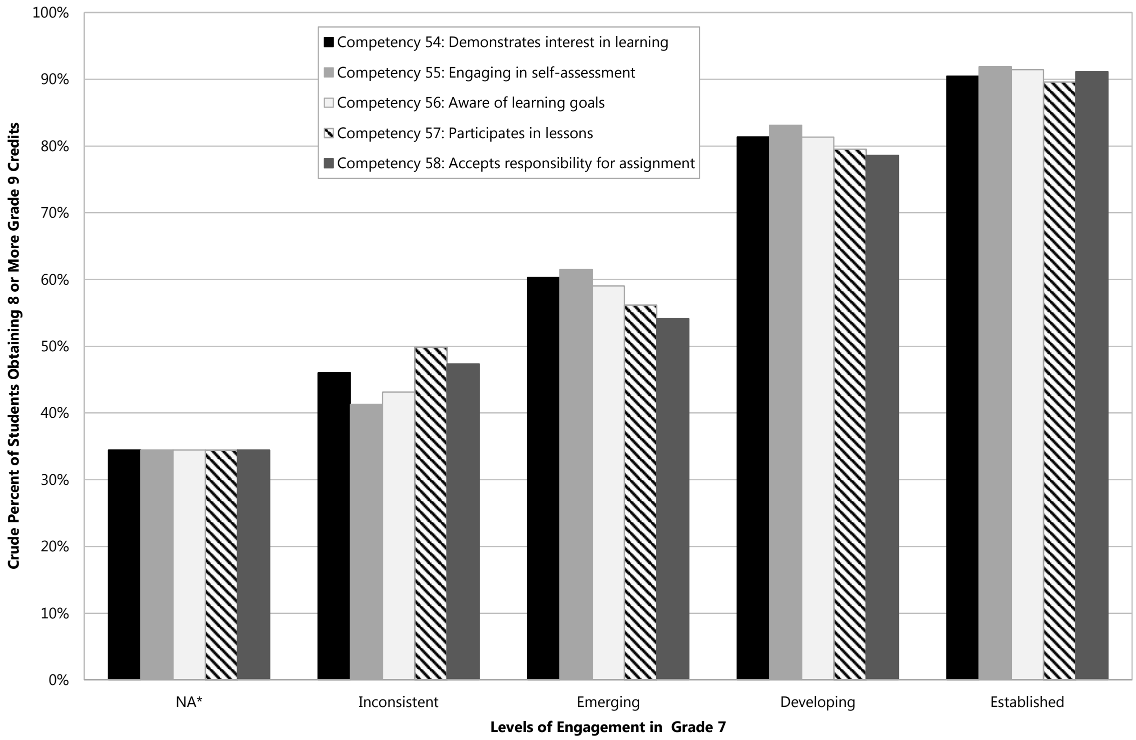
* Not Declared: students with undeclared number of credits earned in first year of Grade 9

Thus looking at the relationship between student engagement in Grade 7 and earning eight or more credits in Grade 9 should give us an idea of whether student engagement in the middle years predicts high school progression. Figure 6.12 shows this relationship. We looked at a cohort of students who were in Grade 7 in 2007/08 and living in Manitoba in 2009/10 (the year they should be in Grade 9). Students who were no longer in Manitoba in 2009/10 were excluded, as were students in First Nations communities, home schooled students, students in non–funded independent schools, and students who died. Students were categorized in Grade 7 according to their engagement assessments for each of the five competencies. Students who were in grade 7 but did not have an assessment were categorized as "No Assessment." As can be seen in the figure, students without an assessment were the least likely to achieve eight or more credits in Grade 9, with only about a third of them accomplishing this. About 40 to 50% of the students who were assessed as "inconsistent" in their engagement earned eight or more credits in Grade 9, depending on the competency. Around 55 to 60% of the students who were assessed as "emerging" in their engagement with learning earned eight or more Grade 9 credits. About 80% of students who were "developing" engagement, and about 90% of students who had "established" engagement in Grade 7 earned eight or more credits two years later in Grade 9.

The middle years engagement assessment provides an opportunity for educators to identify students who may be at risk of losing interest in, falling behind, or withdrawing from school once they reach high school. Efforts to increase the involvement of these students in their learning could improve their high school outcomes.

Updated February 18, 2015

Figure 6.12: Relationship Between Grade 7 Student Engagement and Obtaining Eight or More Credits in Grade 9 (Cohort Approach)
Crude percent of Grade 7 students



* Not assessed: students enrolled in Grade 7 with no record of Grade 7 Student Engagement Assessment

What do these results mean?

We found a strong relationship between student engagement in Grade 7 and completion of eight or more credits in the first year of high school; furthermore, there is a strong relationship between completing eight or more credits in the first year of high school and completing high school within the next four or five years. Student engagement in Grade 7 increased significantly over the three years of data available for analysis in this report. It will be interesting to determine whether this translates into more students completing high school. There was a low degree of inequity in engagement in rural areas but a moderate degree in urban areas. Continued efforts to enhance student engagement in the middle years (and earlier) could result in increased high school completion rates.

Teen Pregnancy

Teen pregnancy rates are calculated as the ratio of hospital records of live and still births, abortions and ectopic pregnancies in hospital data by females aged 15 to 19 years to the total female population of the same age. Rates presented in this section are crude.

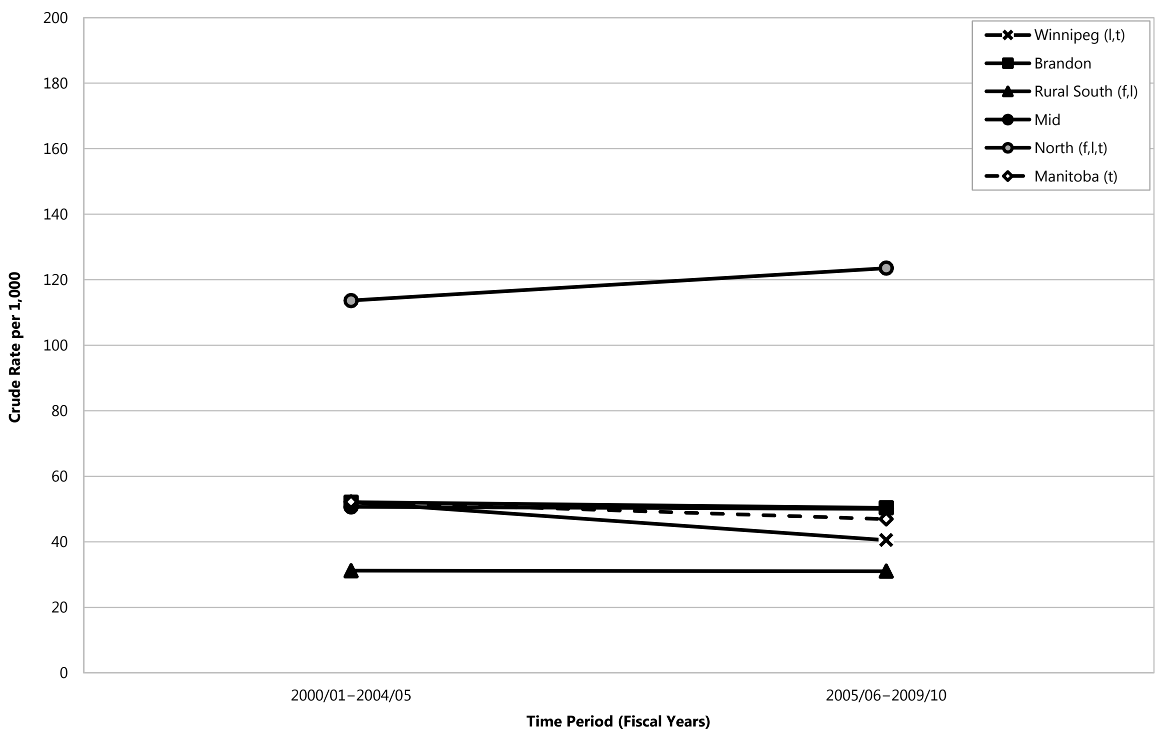
Teenage mothers tend to have lower socioeconomic status (SES) (Al-Sahab, Heifetz, Tamim, Bohr, & Connolly, 2012), as well as reduced educational (Bradley, Cupples, & Irvine, 2002; Chase-Lansdale & Brooks-Gunn, 1994; Nanchahal et al., 2005; Singh, Darroch, & Frost, 2001) and employment (Attico & Hartner, 1993; Chase-Lansdale & Brooks-Gunn, 1994; Hardy et al., 1997; Luster & Mittelstaedt, 1993; Singh et al., 2001) opportunities. Teenage pregnancy is also associated with risk activities such as substance abuse, smoking during pregnancy, and physical or sexual abuse (Al-Sahab et al., 2012; Jacono, Jacono, St, Van, & Meininger, 1992). These risks can lead to complications during pregnancy such as anemia, toxaemia, eclampsia, and hypertension (Chen et al., 2007).

Rates of teen pregnancy in Manitoba have declined in the past decade. However, studies have shown that the likelihood of teenage pregnancy in at–risk groups such as daughters of teen mothers is relatively high (Jutte et al., 2010). For further information on programs and policies that could contribute to declining rates, see Martens et al., 2008.

Regional Trends Over Time

Figure 6.13 shows teen pregnancy rates for females 15 to 19 years of age in two time periods (2000/01–2004/05 and 2005/06–2009/10) for aggregate regions of Manitoba. The provincial rate of teen pregnancy went from 52.2/1000 in the first time period to 47.0/1000 in the last time period, a decrease that was statistically significant. In the North, the rates were higher than the provincial average in both time periods; and these increased significantly over time from 113.6/1000 in the first time period to 123.5/1000 in the last time period. Rates in Rural South were significantly lower than the provincial average in both time periods but did not change over time, at 31.2/1000 in time 1 and 31.0/1000 in time 2. In Winnipeg, the rate was significantly lower than the provincial average in the last time period; and the rates in Winnipeg changed significantly over time, decreasing from 52.0/1000 to 40.5/1000.

Figure 6.13: Teen Pregnancy Rates by Aggregate Region, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 1,000 females 15–19 years



f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates statistically significant difference between first and last time periods for that region at p<0.05

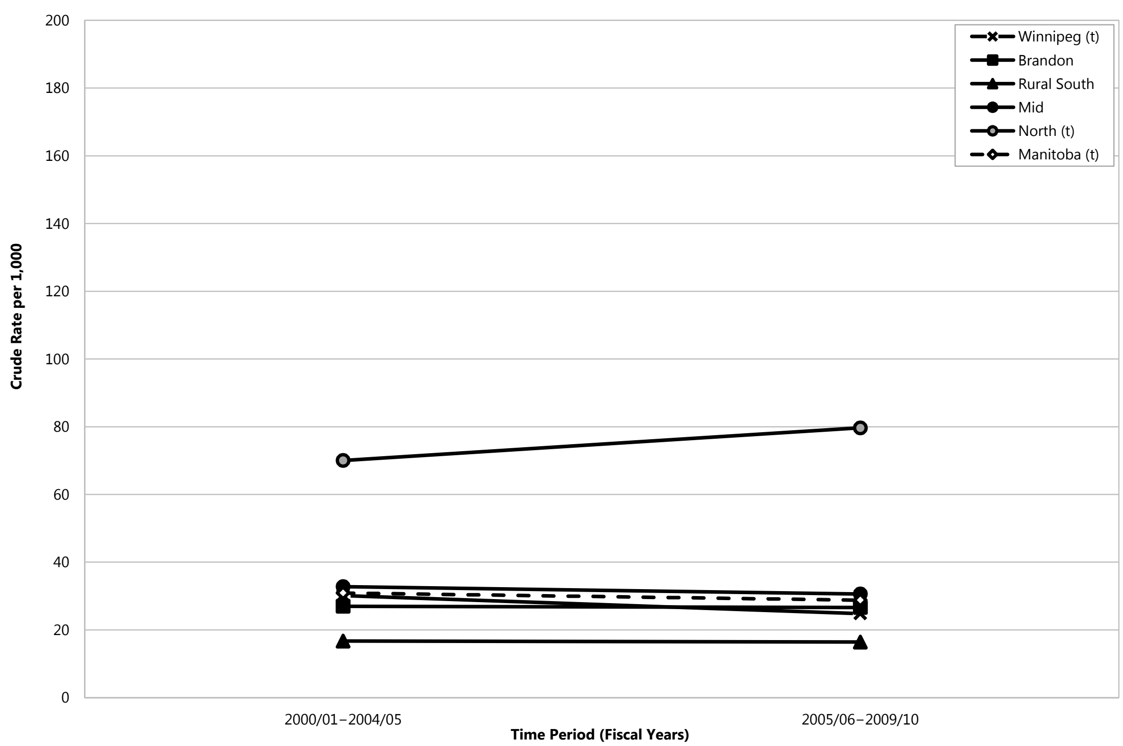
Trends by Age Group

Figures 6.14 and 6.15 show teen pregnancy rates for two of three age categories over the time period; the rates for 13– to 14–year–olds are relatively low and therefore not graphed but discussed here. Not surprisingly, it is clear from the graphs that teen pregnancy rates increase with age in all aggregate regions. The teen pregnancy rate for all Manitoba girls 13 to 14 years of age was relatively low, at 2.2/1000 in time 1 and 2.4/1000 in time 2, with no statistical difference in rates between the two time periods.

For the 15 to 17 age group, the Manitoba teen pregnancy rate was 30.9/1000 in time 1 and 28.8/1000 in time 2. The decrease in rates over time was statistically significant. In the North, the teen pregnancy rate for 15– to 17–year–olds increased significantly over time, going from 70.0/1000 in time 1 to 80.0/1000 in time 2. In Winnipeg, the rate decreased significantly over time, going from 30.1/1000 in time 1 to 24.8/1000 in time 2.

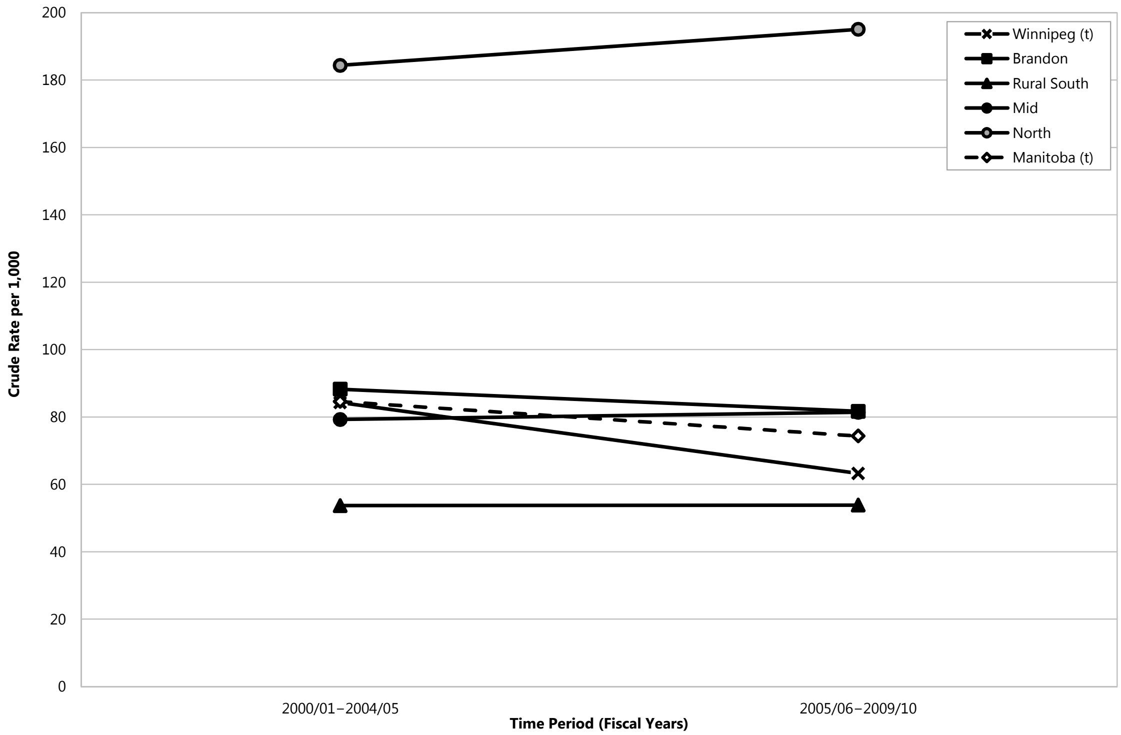
For the 18– to 19–year–old group, the Manitoba teen pregnancy rate was 84.6/1000 in time 1 and 74.4/1000 in time 2, which was a statistically significant decrease over time. Only Winnipeg showed a significant change in teen pregnancy rate over time for 18– to 19–year–olds, decreasing from 84.3/1000 in time 1 to 63.2/1000 in time 2.

Figure 6.14: Teen Pregnancy Rates by Aggregate Region and 15 to 17 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 1,000 females



t indicates statistically significant difference between first and last time periods for that region at p<0.05

Figure 6.15: Teen Pregnancy Rates by Aggregate Region and 18 to 19 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 1,000 females



t indicates statistically significant difference between first and last time periods for that region at p<0.05

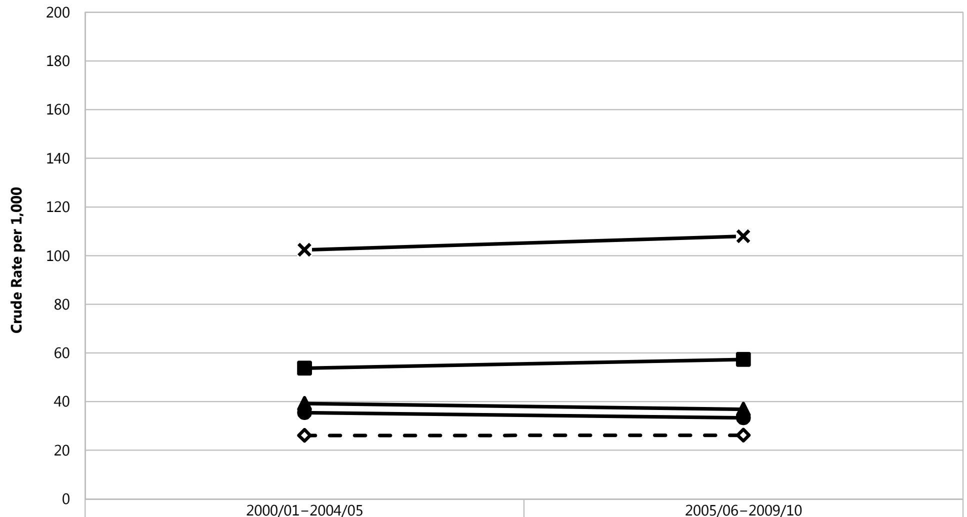
Trends by Socioeconomic Status

Figure 6.16 shows teen pregnancy rates for 15– to 19–year–olds by rural income quintiles for 2000/01–2004/05 and 2005/06–2009/10. There is a significant SES gradient in teen pregnancy rates with rates increasing as income quintile decreases. For example, in time 2, the teen pregnancy rate was 108.0/1000 in R1 and 26.2/1000 in R5. None of the income quintiles showed significant changes in teen pregnancy rates over time.

Figure 6.17 shows teen pregnancy rates for 15– to 19–year–olds by urban income quintiles. As was found in the rural areas, there is a significant gradient across urban income quintiles with rates getting higher with each decrease in income quintile. For example, in time 2, the teen pregnancy rate was 103.4/1000 in U1 and 10.4/1000 in U5, a ten–fold difference. All income quintiles showed significant decreases in teen pregnancy rates over time.

Figure 6.16: Teen Pregnancy Rates by Rural Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Crude rates per 1,000 females 15–19 years



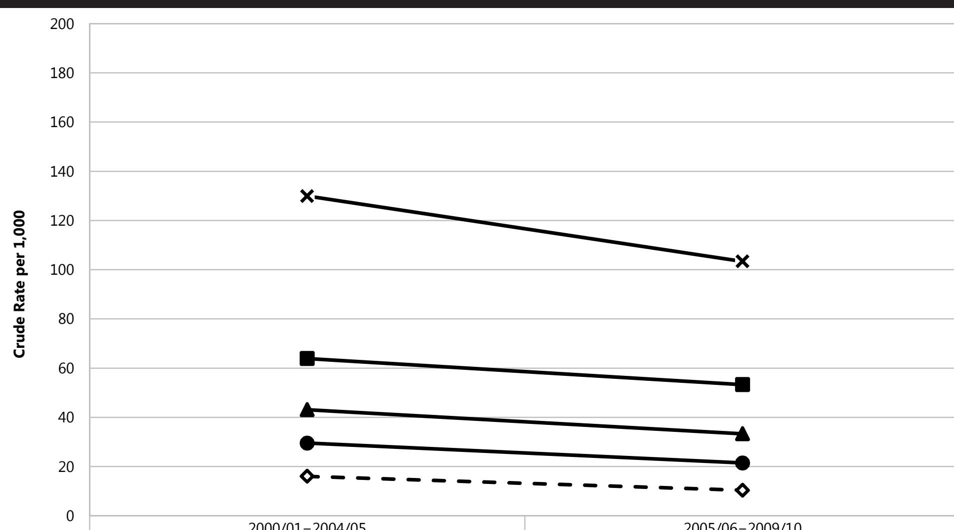
	2000/01–2004/05	2005/06–2009/10
Income Unknown (t)	77.66	59.80
R1 – Lowest Income	102.36	107.95
R2	53.74	57.33
R3	39.22	36.88
R4	35.46	33.36
R5 – Highest Income	26.12	26.19
Linear trend across R1–R5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 6.17: Teen Pregnancy Rates by Urban Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Crude rates per 1,000 females 15–19 years



	2000/01–2004/05	2005/06–2009/10
Income Unknown (t)	77.66	59.80
U1 – Lowest Income (t)	129.93	103.40
U2 (t)	63.90	53.29
U3 (t)	43.12	33.32
U4 (t)	29.54	21.45
U5 – Highest Income (t)	16.06	10.37
Linear trend across U1–U5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 6.18 and 6.19 show the inequities in teen pregnancy rates in the two time periods for rural areas. In both time periods, the lowest income quintile (R1) had higher teen pregnancy rates than expected given the proportion of the population. In time 1, 42.4% of the teen pregnancies were found in the 21.5% of the female population 15 to 19 in R1. The Gini coefficient was 0.273, indicating a high degree of disparity across rural income quintiles. In time 2, 45.0% of the teen pregnancies were found in the 22.5% of the female population in R1. The Gini coefficient was 0.293, also indicating high disparity. The increase in the Gini coefficient over the study period in the rural areas was not statistically significant, indicating no change in disparity over time.

Figures 6.20 and 6.21 show that there are also substantial inequities in teen pregnancy rates in both time periods for urban areas. In time 1, 42.2% of teen pregnancies were found in the 16.9% of the female 15– to 19–year–old population in the lowest income quintile group, with a Gini coefficient of 0.381, indicating substantial disparity. In time 2, 43.9% of the teen pregnancies occurred in the 17.5% of the population in the lowest income quintile group, with a Gini coefficient of 0.408, indicating substantial disparity. There was a significant increase in the Gini coefficient over time in urban areas, indicating a significant increase in inequity. A comparison of the Gini coefficients in the last time period indicated that the disparity was significantly higher in urban compared to rural income areas.

Figure 6.18: Lorenz Curve for Teen Pregnancy in Rural Areas, 2000/01-2004/05
Crude for females 15-19 years

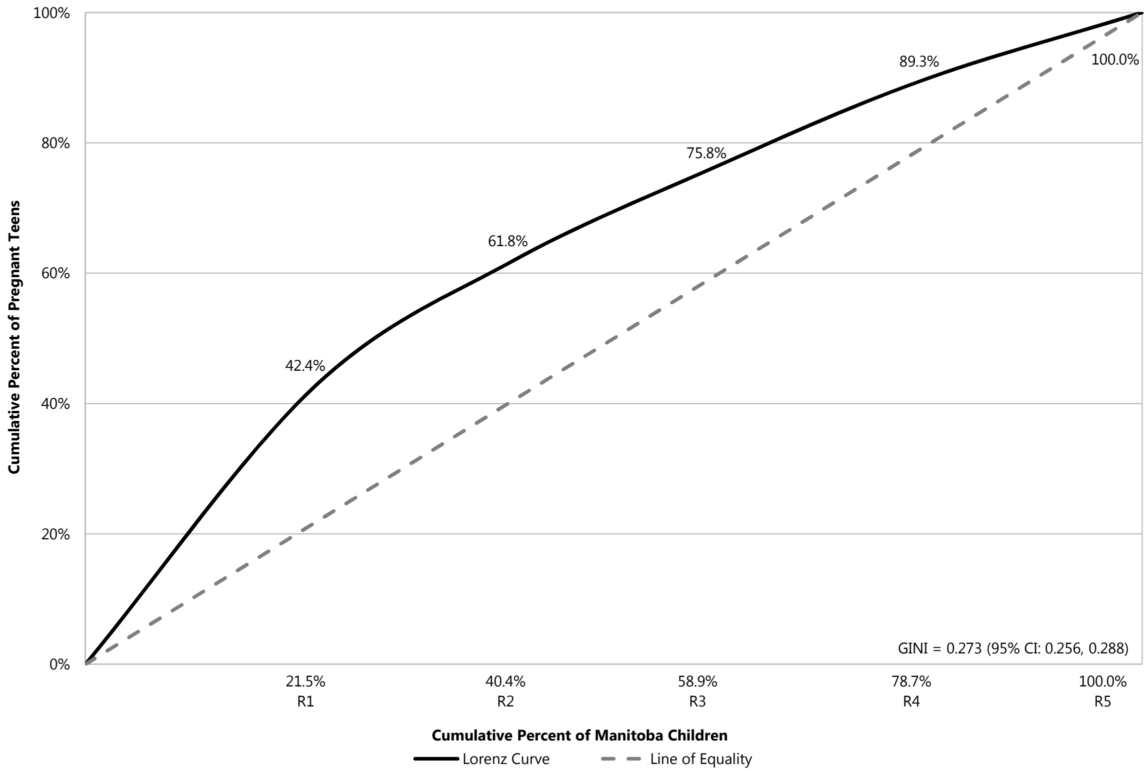


Figure 6.19: Lorenz Curve for Teen Pregnancy in Rural Areas, 2005/06-2009/10
Crude for females 15-19 years

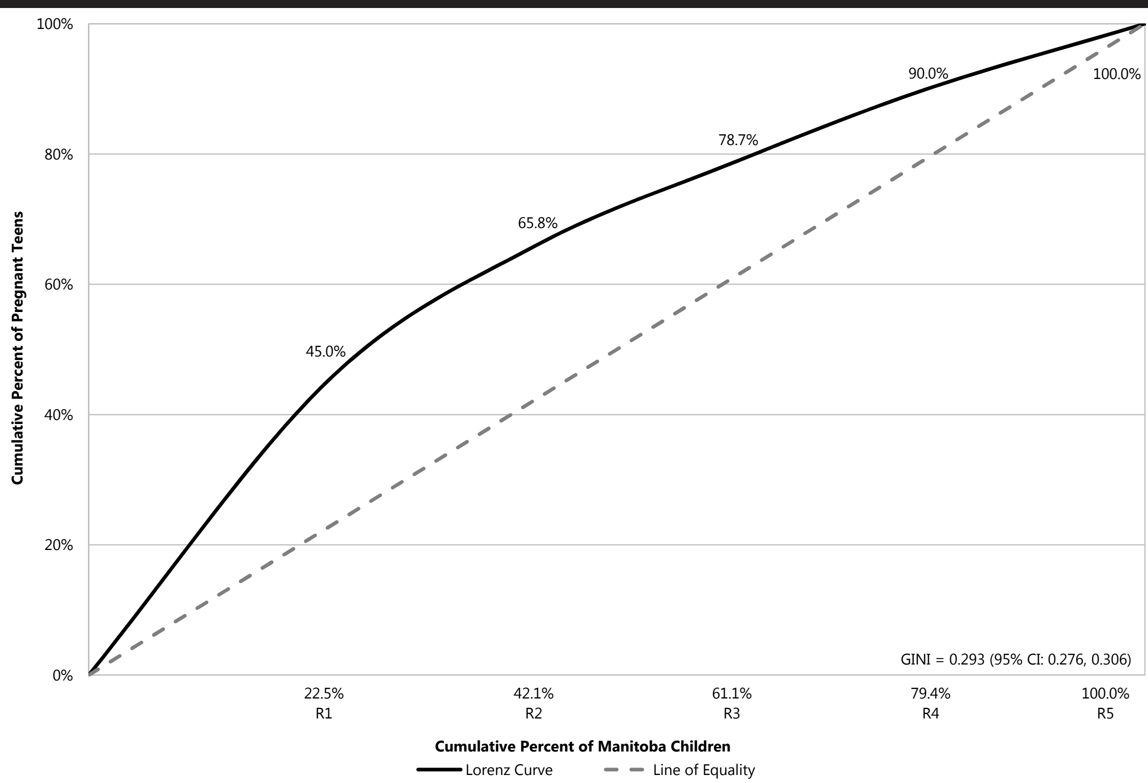


Figure 6.20: Lorenz Curve for Teen Pregnancy in Urban Areas, 2000/01-2004/05
Crude for females 15-19 years

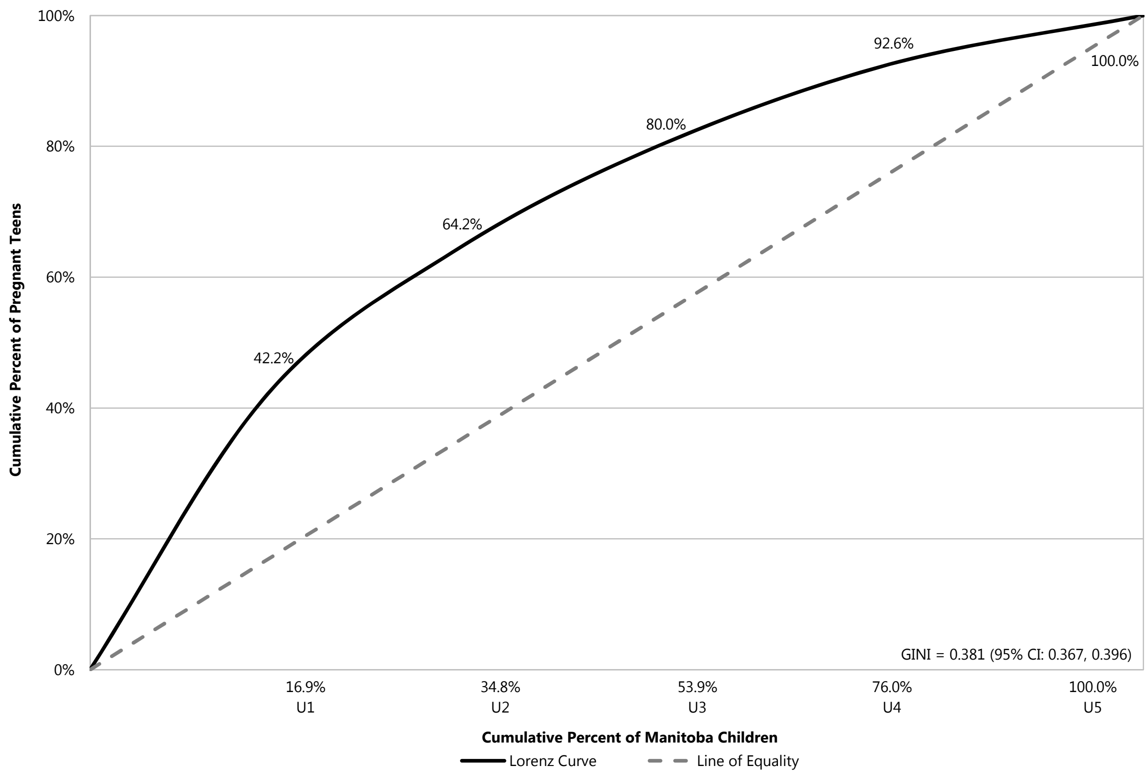
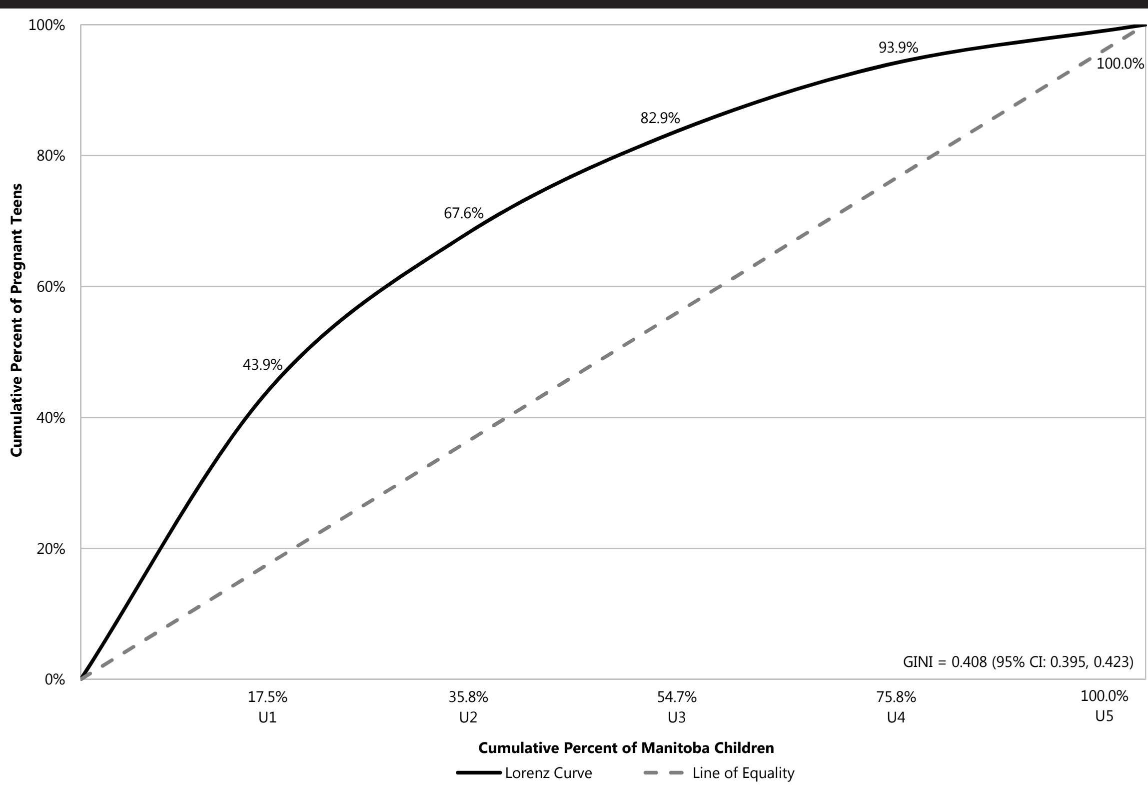


Figure 6.21: Lorenz Curve for Teen Pregnancy in Urban Areas, 2005/06-2009/10
Crude for females 15-19 years



Teen Births

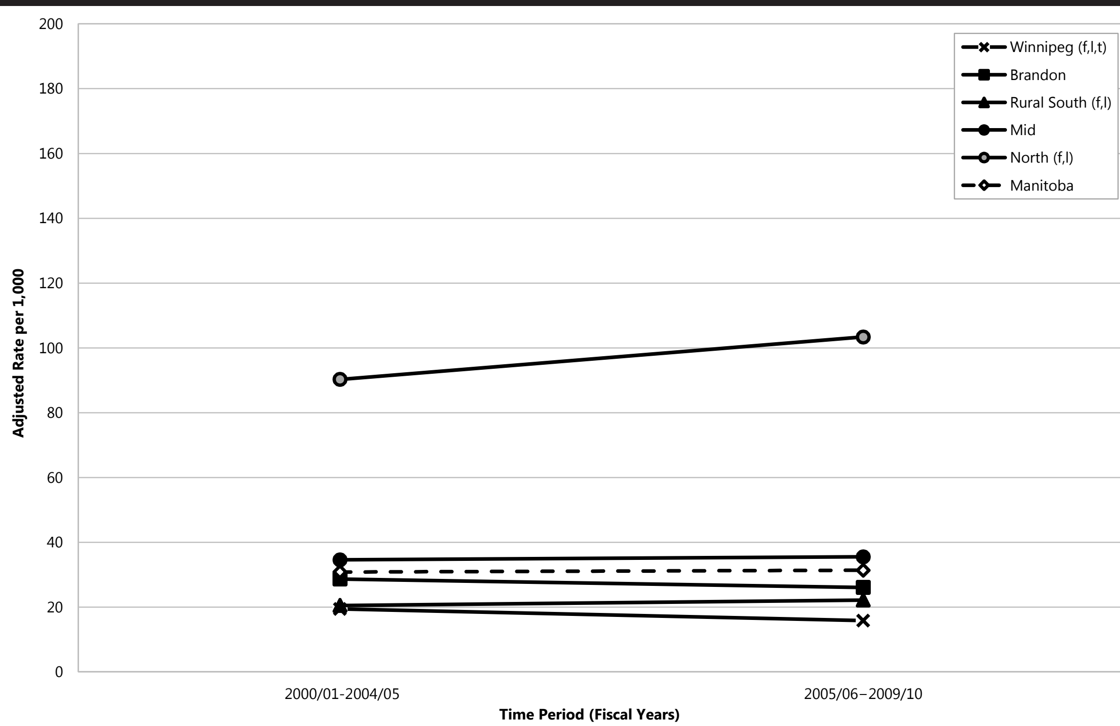
Teen birth rates are calculated as the ratio of live births in hospital data by females aged 15 to 19 to the total female population of the same age.

The reduced opportunities and negative outcomes that teenage mothers often experience can lead to a greater risk of poor health (Jutte et al., 2010; Wolfe & Perozek, 1997) and educational outcomes (Brownell et al., 2010; Moffitt, 2002, Moore & Morrison, 1997) in the children of teen mothers. A recent study has shown that risk of negative outcomes is equally high in the children of prior teen mothers and the health, social, and education effects can extend from childhood into early adulthood (Jutte et al., 2010). For these reasons, a reduction in teen birth rates is seen as a positive outcome.

Regional Trends Over Time

Figure 6.22 shows age–adjusted teen birth rates for females 15 to 19 years of age in two time periods (2000/01–2004/05 and 2005/06–2009/10) for aggregate regions of Manitoba. The provincial rate of teen births was 30.9/1000 in the first time period and 31.4/1000 in the last time period, a change that was not statistically significant. In the North, the rates were higher than the provincial average in both time periods at 90.3/1000 in the first time period and 103.4/1000 in the last time period, an increase that was not statistically significant. Rates in Rural South were significantly lower than the provincial average in both time periods at 20.5/1000 in time 1 and 22.2/1000 in time 2. Rates in Winnipeg were also significantly lower than the provincial average in both time periods, at 19.5/1000 in time 1 and 15.9/1000 in time 2. Winnipeg was the only area showing a significant change in rates over time, which was a decrease.

Figure 6.22: Teen Birth Rates by Aggregate Region, 2000/01–2004/05 to 2005/06–2009/10
Age–adjusted rates per 1,000 females 15–19 years



f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates statistically significant difference between first and last time periods for that region at p<0.05

Trends by Age Group

Figures 6.23 and 6.24 show teen birth rates for two of the three age categories over the time period. The rates for the 13– to 14–year–olds is not shown as the rates are relatively low: the Manitoba rate for girls 13 to 14 years of age was 0.96/1000 in time 1 and 1.3/1000 in time 2. The increase in rates over time was statistically significant. Not surprisingly, teen birth rates increase with age in all aggregate regions.

For the 15 to 17 age group, the Manitoba teen birth rate was 18.0/1000 in time 1 and 18.4/1000 in time 2. There was no statistically significant change in rates over time. In the North, the teen birth rate for 15– to 17–year–olds increased significantly over time, going from 54.8/1000 in time 1 to 63.1/1000 in time 2. In Winnipeg (14.4/1000 and 13.2/1000) and Rural South (11.0/1000 and 11.7/1000), the rates were significantly lower than the provincial average in the first and last time period; whereas in Mid (21.7/1000 and 21.4/1000) and North, the rates were significantly higher than the provincial average in both time periods.

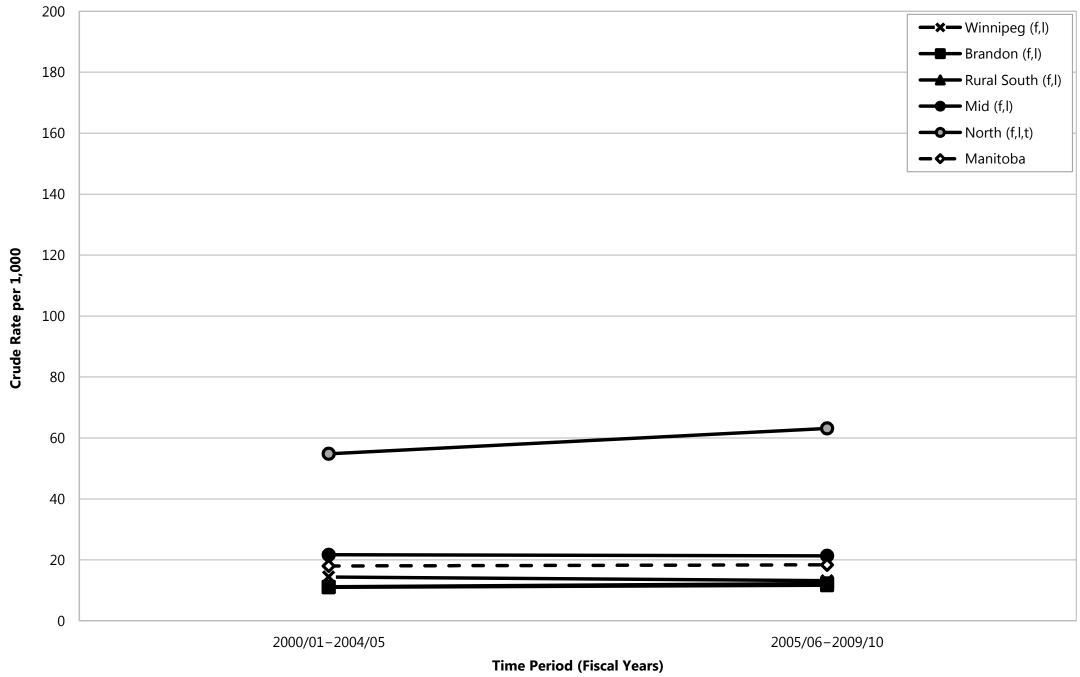
For the 18 to 19 age group, the Manitoba teen birth rate was 50.5/1000 in time 1 and 49.4/1000 in time 2, a change that was not statistically significant. Brandon (60.1/1000 to 49.1/1000) and Winnipeg (41.9/1000 to 35.1/1000) both showed significant decreases in teen birth rates over time for 18– to 19–year–olds; whereas Rural South (36.9/1000 to 41.1/1000) and the North (140.8/1000 to 157.7/1000) showed significant increases over the study period. Winnipeg and Rural South had significantly lower rates than the provincial average in both time periods, whereas the North had significantly higher rates of teen births for 18– and 19–year–olds in both time periods.

Trends by Socioeconomic Status

Figure 6.25 shows teen birth rates for 15– to 19–year–olds by rural income quintiles for 2000/01–2004/05 and 2005/06–2009/10. There is a significant SES gradient in teen birth rates in both time periods, with rates increasing as income quintile decreases. For example, in time 2, the teen birth rate was 91.6/1000 in R1 and 16.7/1000 in R5. R2 (38.2/1000 to 45.8/1000) and R5 (13.4/1000 to 16.7/1000) showed significant increases in rates of teen births over the study period.

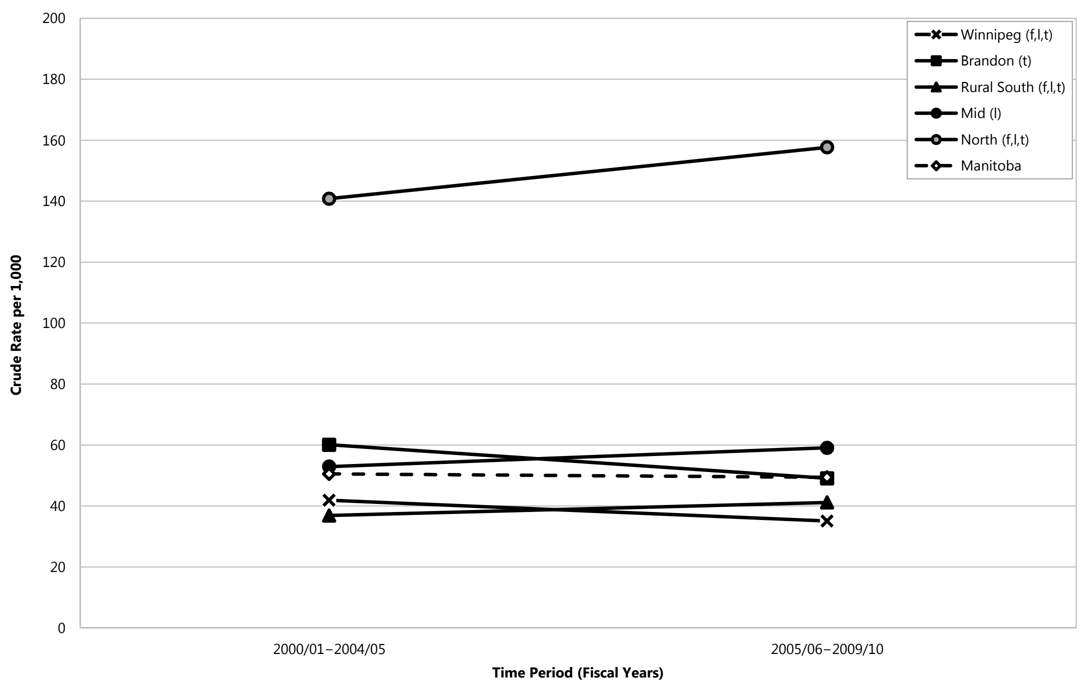
Figure 6.26 shows teen birth rates for 15– to 19–year–olds by urban income quintiles. As was found in the rural areas, there is a significant gradient across urban income quintiles, with rates getting higher with each decrease in income quintile. For example, in time 2, the teen birth rate was 65.7/1000 in U1 and 3.4/1000 in U5, an almost twenty–fold difference. Both U1 (77.0/1000 to 65.7/1000) and U5 (4.9/1000 to 3.4/1000) showed significant decreases in teen birth rates over the study period.

Figure 6.23: Teen Birth Rates by Aggregate Region and 15 to 17 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 1,000 females



f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates statistically significant difference between first and last time periods for that region at p<0.05

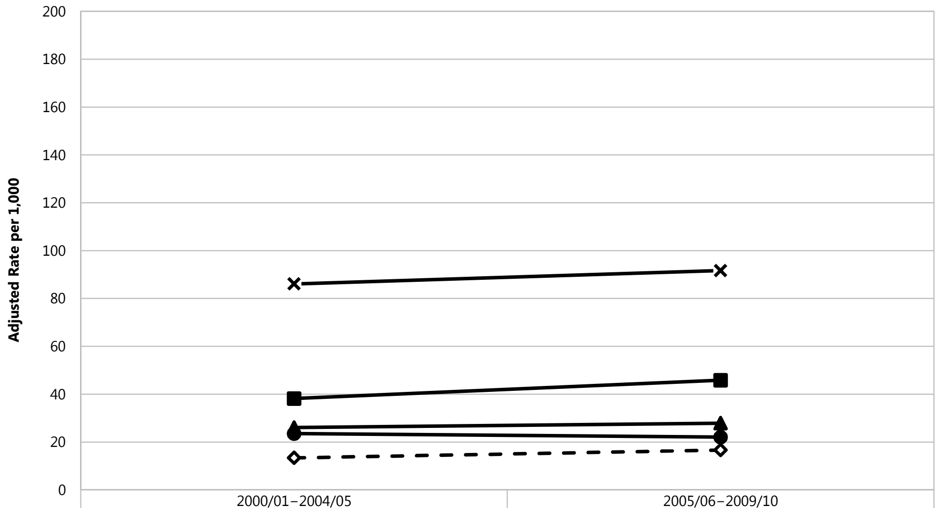
Figure 6.24: Teen Birth Rates by Aggregate Region and 18 to 19 Age Group, 2000/01–2004/05 to 2005/06–2009/10
Crude rates per 1,000 females



f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates statistically significant difference between first and last time periods for that region at p<0.05

Figure 6.25: Teen Birth Rates by Rural Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Age–adjusted rates per 1,000 females 15–19 years



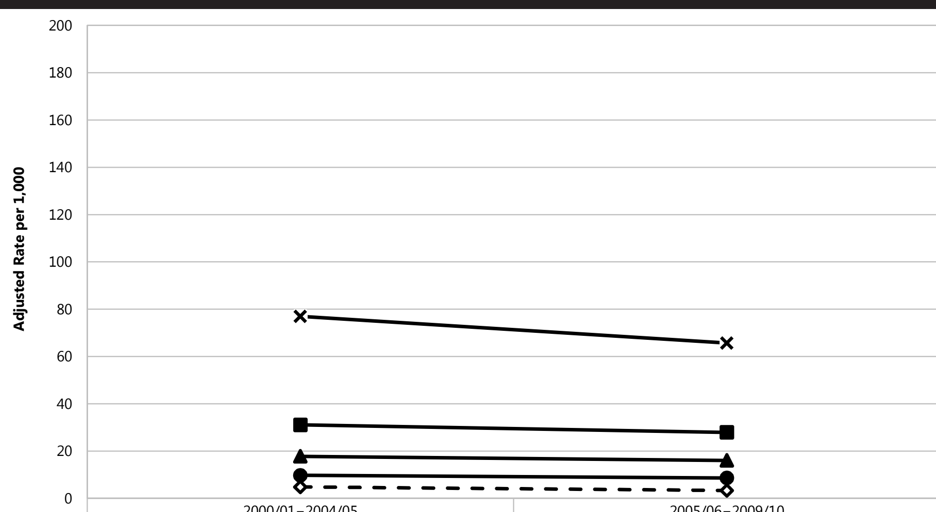
	2000/01–2004/05	2005/06–2009/10
Income Unknown (t)	59.36	40.42
R1 – Lowest Income	86.10	91.64
R2 (t)	38.17	45.82
R3	26.03	27.89
R4	23.51	22.05
R5 – Highest Income (t)	13.41	16.65
Linear trend across R1–R5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time periods for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 6.26: Teen Birth Rates by Urban Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Age–adjusted rates per 1,000 females 15–19 years



	2000/01–2004/05	2005/06–2009/10
Income Unknown (t)	59.36	40.42
U1 – Lowest Income (t)	76.97	65.68
U2	31.09	27.95
U3	17.79	16.07
U4	9.77	8.67
U5 – Highest Income (t)	4.85	3.38
Linear trend across U1–U5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time period for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 6.27 and 6.28 show the inequities in teen birth rates in the two time periods for rural areas. In both time periods, the lowest income quintile (R1) had higher teen birth rates than expected given the proportion of the population. In time 1, 48.7% of the teen births were found in the 21.5% of the 15 to 19 female population in R1. The Gini coefficient was 0.350, indicating a high degree of disparity across rural income quintiles. In time 2, 48.7% of the teen births were found in the 22.5% of the female population in R1. The Gini coefficient was 0.345, also indicating high disparity. The change in the Gini coefficient over the study period in the rural areas was not statistically significant, indicating no change in disparity over time.

Figures 6.29 and 6.30 show that there are also substantial inequities in teen birth rates in both time periods for urban areas. In time 1, 51.4% of teen births were found in the 16.9% of the female 15– to 19–year–old population in the lowest income quintile group, with a Gini coefficient of 0.488, indicating substantial disparity. In time 2, 51.5% of the teen births occurred in the 17.5% of the population in the lowest income quintile group, with a Gini coefficient of 0.492, indicating substantial disparity. There was no significant change in the Gini coefficient over time in urban areas, indicating no change in inequity. A comparison of the Gini coefficients in the last time period indicated that the disparity was significantly higher in urban compared to rural income areas.

What do these results mean?

Among Canadian provinces, Manitoba has the second highest rate of teen pregnancies and teen births in Canada (Public Health Agency of Canada, 2012b). Although the overall teen pregnancy rate decreased significantly in Manitoba over the study period, the teen birth rate remained stable. Rates of both teen pregnancy and birth are significantly higher in the North and have increased overtime (overall for teen pregnancy and for the 15– to 17– and 18– to 19–year–olds for births). Winnipeg has significantly lower rates of teen pregnancy and births and these rates both decreased significantly over time. Efforts to reduce teen pregnancies and births in rural areas should be increased, and an examination of what has worked for reducing these rates in Winnipeg is warranted. There is a high degree of inequity in both teen pregnancy and teen birth rates in both rural and urban areas, which suggest the need for programs aimed at reducing teen pregnancies targeted at these areas.

Figure 6.27: Lorenz Curve for Teen Births in Rural Areas, 2000/01–2004/05
Adjusted by age for females 15–19 years

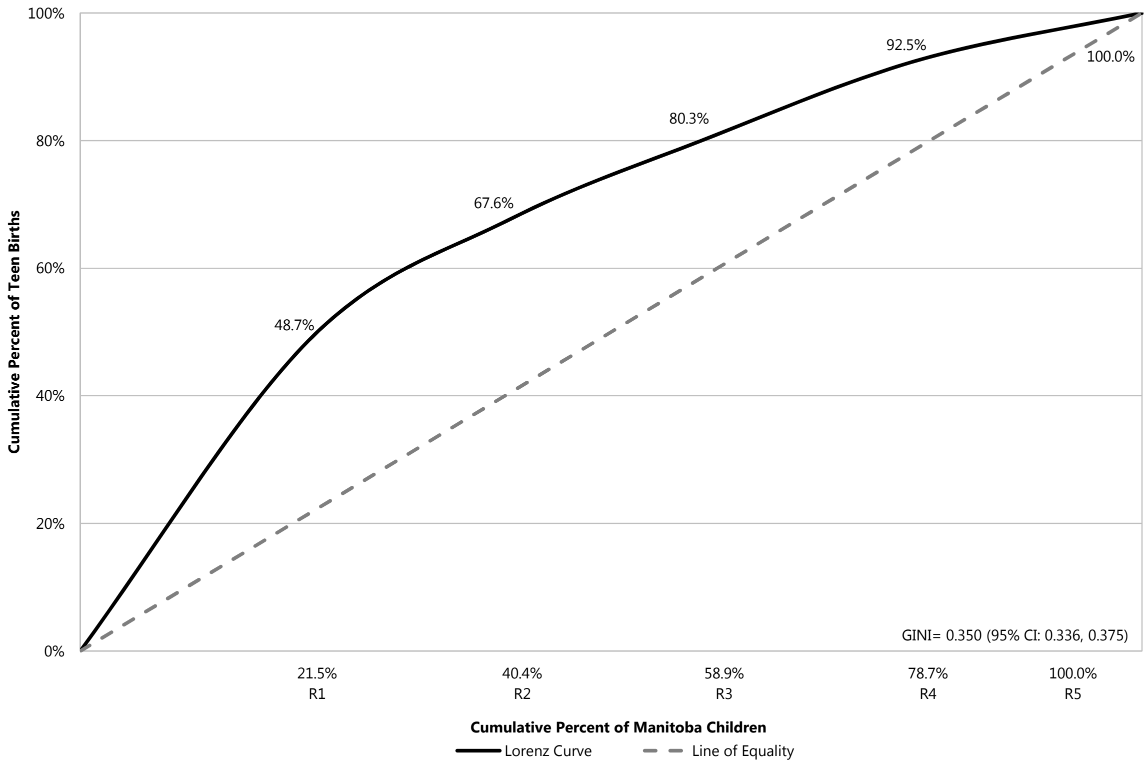


Figure 6.28: Lorenz Curve for Teen Births in Rural Areas, 2005/06–2009/10
Adjusted by age for females 15–19 years

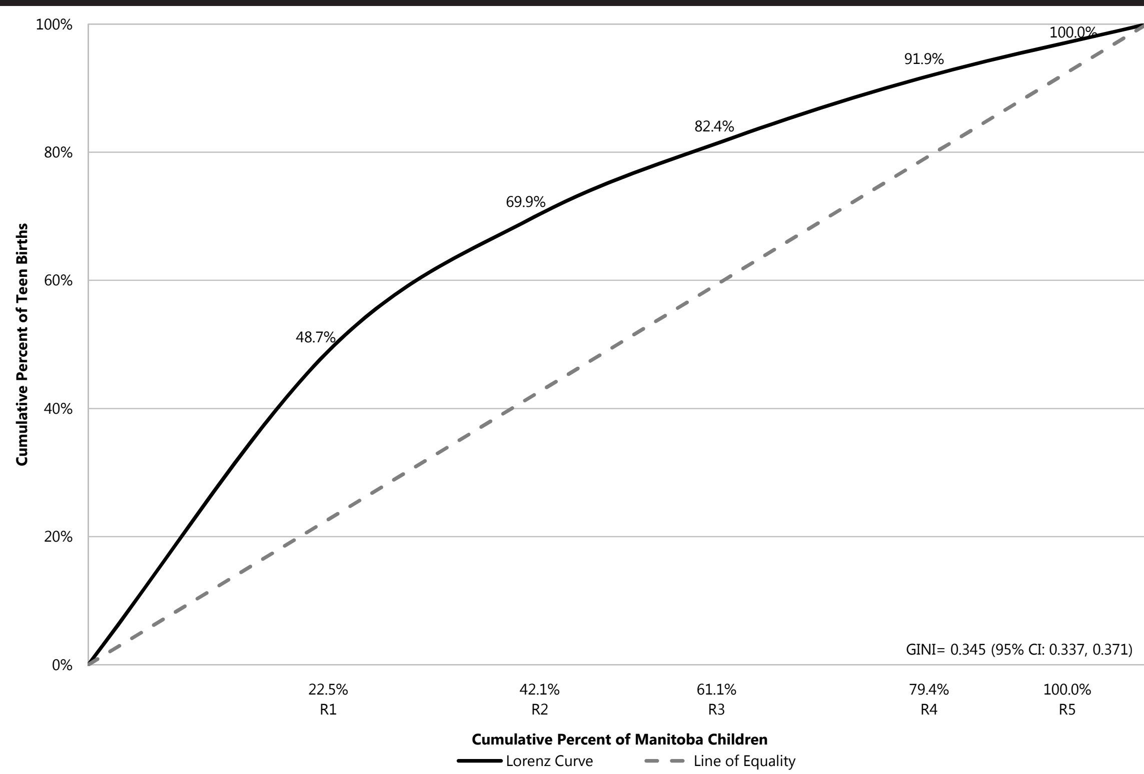


Figure 6.29: Lorenz Curve for Teen Births in Urban Areas, 2000/01–2004/05

Adjusted by age for females 15–19 years

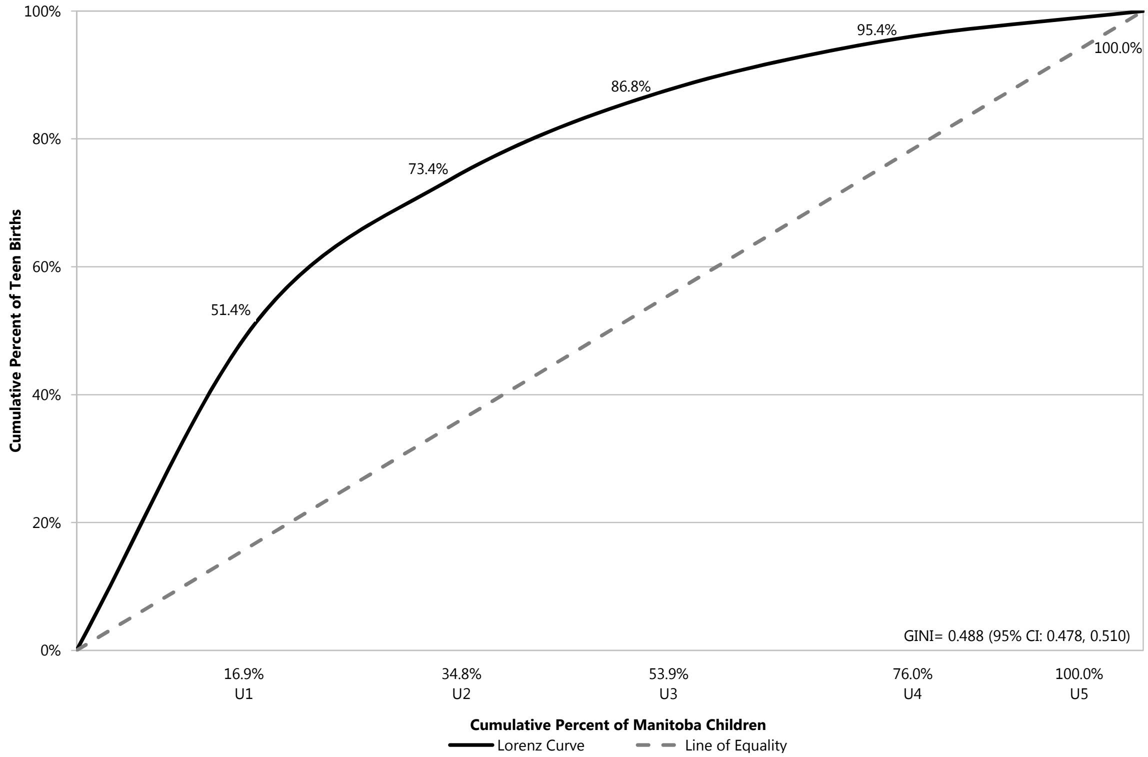
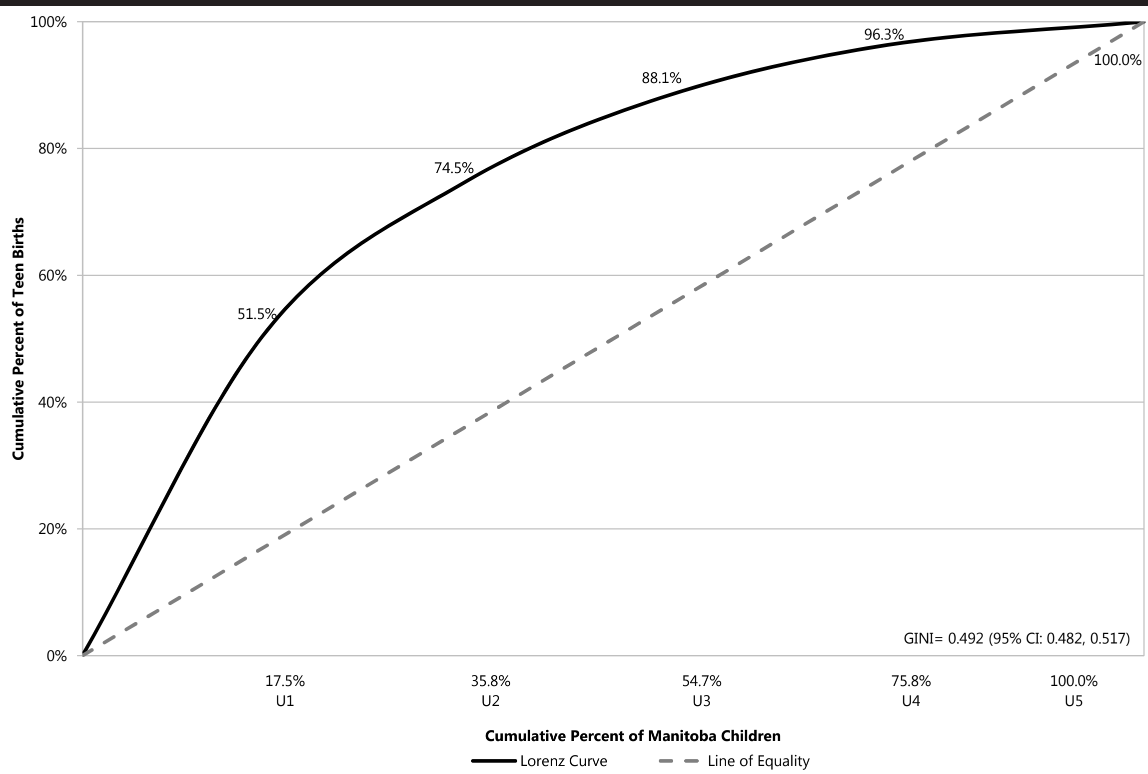


Figure 6.30: Lorenz Curve for Teen Births in Urban Areas, 2005/06–2009/10

Adjusted by age for females 15–19 years



Youths on Income Assistance

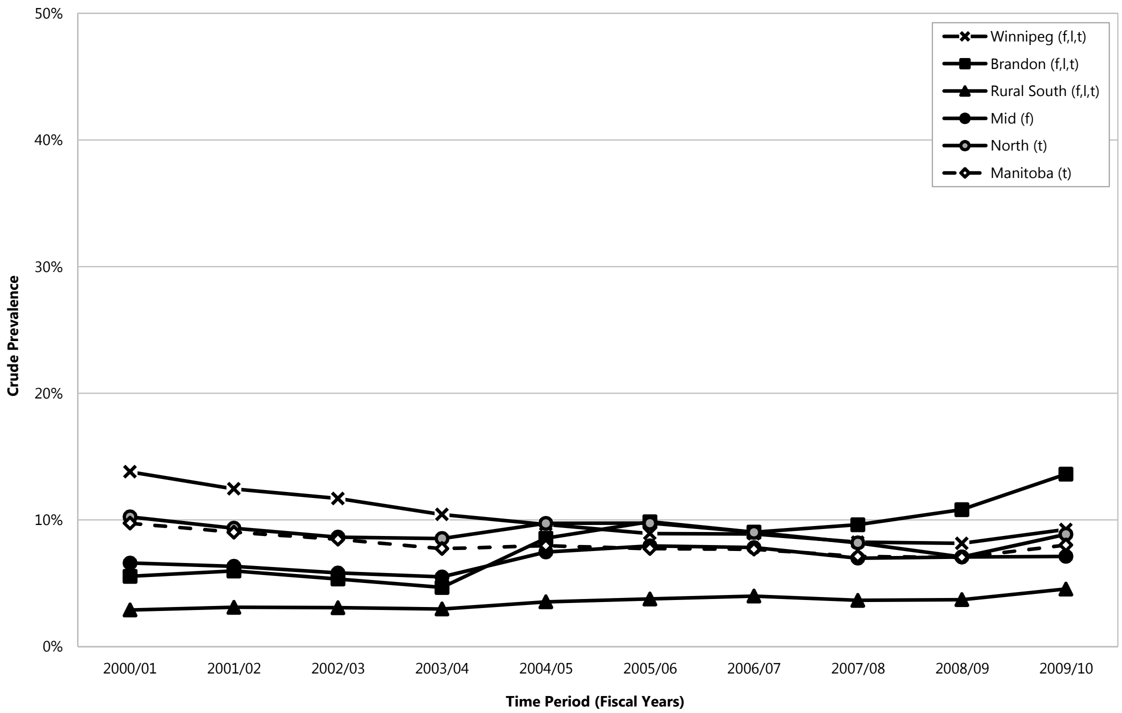
The province of Manitoba provides income assistance to individuals and families who require financial assistance in meeting their basic needs of living (Manitoba Family Services and Labour, 2011). Once children turn 18 years of age, they are no longer considered dependents in their family household. Therefore, should they feel the need, these youths may apply for their own income assistance from the Department of Entrepreneurship, Training, and Trade (Catherine Gates, personal communication, July 2012). Youths receiving income assistance are living in poverty. Being in this group is associated with a higher risk of behavioural and emotional difficulties and poor academic performance (Brownell et al., 2007; Chase-Lansdale & Pittman, 2002; Duncan & Yeung, 2012; Gennetian et al., 2004; Morris & Gennetian, 2003). As a group with lower incomes, they are more likely to experience poor health outcomes (Adler et al., 1994; Benzeval & Judge, 2001; Woolf, Johnson, & Geiger, 2006).

This report focuses on the prevalence of youths aged 18 to19 years who have received at least one month of income assistance over the course of a year; the indicator was measured for ten 1–year time periods. First Nations youths living in First Nations communities must apply for financial assistance from federally funded programs in place of the provincial income assistance program. These federally funded programs are not captured in our analyses; therefore, the prevalence of youths on income assistance is underestimated in some rural areas—particularly in First Nations communities.

Regional Trends Over Time

Figure 6.31 shows the prevalence of youths on income assistance for each of the 10 years in the study period for aggregate regions of Manitoba. The provincial prevalence of youths on income assistance went from 9.7% in the first year to 8.0% in the last year, a decrease that was statistically significant. The prevalence of youths on income assistance was significantly higher than the provincial average in Winnipeg in all 10 time periods at 13.8% in the first year and 9.2% in the last year, a decrease that was statistically significant. In Brandon, the prevalence of youths on income assistance was significantly lower than the provincial average in the first time period (5.5%) and significantly higher in the last time period (13.6%), an increase that was statistically significant. In Rural South, the prevalence of youths on income assistance was significantly lower than the provincial average in both time periods, but increased significantly over time from 2.9% in time 1 to 4.5% in time 10. In Mid, the prevalence of youths on income assistance was significantly lower than the provincial average in time 1 (6.6%) but no change over time was found. In the North, the prevalence of youths on income assistance decreased significantly over time from 10.2% in the first time period to 8.9% in the final time period.

Figure 6.31: Youths on Income Assistance by Aggregate Region, 2000/01–2009/10
Crude prevalence of youths 18–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

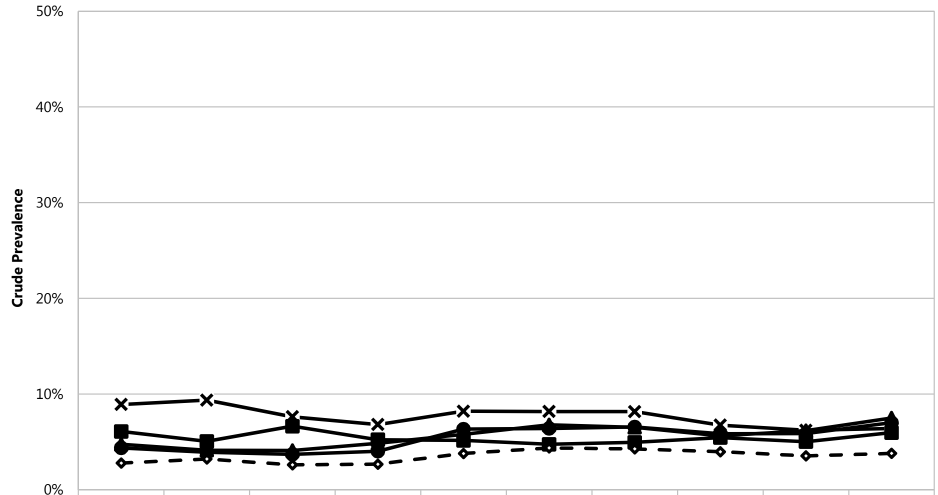
Trends by Socioeconomic Status

Figure 6.32 shows prevalence of youths on income assistance by rural income quintiles for all study years. There is a significant SES gradient in prevalence of youths on income assistance in each of the 10 study years, with prevalence increasing as income quintile decreases. For example, in time 10, the prevalence of youths on income assistance in R1 was 6.4% compared to 3.8% in R5. A significant decrease in prevalence of youths on income assistance was found in R1 (8.9% to 6.4%). Significant increases in prevalence of youths on income assistance were found in R3 (4.7% to 7.5%), R4 (4.4% to 7.0%), and R5 (2.8% to 3.8%).

Figure 6.33 shows prevalence of youths on income assistance by urban income quintiles. As was found in the rural areas, there was a significant gradient across urban income quintiles for each year examined, with rates getting higher with each decrease in income quintile. For example, in time 10, the prevalence of youths on income assistance was 28.4% in U1 and 2.0% in U5, a fourteen–fold difference. Significant decreases in prevalence of youths on income assistance were found in U1 (39.9% to 28.4%), U2 (16.4% to 10.9%), and U3 (9.2% to 6.2%).

Figure 6.32: Youths on Income Assistance by Rural Income Quintile, 2000/01–2009/10

Crude prevalence of youths 18–19 years



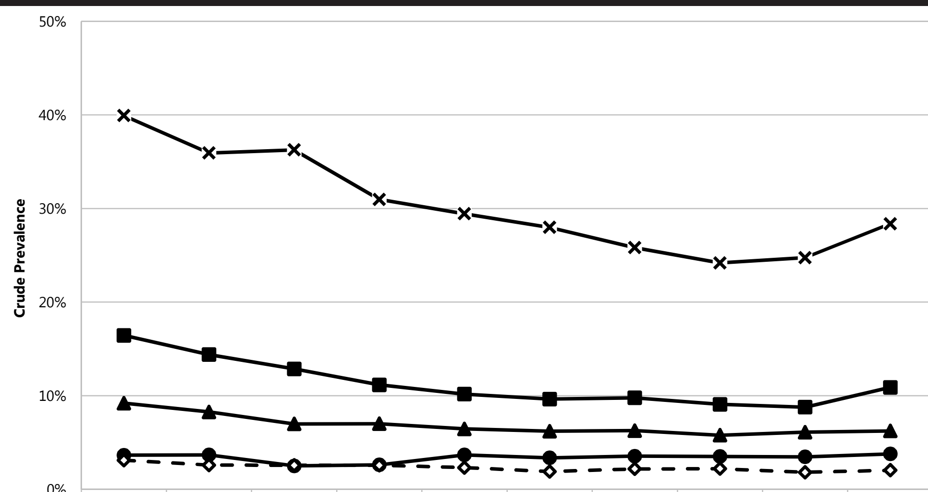
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown	17.17%	19.15%	13.43%	13.01%	13.04%	6.88%	7.88%	6.09%	4.98%	3.93%
R1 – Lowest Income (t)	8.90%	9.36%	7.62%	6.81%	8.20%	8.17%	8.16%	6.74%	6.21%	6.40%
R2	6.09%	5.05%	6.63%	5.23%	5.15%	4.74%	4.95%	5.45%	5.02%	5.97%
R3 (t)	4.75%	4.13%	4.09%	4.85%	5.80%	6.78%	6.53%	5.63%	6.17%	7.49%
R4 (t)	4.37%	3.91%	3.70%	4.03%	6.33%	6.40%	6.56%	5.85%	5.86%	7.00%
R5 – Highest Income (t)	2.79%	3.21%	2.60%	2.67%	3.79%	4.37%	4.26%	3.98%	3.54%	3.80%
Linear trend across R1–R5	*	*	*	*	*	*	*	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Figure 6.33: Youths on Income Assistance by Urban Income Quintile, 2000/01–2009/10

Crude prevalence of youths 18–19 years



	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown	17.17%	19.15%	13.43%	13.01%	13.04%	6.88%	7.88%	6.09%	4.98%	3.93%
U1 – Lowest Income (t)	39.93%	35.94%	36.26%	30.97%	29.44%	27.98%	25.82%	24.19%	24.75%	28.37%
U2 (t)	16.44%	14.39%	12.86%	11.16%	10.17%	9.64%	9.78%	9.07%	8.77%	10.88%
U3 (t)	9.20%	8.26%	6.99%	7.01%	6.45%	6.21%	6.27%	5.77%	6.11%	6.24%
U4	3.65%	3.67%	2.50%	2.61%	3.68%	3.37%	3.54%	3.51%	3.46%	3.78%
U5 – Highest Income	3.11%	2.59%	2.57%	2.56%	2.31%	1.89%	2.18%	2.20%	1.81%	2.03%
Linear trend across U1–U5	*	*	*	*	*	*	*	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Changes in Inequity Over Time

Figures 6.34 and 6.35 show the inequities in prevalence of youths on income assistance in the first and last time periods for rural areas. In both time periods, the lowest income quintile (R1) had higher prevalence of youths on income assistance than expected given the proportion of the population. In time 1, 34.1% of the youths on income assistance were found in the 20.4% of the population 18 to 19 years in R1. The Gini coefficient was 0.213, indicating a high degree of disparity across rural income quintiles. In time 10, 23.4% of the youths on income assistance were found in the 22.3% of the 18– to 19–year–old population in R1. The Gini coefficient was 0.059, indicating a low degree of disparity. The decrease in the Gini coefficient over the study period in the rural areas was statistically significant, indicating a decrease in disparity over time.

Figures 6.36 and 6.37 show that there are also substantial inequities in the prevalence of youths on income assistance in the first and last time periods for urban areas. In time 1, 53.2% of youths on income assistance were found in the 17.5% of the 18– to 19–year–old population in the lowest income quintile group, with a Gini coefficient of 0.496, indicating substantial disparity. In time 10, 53.6% of the youths on income assistance were found in the 18.1% of the population in the lowest income quintile group, with a Gini coefficient of 0.479 also indicating substantial disparity. There was no significant change in the Gini coefficient over time in urban areas, indicating no change in inequity. A comparison of the Gini coefficients in the last time period indicated that the disparity was significantly higher in urban compared to rural income areas.

What do these results mean?

The prevalence of youth on income assistance decreased significantly over the study period; it is difficult to determine from the data available whether this is due to increased employment or education opportunities for youths or due to reduced access to income assistance for youths in need. Data on employment and post–secondary school participation would be beneficial for better understanding the opportunities available to Manitoba youths.

Figure 6.34: Lorenz Curve for Youths on Income Assistance in Rural Areas, 2000/01
Crude for youths 18-19 years

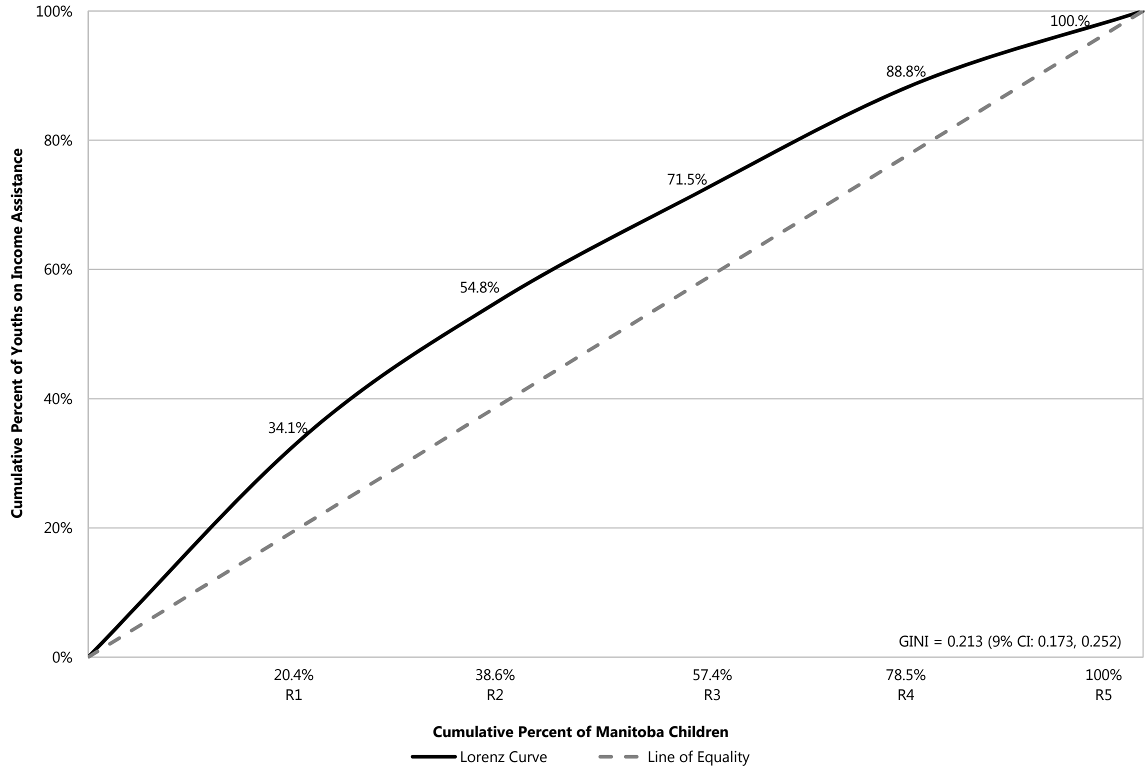


Figure 6.35: Lorenz Curve for Youths on Income Assistance in Rural Areas, 2009/10
Crude for youths 18-19 years

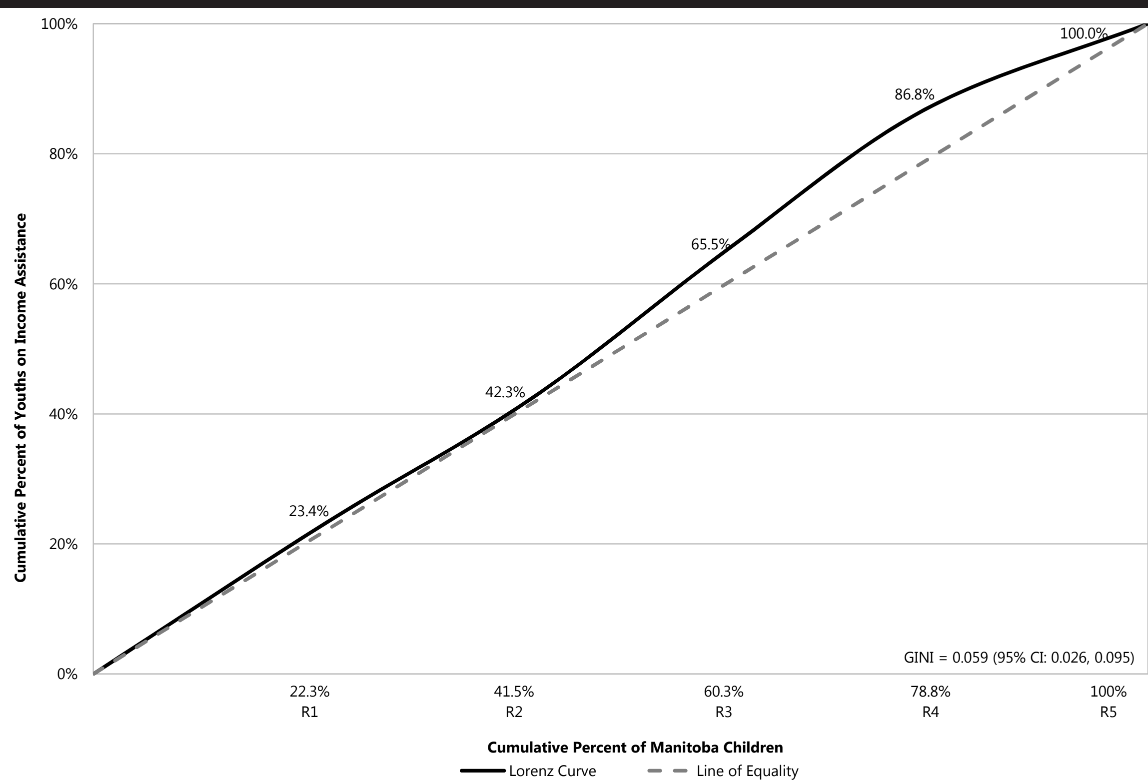


Figure 6.36: Lorenz Curve for Youths on Income Assistance in Urban Areas, 2000/01
Crude for youths 18-19 years

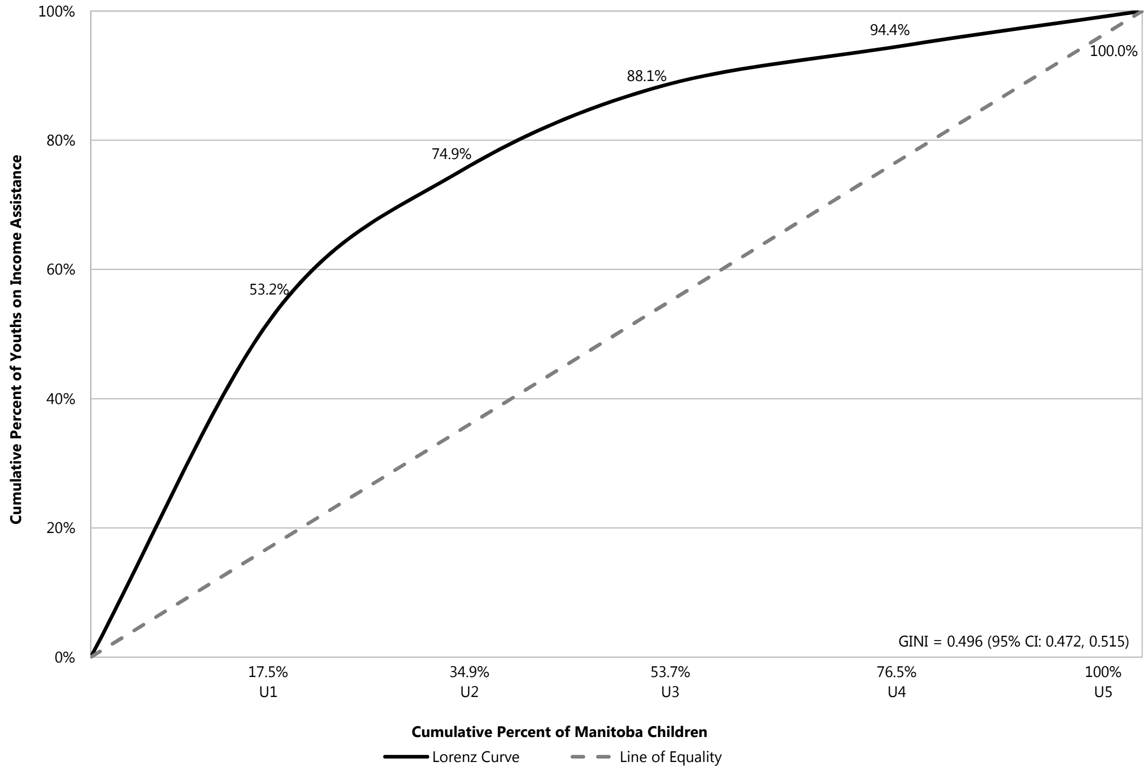
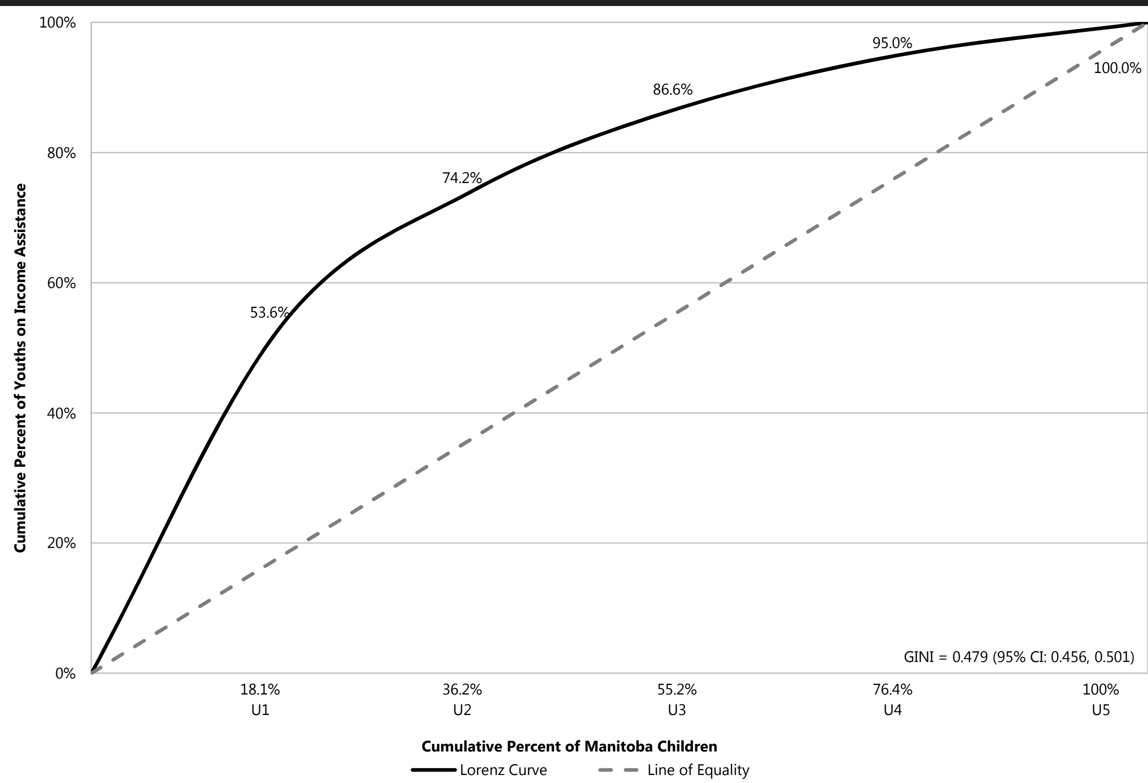


Figure 6.37: Lorenz Curve for Youths on Income Assistance in Urban Areas, 2009/10
Crude for youths 18-19 years



Chapter 7: Summary and Recommendations

Summary of Findings

There is a wealth of information in this report on indicators of child health and well–being of use to planners and decision–makers at the regional and provincial levels. Our hope is that the information in this report will provide a useful tool in the effort to improve the health and well–being of Manitoba children.

While it is difficult to summarize the information in the report, a consistent and pervasive theme running through many indicators is the inequity of health and well–being associated with socioeconomic status—simply put, area–level income is strongly related to multiple child outcomes, with lower incomes associated with poorer outcomes in physical and mental health, safety and security, successful learning, and social engagement and responsibility.

Physical Health

Most of the physical health indicators showed moderate or high degrees of inequity, suggesting the need for some targeted strategies within universal approaches to improve outcomes. Targeted strategies in northern Manitoba are also necessary as children in the North had poorer outcomes on most measures of physical health. Of particular concern was the high degree of inequity in child mortality and hospitalizations in rural areas. Despite decreases in hospitalizations over time, inequity increased in rural areas. Also of concern is the relatively high rate of diabetes in Manitoba children, particularly for teens in northern Manitoba.

Emotional Health

Compared to measures of physical health, there was less inequity in our measures of emotional health. We found that one in five children were living with a mother with a mood or anxiety disorder and there was substantial increase in children diagnosed with Attention–Deficit/Hypertension Disorder (ADHD). Given a lack of population–based data on disorders such as Fetal Alcohol Syndrome Disorder (FASD) and Autism Spectrum Disorders, it is difficult to get a full picture of children's mental health. Canadian studies suggest that although about one in seven children experience mental disorders at any given time, less than a quarter of these children receive the clinical treatment services they require, and investments in programs that could prevent mental disorders in children are woefully lacking (Canadian Institute for Health Information, 2010; Katz et al., 2009; Waddell, Offord, Shepherd, Hua, & McEwan, 2002). If not prevented or treated early, mental disorders can persist and can have a negative impact on educational and occupational trajectories and ultimately earlier mortality (Boyle & Georgiades, 2010; Fergusson, John Horwood, & Ridder, 2005; Jokela, Ferrie, & Kivimäki, 2009).

Safety and Security

Nearly all the measures of safety and security showed high degrees of inequity, confirming the need for targeted strategies within universal programs aimed at injury prevention. There is a high degree of inequity in children in care, and this inequity increased over the study period in rural areas. Although not examined in this report, there is a disproportionate representation of Aboriginal children in care, comprising over 85% of the children in care in Manitoba on March 31, 2011 (Manitoba Family Services and Consumer Affairs, 2011). The large number of children in care in Manitoba (9,432 on March 31, 2011; (Manitoba Family Services and Consumer Affairs, 2011)) raises questions about the sustainability of providing high quality foster care in some communities (Gilbert et al., 2012) and underscores the importance of ensuring effective prevention and support services are available to families.

Successful Learning

It is interesting that for only one of the measures of successful learning was there a high degree of inequity (grade repetition); and in fact for many of the indicators, the degree of inequity was low. Also of interest, when looking across assessments, inequities tend to increase as children progress through school. For example, the degree of inequity for Grade 3 assessments was low; for middle year assessments, it was low to moderate; and for assessments in Grade 12, it was moderate and getting closer to the cut–off for a high degree of inequity. These results, coupled with the results on trajectory patterns between Kindergarten and Grade 3 that showed the highest percentage of children with "deflections" were from the lowest income areas, suggest that the early and middle years of childhood may present opportunities for programs and interventions that increase positive trajectories and reduce inequities. Snow, Burns, and Griffin (1998) have documented that neighborhood socioeconomic status and the quality of the school are important factors in successful learning.

Social Engagement and Responsibility

Most of the indicators of social engagement and responsibility showed a moderate to high degree of inequity. Although teen pregnancy rates decreased over the study period, they increased in the North, where rates were already higher than other areas of the province. Teen pregnancy rates decreased for all urban income quintiles; an examination of what strategies and programs contributed to this decrease could help inform programs in rural areas.

Recommendations

Short and Long–Term Strategies to Address Health Inequities

Our finding that area–level income is strongly related to multiple child outcomes with lower incomes associated with poorer outcomes is not new information! Tackling social inequities is a daunting task—a task which has stymied policy–makers, planners, and researchers alike. While an equal distribution of wealth and resources in society is unlikely in the near future, short and long–term strategies focusing explicitly on addressing inequities can help to reduce them and ultimately improve child health. The existence of significant gradients in health and social outcomes underscores that inequities do not just impact the most disadvantaged: with every increase in socioeconomic status, there is an increase in positive outcomes. Thus, targeting programs and policies solely on the most disadvantaged will not eliminate health inequities. In order to flatten the gradient, programs, strategies and policies must be universal, but proportionately targeted according to level of disadvantage (Marmot et al., 2010). An example of this "proportionate universalism" would be teen clinics in high schools with access for all students, but additional resources (e.g., more clinic days, more outreach and education) in areas with higher rates of teen pregnancy and STIs.

In their recent book, Wilkinson and Pickett (2010) review decades of studies examining the impact of income inequality on population health outcomes. They remind us that the health of all Manitobans could benefit from greater equality. The authors show that "when people in the same social class, at the same level of income or education, are compared across countries, those in more equal societies do better" (p. 275). In other words, the effects of income inequalities not only influence the health of those in the lower socioeconomic levels, but also those in the middle and higher levels. More importantly, the book dedicates a chapter to examining a number of strategies aimed at addressing income inequities ranging from strategies to influence political will, alternate business models, and policies on redistribution of wealth by taxes and benefits to controlling the disparities in earnings.

Programs that Address Health Behaviors and the Broader Living Conditions that Contribute to Poor Health

Programs and policies aimed at encouraging healthy eating, preventing smoking and alcohol consumption in children and youths, and promoting physical activity within schools and communities should be fostered in order to improve health outcomes, reduce conditions such as diabetes, and reduce injuries. Programs must also address the broader living conditions and social circumstances that contribute to poor health, such as unemployment, poor housing, food insecurity, and parental mental health.

Targeted Strategies Aimed at Improving Sexual Health Among Teenagers

The high degree of inequity in chlamydia and gonorrhea coupled with the high degree of inequity in teen pregnancy rates suggest the need for targeted strategies to reduce unprotected sex among teens in lower income areas and in the North. Teen clinics situated within high schools and aimed at promoting reproductive health should be evaluated to determine their impact on teen pregnancy and STI rates.

Mental Health Promotion Strategies for Children and Youth

In recent years, Healthy Child Manitoba has implemented a range of programs that could potentially enhance children's mental health and, therefore, their long–term health and social outcomes, including the Triple P Program, Roots of Empathy, and the Pax Good Behaviour Game. The impact of these programs on population–level measures of mental disorders should be monitored. Likewise, programs aimed at improving parent–child relationships such as Families First and Strengthening Families and those aimed at improving the mental health of parents with young children such as the Towards Flourishing Mental Health Promotion Strategy, should also be monitored and extended to families with older children as well. A report focusing on children's mental health and use of mental health services would be valuable for planning a mental health strategy for Manitoba children.

Integrated Service Delivery for Children and Youth

In communities across the country, the "hub" model of integrated service delivery is being developed and implemented. These hubs generally integrate a range of services from the prenatal period through entry into the school system. The idea is a "one–stop shop", located in a school or community health centre, to connect families to the health, social, and education services they need to ensure healthy child development. Services may include programs to promote health in pregnancy and infancy, regulated child care, parenting classes, family literacy activities, home visiting, and early identification and intervention programs. Programs can be aimed at improving modifiable risk and protective factors such as reducing alcohol use and smoking during pregnancy, encouraging breastfeeding, improving parental mental health and parenting skills, and increasing school readiness. Having access to services across multiple domains could help to reduce inequities across multiple outcomes. It will be important to determine not only whether these hubs of integrated services have an impact on improving modifiable risk and protective factors, but also whether they are helping those most in need to access the services they require.

This hub model does not need to be limited to families with young children. Indeed, the teen clinics mentioned above should also provide links to academic support services, mental health services for adolescents, as well as connecting their parents to programs addressing the challenges of parenting teenagers. And pregnant teens intending to become parents themselves could be linked to the types of programs encouraging healthy pregnancies and infant development described above. Integrating these services would help to ensure that children and families facing challenges do not fall through the cracks and instead receive the services and supports they require.

Addressing the Needs of Aboriginal Children

Although not specifically examined in this report, the health needs of Manitoba's aboriginal children need to be addressed. According to a report on the health of Aboriginal children in Canada, child mortality rates, poverty, and inadequate living conditions are unacceptably high among Aboriginal people (UNICEF Canada, 2009). In our report, we found that children living in northern Manitoba and in lower income areas of the province have poorer health, social and educational outcomes than other Manitoba children; and it is likely that these areas with poorer outcomes have higher proportions of Aboriginal children. Local, provincial, and federal government agencies all have a role to play in ensuring that there are no gaps in funding or supports for health, education, and social services for Aboriginal children and their families. More research, specifically focusing on the health and social outcomes of Aboriginal children as well as their access to services and programs and outcomes for those involved in programs, is needed in order to determine what works to improve the health of Manitoba's Aboriginal children.

Program Evaluation

There are numerous programs aimed at improving child health and well–being throughout schools and communities in Manitoba, implemented at local, regional, and provincial levels. It is important that information on participation in these programs is documented, outcomes for children and families involved are evaluated to determine what programs work for improving outcomes, and whether inequities in children's outcomes are reduced as a result of the programs. Equity–focused Health Impact Assessments (EfHIA) could be utilized to assess how best to implement programs and ensure that they reach all families (Harris, Harris-Roxas, Harris, & Kemp, 2007). The PATHS Equity for Children program of research is evaluating the impact on health and equity of several programs in Manitoba and will provide valuable information to planners and policy makers about what works to improve child health. In addition, further exploration of factors (individual, family, school) that contribute to positive trajectories and positive deflections in school performance would be worthwhile.

Complete Data on Health, Social and Education Indicators

With respect to data issues, it will be important to ensure that complete information on children involved with Child and Family Services is collected and entered into the Child and Family Services Information System, so that policy decisions and programs can be made based on solid evidence. Likewise, research on education outcomes and programs would be strengthened if the data available were truly population–based, including enrolment and assessment data for children in all First Nations schools, non–funded independent schools, home–schooled children, and youths attending adult learning centres. More comprehensive data collection on children's mental health conditions and the services they receive would also be beneficial for developing strategies for improving children's mental health. More complete data on physician visits to salaried physicians would help determine whether lower rates of conditions like asthma and ADHD in northern areas are due to real differences in prevalence or data capture issues. Finally, abstracting routinely charted information on children's height and weight from physician records would be useful for monitoring childhood overweight and obesity and exploring associated risk and protective factors.

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Statistics Canada. Table 105-0501: Health indicator profile, annual estimates, by age group and sex, Canada, provinces, territories, health regions (2011 boundaries) and peer groups, occasional, CANSIM (database). 2012c. http://www5.statcan.gc.ca/cansim/. Accessed August 15, 2012c.

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Glossary

Academic Year
Period of time each year when most students attend school sessions, usually from early September to late June.

Adjusted
Standardized across groups, in order to allow for comparison across groups. For example, **prevalence** or **rate** of an area may be adjusted by age and sex so as to provide an estimate of what an area's prevalence or rate might have been if that area's age and sex distribution was the same as that for the province overall. This adjustment removes the effects of demographic differences.

Adult Learning Centres
Colleges, community centres and organizations affiliated with Adult Learning and Literacy in Manitoba that offer adult learning programs. These programs are designed to help adults (19 years of age and older) obtain a Mature Student High School Diploma, to meet post–secondary requirements, and/or to upgrade qualifications for better employment (Manitoba Adult Learning and Literacy, 2010; Manitoba Adult Learning and Literacy, 2012).

Manitoba Adult Learning and Literacy. Manitoba Adult Literacy Strategy. Annual Report 2009–2010. 2010. http://www.edu.gov.mb.ca/ael/all/publications/annual/alc_ar_09_10.pdf. Accessed August 2, 2012.

Manitoba Adult Learning and Literacy. Directory of Certified Adult Learning and Literacy Centres of Manitoba 2011–2012. Manitoba Advanced Education and Literacy. http://www.edu.gov.mb.ca/ael/all/directory/pdf/all_directory.pdf. Accessed August 2, 2012.

Aggregated Diagnosis GroupsTM (ADGsTM)
Formerly known as Ambulatory Diagnostic Groups, ADGs continue to be part of the **Johns Hopkins Adjusted Clinical Group® (ACG®) case–mix system**. The ACG method groups every **International Classification of Diseases (ICD)** diagnosis code assigned to a patient into one of 32 different ADGs based on five clinical and expected utilization criteria:

a. duration of the condition (acute, recurrent, or chronic)
b. severity of the condition (e.g., minor and stable versus major and unstable)
c. diagnostic certainty (symptoms focusing on diagnostic evaluation versus documented disease focusing on treatment services)
d. etiology of the condition (infectious, injury, or other)
e. specialty care involvement (medical, surgical, obstetric, haematology, etc.)

Ambulatory Visits
Almost all contacts with physicians: office visits, walk–in clinics, home visits, personal care home (nursing home) visits, visits to outpatient departments, some emergency room visits (where data are recorded), and in northern/remote nursing stations. Services provided to patients while admitted to hospital and most visits for prenatal care are excluded.

Anatomical Therapeutic Chemical (ATC) Drug Classification System

A drug classification system that is often used for research purposes. Drugs are divided into five main groups according to the target organ or system and/or the drug's therapeutic and chemical characteristics:

a. anatomical group
b. therapeutic main group;
c. therapeutic/pharmacological subgroup
d. chemical/therapeutic/pharmacological subgroup
e. subgroup for chemical substance

The ATC classification is a component of the Health Canada Drug Product Database (Health Canada, 2011). ATC classifications are available online from the **World Health Organization**, and are updated and published once a year (WHO Collaborating Centre for Drug Statistics Methodology, 2011).

Health Canada. Drug Product Database. 2011. http://www.hc–sc.gc.ca/dhp–mps/prodpharma/databasdon/index–eng.php. Accessed August 15, 2012.

WHO Collaborating Centre for Drug Statistics Methodology. ATC/DDD Index 2012. 2011. http://www.whocc.no/atc_ddd_index/. Accessed August 12, 2012.

Asthma

A **chronic condition** in which inflammation of the airways restricts airflow into and out of the lungs. In this study, asthma **prevalence** was defined as the percent of children 6 to 19 years with:

a. one or more hospitalizations with asthma diagnosis (ICD–9–CM 493, ICD–10–CA J45)
b. one or more physician visits with asthma diagnosis
c. one or more prescriptions for asthma drugs

over two–year time periods from **fiscal year** 2000/01 through 2009/10. See online appendix for a list of relevant **Anatomical Therapeutic Chemical (ATC)** drug codes and **Drug Identification Numbers (DIN)**.

Attention–Deficit Hyperactivity Disorder (ADHD)

A neurobehavioural developmental disorder that is characterized by a persistent pattern of impulsiveness, hyperactivity and absence of attention in children. In this study, ADHD **prevalence** was defined as the percent of children aged 6 to19 with:

a. one or more hospitalizations or physician visits with a diagnosis of hyperkinetic syndrome (ICD–9–CM 314, ICD–10–CA F90) in one fiscal year
b. two or more prescriptions for psychostimulants within one fiscal year without a corresponding diagnosis of conduct disorder (ICD–9–CM 312; ICD–10–CA F63, F91, F92), disturbance of emotions (ICD–9–CM 313; ICD–10–CA F93, F94), or cataplexy and narcolepsy (ICD–9–CM 347; ICD–10–CA G47.4) in one year
c. one prescription for psychostimulants in a fiscal year and a diagnosis of hyperkinetic syndrome in the previous three years

Prevalence was calculated for every **fiscal year** from 2000/01 through 2009/10. See online appendix for a list of relevant **Anatomical Therapeutic Chemical (ATC)** drug codes and **Drug Identification Numbers (DIN)**.

Updated November 1, 2012

Bentler and Bonnet's Normed Fit Index (NFI)

Also called Bentler–Bonett Normed Fit Index, NFI is an incremental measure of goodness of fit for a statistical model, which is not affected by the number of parameters/variables in the model. Goodness of fit is measured through a comparison of the model of interest to a model of completely uncorrelated variables.

Statsoft Inc. Other indices of fit – Bentler Fit - Bentler-Bonett Normed Fit Index. 2012. http://documentation.statsoft.com/STATISTICAHelp.aspx?path=SEPATH/Sepath/Notes/Technical/OtherIndicesofFitBentlerBonettNormedFitIndex. Accessed October 12, 2012

Ullman JB. Structural equation modeling. In: Tabachnick BG, Fidell LS, eds. Using Multivariate Statistics. 5th ed. Boston, MA: Pearson Education Inc.; 1996: 676-780.

Bollen's Normed Index (Rho1)

Incremental measure of goodness of fit for a statistical model, the normed index (also known as relative fit index) is similar to **Normed Fit Index** with the exception that the fit is affected by each additional parameter or variable in the model.

StatSoft Inc. Other indices of fit - Bollen's Rho. 2012. http://documentation.statsoft.com/STATISTICAHelp.aspx?path=SEPATH/Sepath/Notes/Technical/OtherIndicesofFitBollensRho. Accessed October 12, 2012

Widaman KF, Thompson JS. On specifying the null model for incremental fit indices in structural equation modeling. Psychological Methods 2003;8(1): 16-37.

Bootstrap

"A technique for estimating the variance and the bias of an estimator by repeatedly drawing random samples with replacement from the observations at hand. One applies the estimator to each sample drawn, thus obtaining a set of estimates. The observed variance of this set is the bootstrap estimate of variance. The difference between the average of the set of estimates and the original estimate is the bootstrap estimate of bias" (Last, 1995).

Last JM. *A Dictionary of Epidemiology.* New York, NY: Oxford University Press; 1995.

Cadham Provincial Laboratory Database

An administrative health database containing information about the services provided by the Cadham Provincial Laboratory, including public health laboratory services (microbiology, serology, parasitology, and virology) and reference services for identification and typing of microorganisms. Request for these services (from health practitioners) are captured in this database, as well as the results of the requests. Patient information and clinical information are also provided.

Causes of Hospitalization

Reasons for hospitalization indicated as "most responsible" diagnoses attributed during inpatient hospital stay. These diagnoses are categorized according to the I**nternational Classification of Diseases (ICD)** system. Causes of **hospital episodes** were calculated using two sets of exclusions:

a. birth–related hospitalizations
b. pregnancy– and birth–related hospitalizations

In this study, proportions and **rates** of hospitalization causes for children aged 0 to 19 in every **fiscal year** from 2000/01 through 2009/10 were calculated using each set of exclusions.

Causes of Injury Hospitalization

Reasons for hospitalization indicated as "most responsible" diagnoses attributed during inpatient hospital stay related to injury. These diagnoses are according to the **International Classification of Diseases (ICD)** system. In this study, proportions of all **injury hospitalization** causes and **rates** were calculated for children aged 0 to 19 over five–year time periods from **fiscal year** 2000/01 through 2009/10. Causes of injury hospitalization for out of province, newborn, stillborn, brain death hospital records, surgical misadventures, and adverse drug effects were excluded.

Causes of Child Mortality

Causes of death, as indicated with **International Classification of Diseases (ICD)** codes on the Death Certificate from **Vital Statistics**. In this study, proportions and rates of **child mortality** causes were calculated for children aged 1 to 19 over five–year time periods from **calendar year** 2000 through 2009.

Census

The official count of a population, often including demographic information such as age, sex, employment and income. **Statistics Canada** conducts a Census every five years. It takes account of persons living in Canada, including any individuals residing in Canada on a temporary basis and Canadians abroad on military missions or on merchant vessels that are registered in Canada (Statistics Canada, 2009).

Statistics Canada. 2006 Census Reference Material. 2009. http://www12.statcan.gc.ca/census–recensement/2006/index–eng.cfm. Accessed August 1, 2012.

Child and Family Services (CFS)

A branch of the Community Service Delivery division of the Department of Manitoba Family Services and Labour that provides a comprehensive continuum of child protection (e.g., foster care) and family support services in Manitoba in accordance with The Child and Family Services Act and The Adoption Act.

Child and Family Services Information System (CFSIS)

A data management system that supports case tracking and reporting of services provided to children and families as they pass through Manitoba **Child and Family Services (CFS)**. CFSIS includes information on **children in care** as well as information on families receiving protective services and support services

Child Mood and Anxiety Disorders

In this study, **prevalence** of child **mood and anxiety disorders** was defined as the percent of children aged 13 to 19 diagnosed with mood and anxiety disorders over two–year time periods from **fiscal year** 2000/01 through 2009/10.

Child Mortality

In this study, child mortality was defined as death reported in the **Vital Statistics** database. Mortality rates were calculated per 100,000 children aged 1 to 19 years over five–year time periods from calendar year 2000 through 2009.

Child Welfare Involvement

Children receiving services from **Child and Family Services (CFS)**, which includes **children in care** and **children in a family receiving services from CFS**.

Children in Care

Children who are removed from their families of origin and placed in the care of another adult(s) (not a parent or guardian) due to concerns about the proper provision of care in the family of origin. In a situation where a family is unable or unfit to properly look after their child(ren), the child(ren) may be placed into foster care. Children can come into care for a variety of reasons including abuse and neglect, illness, death, conflict in their family, disability, or emotional problems. Children can be placed in foster care through voluntary placement, voluntary surrender of guardianship, apprehension, or order of guardianship. CIC does not include children who remain with or are returned to a parent or guardian under an order of supervision.

In this study, **prevalence** of children in care was calculated as the percent of children 0 to 17 years who were reported in the **Child and Family Services Information System (CFSIS)** database as being in care within a three–year time period from **fiscal year** 2000/01 through 2008/09.

Children in a Family Receiving Services from Child and Family Services (CFS)

Children whose health or emotional well–being is thought to be endangered, but who remain in a family that receives a service from **Child and Family Services (CFS)**. Services requested by the family or received upon "recommendation" by CFS are intended to serve as aid in the resolution of family matters. In this study, **prevalence** of children in a family receiving services from CFS was defined as the percent of children 0 to 17 years who were reported in CFSIS as receiving services within a three–year time period from **fiscal year** 2000/01 through 2008/09.

Children Living with a Mother with Mood and/or Anxiety Disorders

In this study, **prevalence** of children with a mother with mood and/or anxiety disorders was defined as the percent of children aged 13 to 19 with a mother diagnosed with **mood and anxiety disorders** at any point over a two–year time period from **fiscal year** 2000/01 through 2009/10.

Chlamydia

A **sexually transmitted infection (STI)** that, if left untreated, may increase the risk of contracting **Human Immunodeficiency Virus (HIV)**, as well as infertility, epididymitis in males, or ectopic pregnancy and pelvic inflammatory disease in females (Chin, 2000; Dickerson, Johnston, Delea, White, & Andrews, 1996). In this report, chlamydia was defined as the percent of youths, aged 13 to 19, having at least one positive detection for the infection in the **Cadham Provincial Laboratory Database** in fiscal year 2008/09:

a. microbiology organism: Chlamydia Trachomatis
b. microbiology results section: Chlamydia detected

Chin J. Control of Communicable Disease Manual. American Public Health Association. 2000. http://www.ciphi.ca/hamilton/Content/documents/ccdm.pdf. Accessed November 5, 2012.

Dickerson MC, Johnston J, Delea TE, White A, Andrews E. The Causal Role for Genital Ulcer Disease as a Risk Factor for Transmission of Human Immunodeficiency Virus: An Application of the Bradford Hill Criteria. Sexually Transmitted Diseases. 1996;23(5).

Chronic Condition

A health condition that is generally incurable, is often caused by a complex interaction of factors, and usually has a prolonged clinical course.

Communication Skills and General Knowledge

Set of eight items on the **Early Development Instrument (EDI)** used to assess a Kindergarten child's readiness for school in terms of their "ability to clearly communicate one's own needs and understand others, active participation in story–telling, interest in general knowledge about the world," and other similar characteristics (Offord Centre for Child Studies, 2010).

Offord Centre for Child Studies. The Early Development Instrument (EDI) Guide. 2010. http://www.offordcentre.com/readiness/files/EDI_Guide_2010–2011_EN.pdf. Accessed August 15, 2012.

Comparative Fit Index (CFI)

A measure of model fit relative to other models, which performs well with all sample sizes (Bentler, 1990).

Bentler PM. Comparative fit indexes in structural models. Psychological Bulletin. 1990;107(2):238–246.

Confidence Interval (CI)

A computed interval with a given probability that the true value of a variable (e.g., a mean or rate) is contained within the interval. For example, a 95% CI would have a 95% probability of containing the true population value.

Contrast Statement – see **Generalized Linear Model**

Diabetes (Diabetes Mellitus)

A chronic endocrine disease relating to a deficiency of the hormone insulin. The deficiency is complete when the pancreas no longer produces insulin (Type 1 Diabetes) or is relative due to an insensitivity of the cells in the body to the insulin that is produced (Type 2 Diabetes). In both types of diabetes, glucose in the blood cannot be properly absorbed and utilized by the cells of the body. In this study, type 1 and type 2 diabetes were not distinguished. Diabetes **prevalence** was defined as the percent of children aged 6 to19 years with:

a. one or more hospitalizations with a diagnosis of diabetes (ICD–9–CM 250, ICD–10–CA E10–E14)
b. two or more physician visits with a diagnosis of diabetes
c. two or more prescriptions for diabetes (ATC A10) within a period of three years

Prevalence of diabetes in children aged 6 to 19 was calculated over three–year time periods during fiscal years 2000/01–2009/10. See online appendix for a list of relevant **Anatomical Therapeutic Chemical (ATC)** drug codes and **Drug Identification Numbers (DIN)**.

Dissemination Area (DA)

A small, relatively stable geographic unit composed of one or more blocks. It is the smallest standard area for which all **Census** data are disseminated. DAs cover all the territory of Canada, and in 2001 replaced the enumeration area as a basic unit for dissemination (Statistics Canada, 2009).

Statistics Canada. 2006 Census Reference Material. 2009. http://www12.statcan.gc.ca/census–recensement/2006/index–eng.cfm. Accessed August 1, 2012.

Drug Identification Number (DIN)

An eight digit number, assigned by the Therapeutic Products Directorate of Health Canada, to each drug approved for use in Canada in accordance with the Food and Drug Regulation. The same drug (e.g., Amoxicillin, 250 mg capsules) can have several different DINs associated with it. For example, due to different manufacturers, a drug can have different dosage forms, routes, or strengths.

Drug Program Information Network (DPIN)

An electronic, on–line, point–of–sale drug database. It links all community pharmacies (excluding pharmacies in hospitals or nursing homes/personal care homes) and captures information about all Manitoba residents, including most prescriptions dispensed to residents holding First Nation status. DPIN contains information such as unique patient identification, age, birthdate, sex, medication history, over–the–counter medication history, patient postal code, new drugs prescribed, date dispensed, and unique pharmacy identification number. DPIN is maintained by the Government of Manitoba's Ministry of Health.

Early Development Instrument (EDI)

"A short, teacher–completed instrument which measures children's readiness to learn at school in five domains: physical health and well–being; social knowledge and competence; emotional health/maturity; language and cognitive development; and general knowledge and communication skills" (Offord Centre for Child Studies, 2010). It is administered at the Kindergarten level and was designed to measure population–level development in the early childhood period.

Offord Centre for Child Studies. The Early Development Instrument (EDI) Guide. 2010. http://www.offordcentre.com/readiness/files/EDI_Guide_2010–2011_EN.pdf. Accessed August 15, 2012.

Education Information System

An integrated database that facilitates departmental, divisional, and school–based planning and decision making. The database is designed to enhance the accountability of the educational system to students, parents, and the community and to improve the collection, storage, access, and analysis of education information (Manitoba Education, 2012).

Manitoba Education. About EIS Collection. 2012. http://www.edu.gov.mb.ca/k12/eis/about.html. Accessed August 15, 2012.

Emotional Maturity

Set of 30 items on the **Early Development Instrument (EDI)** used to assess a Kindergarten child's readiness for school in terms of their pro–social and helping behaviours; ability to concentrate; patience; lack of anxious, fearful, or aggressive behaviour; and other similar characteristics (Offord Centre for Child Studies, 2010).

Offord Centre for Child Studies. The Early Development Instrument (EDI) Guide. 2010. http://www.offordcentre.com/readiness/files/EDI_Guide_2010–2011_EN.pdf. Accessed August 15, 2012.

Estimate Statement – see **Generalized Linear Model**

Families First Screen

A brief measure of biological, social, and demographic risk factors. This is used by public health nurses to screen all postpartum referrals in Manitoba. The Families First (previously known as BabyFirst) screening form is the first of two screening stages for Manitoba's Families First home visiting program. The screen is also utilized for linking families to other resources and services such as community support groups, financial assistance, parenting programs, child care, and mental health services. In 2003, the screen and the home visiting program changed names from BabyFirst to Families First to better reflect a family–centered approach.

Fetal Alcohol Spectrum Disorder (FASD)

A condition that encompasses a wide range of effects that can occur in an individual who was exposed to alcohol during pregnancy (Chudley et al., 2005). Some of these effects last a lifetime and may include physical, mental, behavioural, and cognitive disabilities (Streissguth et al., 2004). In this study, FASD was defined as the percent of children aged 0 to 19 with a diagnosis of 'ARND', 'ARND/ARBD', 'FAS', 'FAS/ARBD', or 'Partial FAS,' which are diagnostic categories taken from the Manitoba FASD Centre clinical database.

Chudley AE, Conry J, Cook JL, Loock C, Rosales T, LeBlanc N. Fetal alcohol spectrum disorder: Canadian guidelines for diagnosis. *CMAJ.* 2005;172(5 Suppl):S1–S21.

Streissguth AP, Bookstein FL, Barr HM, Sampson PD, O'Malley K, Young JK. Risk factors for adverse life outcomes in fetal alcohol syndrome and fetal alcohol effects. *J Dev Behav Pediatr*. 2004;25(4):228–238.

First Nations Community

A legal list of First Nations communities maintained by **Aboriginal Affairs and Northern Development Canada**, which includes the following census sub–division types: Indian Government Districts, Reserves, Indian Settlements, Terre Reservées, Nisga'a Lands, Nisga'a Villages, and Teslin Lands. By definition, the complete list of First Nations communities includes:

a. Land reserved under the Indian Act
b. Land set aside for the use and benefit of Indian people
c. Areas where activities on the land are paid or administered by INAC
d. Areas listed in the Indian Lands Registry System held by Lands and Trust Services at the Indian and Northern Affairs Canada

This broader definition of a First Nation community includes a selection of the following census sub–division types: Chartered Community, Hamlet, Northern Hamlet, Northern Village, Settlement, Town, and Village.

Fiscal Year

For most Canadian government agencies and health care institutions, the fiscal year was defined as starting April 1 and ending the following year at March 31.

Generalized Linear Model (GLM)

A unified class of models for regression analysis of independent observations of a discrete or continuous response. A characteristic feature of generalized linear models is that a suitable non–linear transformation of the mean response is a linear function of the covariates. These models provide a unified method for analyzing diverse types of univariate responses (e.g., continuous, binary, counts) by combining several regression models such as the standard linear regression for normally distributed continuous outcomes, **logistic regression** models for a binary outcome, or Poisson regression models for counts (Fox, 1997). Estimate statements in generalized linear models provide both a parameter estimate based on the regressions and a statistical test of linear combinations of fixed effects. Contrast statements can be used to produce statistical test results.

Fox J. Applied Regression Analysis, Linear Models, and Related Methods. Thousand Oaks, CA: Sage Publications; 1997.

Gini Coefficient

The Gini coefficient is a measure of disparity in a population. It is the ratio of the area between the line of equality and the **Lorenz curve** divided by the total area under the line of equality. The calculated Gini coefficient can take on a value from 0 to 1. A Gini coefficient equal to 0 indicates that there is zero disparity in the population such as in the case where there is perfect equality. A Gini coefficient equal to one indicates that there is perfect inequality in the population. A general rule is that the closer the Gini is to zero the less disparity there is between the neighbourhood income quintile groups and hence the overall population (Gini, 1955).

Gini C. Variabilite Mutabilita, 1912 (Reprinted in Memorie di metodologica statistica. Pizetti E. and Salvemini T. (eds.)). Rome, Italy: Libreria Eredi Virgilio Veschi; 1955.

Gonorrhea

A **sexually transmitted infection (STI)** that, if left untreated, may increase the risk of contracting **Human Immunodeficiency Virus (HIV)** (Chin, 2000; Dickerson et al., 1996), pelvic inflammatory disease, ectopic pregnancy, and infertility in females or urethritis, epididymitis, and gonococcal arthritis in males (Merck Research Laboratories, 1992). Gonorrhea may also cause pharyngeal and anorectal infections in females and homosexual males (Chin, 2000). In this study, gonorrhea in youths aged 13 to 19 years was defined as having at least one positive detection for gonorrhea in the **Cadham Provincial Laboratory database** in **fiscal year** 2008/09:

a. microbiology organism: Neisseria Gonorrhoeae
b. microbiology results: N. Gonorrhoeae isolated, beta lactamase negative; N. Gonorrhoeae isolated, beta lactamase positive; Neisseria Gonorrhoeae detected; presumptive Neisseria Gonorrhoeae detected

Chin J. Control of Communicable Disease Manual. American Public Health Association. 2000. http://www.ciphi.ca/hamilton/Content/documents/ccdm.pdf. Accessed November 5, 2012.

Dickerson MC, Johnston J, Delea TE, White A, Andrews E. The Causal Role for Genital Ulcer Disease as a Risk Factor for Transmission of Human Immunodeficiency Virus: An Application of the Bradford Hill Criteria. Sexually Transmitted Diseases. 1996;23(5).

Merck Research Laboratories. The Merck Manual of Diagnosis and Therapy. 16th ed. Rahway, NJ: Merck Research Laboratories; 1992.

Grade 3/4 Assessments

Evaluations of reading, math and number skills for students in Grades 3 and 4 of publicly funded schools in Manitoba. Students in English and Français programs are assessed in reading in Grade 3. Students in the French Immersion program are assessed in reading in Grades 3 and 4. Students in all programs are assessed in numeracy in Grade 3. Using select criteria provided by the Department of Education, these assessments are conducted by the teacher early in the school year in order to identify strengths and needs in reading and to guide the class curriculum for the school year.

In this study, reading and numeracy assessments in Grade 3 were used to calculate the percent of Grade 3 students meeting or approaching their grade level of performance in two reading and four numeracy competencies in the **academic year** 2009/10:

Reading competencies:

a. uses strategies during reading to make sense of texts
b. demonstrates comprehension

Numeracy competencies:

a. predicts an element in a repeating pattern
b. understands that the equal symbol represents an equality of the terms found on either side of the symbol
c. understands that a given whole number may be represented in a variety of ways (to 100)
d. uses various mental math strategies to determine answers to addition and subtraction questions to 18

Grade 3 Assessment in Reading – see **Grade 3/4 Assessments**

Grade 3 Assessment in Numeracy – see **Grade 3/4 Assessments**

Grade 7 Assessment in Mathematics

An evaluation of math skills for students in Grade 7 of publicly funded schools in Manitoba. This assessment is performed by the teacher and students throughout the **academic year** in order to review the students' skills in math and to develop the best learning process to reach their competency goals. In this study, Grade 7 assessments in mathematics were used to calculate the percent of Grade 7 students meeting or approaching their grade level of performance in all five math competencies in each **academic year** during 2007/08–2009/10:

a. orders fractions
b. orders decimal numbers
c. student understands that a given number may be represented in a variety of ways
d. uses number patterns to solve mathematical problems
e. uses a variety of strategies to calculate and explain a mental math problem

Grade 7 Assessment of Student Engagement

An evaluation of student involvement in their education in Grade 7 of publicly funded schools in Manitoba. In this study, Grade 7 engagement assessments were used to calculate the percent of Grade 7 students meeting or approaching their grade level of performance in all five engagement competencies in each **academic year** during 2007/08–2009/10:

a. demonstrates an interest in his or her learning
b. engages in self–assessment
c. is aware of learning goals of a unit of study and/or personal learning goals
d. participates in lessons
e. accepts responsibility for assignments

Age– and sex–adjusted rates of students establishing or developing expectations in Grade 7 engagement were calculated by aggregate region and income quintile for each academic year during 2007/08–2009/10. Gini coefficients for students in rural and urban areas in 2007/08 and 2009/10 were adjusted by age and sex.

Grade 8 Assessment in Reading and Writing

An evaluation of reading comprehension and writing of informal texts for students in Grade 8 of publicly funded schools. This assessment is performed by the teacher and students during the first term of the school year in order to review the students' reading and writing skills and to develop the best learning process to reach their competency goals.

In this study, Grade 8 assessments were used to calculate the percent of Grade 8 students meeting or approaching their grade level of performance in all six reading and writing competencies in each **academic year** during 2007/08–2009/10:

a. understands key ideas and messages in a variety of texts
b. interprets a variety of texts
c. responds critically to a variety of texts
d. generates selects and organizes ideas to support the readers' understanding
e. chooses language (word choices, sentence patterns) to make an impact on the reader
f. uses conventions (spelling, grammar and/or punctuation) and resources to edit and proofread to make meaning clear

Grade 12 Standards Tests

Standard provincial tests that Grade 12 students are required to write. Individual tests are written in Language Arts (LA) and Mathematics. The standards tests are curriculum–based and account for 30% of the students' final course mark. Adaptations of the tests are provided for many special needs students. Exemptions can be provided on an individual basis, as required.

In this study, Grade 12 Standards Tests were used to calculate the percent of Grade 12 students passing the tests on time in each academic year during 2000/01–2009/10. Students passing the tests on time included all children who:

a. were born in Manitoba and living in the province in the year they turned 18 years of age (i.e., the year they should have written the standard tests if they had progressed through the school system as expected)
b. achieved at least a 50% mark on the standards test.

Grade 12 Standards Test Performance

In this study, the performance of students on the **Grade 12 Standards Tests** for Language Arts (LA) and Mathematics were calculated for each **academic year** during 2000/01–2009/10. Student performance was defined as the percent of youths who were born in Manitoba and living in the province in the year they turned 18 years of age (i.e., the year they should have written the standard tests if they had progressed through the school system as expected). These youths were grouped into seven categories for analysis:

a. passed the tests (at least 50% exam mark)
b. failed the tests
c. were absent from school
d. did not complete the test
e. were in Grade 11 or lower (i.e., retained at least one year)
f. who had **withdrawn** from school
g. other

The latter category includes students with a previous record of the Grade 12 LA or Math credit and students that were exempt from the test, dropped the course, or otherwise did not write the test.

Grade Repetition

Continuation in a school program at the same grade level for part or all of the next school year due to failing to acquire the minimum expectations or outcomes to proceed to the next grade level. In this study, grade repetition was defined as the percent of students in Kindergarten to Grade 8 who have been enrolled in the same grade for two or more consecutive academic years and who did not have an aberrant pattern of grade promotion any other year (e.g., retention one year and promotion of two grades the next). Grade repetition was calculated over five–year **academic years** from 2000/01 through 2008/09.

Healthy Child Manitoba (HCM)

The Government of Manitoba's long–term, cross–departmental prevention strategy for children and families. Led by the Healthy Child Committee of Cabinet, Healthy Child Manitoba bridges departments and governments and, together with the community, works to improve the well–being of Manitoba's children and youth. HCM focuses on child–centred public policy through the integration of financial and community–based family supports. HCM researches best practices and models and adapts these to Manitoba's unique situation. It works to strengthen provincial policies and programs for healthy child and adolescent development, from the prenatal period to adulthood. HCM evaluates programs and services in an attempt to find the most effective ways to achieve the best possible outcomes for Manitoba children, families, and communities (Healthy Child Manitoba, 2010).

Healthy Child Manitoba. Healthy Baby Community Program Guide. 2010. http://www.gov.mb.ca/healthychild/healthybaby/hb_programguide.pdf. Accessed May 25, 2012.

High School Completion

Level of educational attainment, in which the individual has completed high school (i.e., grade 12). In this study, high school completion was defined as the percent of Grade 9 students who completed high school within six years of beginning Grade 9. Completion of high school is defined as having:

a. a student record with a year–end status that indicated graduation
b. at least 28 to 30 (depending on the year) cumulative high school course credits
c. four or more grade 12 credits

No attempt was made to determine whether the credits earned were the required credits. Students who were enrolled in Grade 9 in school years 1997/98–2004/05 were followed until 2002/03–2009/10. Students enrolled at a home school, First Nations Schools (including those administered by Frontier School Division under an education agreement), non–funded independent school, and Adult Learning Centre were excluded in two steps: first, based on Grade 9 enrolment and second, based on the last **academic year** available for the student. **High school completion** calculations by region and **income quintile** are based on where students live rather than where they attend school. **High school completion** was calculated for each **academic year** from 2002/03 through 2009/10.

Hepatitis B

A **sexually transmitted and blood–borne infection (STBBI)** of the liver caused by the hepatitis B virus, which can be transmitted through sexual contact and exchange of bodily fluids including blood and saliva. This virus is 100 times more infectious than the **Human Immunodeficiency Virus (HIV)**. The majority of infected individuals (90%) develop a protection against the virus, while about 10% become chronic carriers of the virus. Approximately 50% of hepatitis B virus carriers do not show any symptoms. Prolonged exposure to this virus may have serious health implications, including scarring of the liver or liver cancer. Unlike other **sexually transmitted diseases (STIs)**, hepatitis B can be prevented through vaccination (Public Health Agency of Canada, 2010).

Public Health Agency of Canada. Hepatitis B – Get the Facts. 2010. http://www.phac–aspc.gc.ca/hcai–iamss/bbp–pts/hepatitis/hep_b–eng.php. Accessed August 3, 2012.

Hospital Discharge Abstract

A form or a computerized record filled out upon a patient's discharge (separation) from an acute care hospital. The abstract contains information from the patient's medical record based on their stay in hospital, such as gender, residence (postal code), diagnoses and procedure codes, admission and discharge dates, length of stay, and service type (inpatient, day surgery, outpatient). Abstract records are stored in the Hospital Abstracts Database.

Hospital Episode

A single, continuous stay in the hospital system, irrespective of transfers between hospitals.

Hospital Utilization

In this study, hospital utilization was defined as the **rate** of **hospital episodes** per 1,000 children aged 0 to19 in each **fiscal year** from 2000/01 through 2009/10. Birth hospitalizations were excluded.

Human Immunodeficiency Virus (HIV)

A **sexually transmitted and blood–borne infection (STBBI)** that can also be transmitted to infants though breast milk. HIV attacks the host immune system, increasing the susceptibility to other infections. If left untreated, this systemic infection may develop into Acquired Immunodeficiency Syndrome (AIDS). However, not all HIV carriers develop AIDS and some may not develop symptoms of HIV infection for years (Public Health Agency of Canada, 2011).

Public Health Agency of Canada. STI– Sexually Transmitted Infections: HIV. 2011. http://www.phac–aspc.gc.ca/publicat/std–mts/hiv–eng.php. Accessed August 3, 2012.

Income Assistance (IA)

A provincial program of last resort for people who need help to meet basic personal and family needs and to find a job or get back to work. Eligibility for IA is determined by a test of need that compares the total financial resources of the household to the total cost of basic necessities. Applicants must be in financial need for the monthly cost of basic needs, medical costs, living expenses, and special costs associated with disabilities, as defined in the Employment and Income Assistance Act and Regulation (Manitoba Family Services and Labour, 2012). As of 2012, applications for IA are reviewed by Manitoba Entrepreneurship, Training and Trade.

Manitoba Family Services and Labour. Employment and Income Assistance Program. 2012. http://www.gov.mb.ca/fs/assistance/eia_faq.html. Accessed August 15, 2012.

Income Quintile

A method used to measure the average household income of residents by aggregating household income to the **dissemination area (DA)** derived from **Census** data, ranking them from poorest to wealthiest, and then grouping them into five income quintiles (1 being poorest and 5 being wealthiest). Each quintile contains approximately 20% of the population. Income quintiles are available for urban (Winnipeg and Brandon) and rural (other Manitoba areas) populations. Individuals that cannot be assigned an income quintile from census data are assigned to the Income Unknown group. This category includes individuals residing in facilities such as personal care homes, psychiatric facilities, prisons, or wards of the Public Trustee and Child and Family Services. Residents of areas reporting no income in the census and households in areas with populations less than 250 persons are also grouped in this category.

Independent Schools

This group of schools includes homeschooling, funded and non–funded schools that may be affiliated with a specific religious or denominational group. Independent schools have their own governing bodies or boards, and their operation varies (Manitoba Education, 2012a; Manitoba Education, 2012b). "Independent schools are eligible for provincial funding if they implement the Manitoba curriculum, [hire Manitoba certified teachers,] and meet a number of additional requirements. Non–funded independent schools may not follow provincial curricula but must deliver a standard of education to that provided in a public school. Only funded independent schools are authorized to issue Senior Years course credits recognized by Manitoba Education (Manitoba Education, 2012)."

Manitoba Education. Going to school in Manitoba. 2012a. http://www.edu.gov.mb.ca/k12/schools/gts.html. Accessed August 31, 2012.

Manitoba Education. Schools in Manitoba: non–funded independent schools. 2012b. http://www.edu.gov.mb.ca/k12/schools/ind/non_fund_ind.html. Accessed August 15, 2012.

Injury Hospitalization

Hospital Episode with a "most responsible" diagnosis for injury. In this study, rates of injury hospitalizations were defined as hospitalizations per 10,000 children aged 0 to 19 with diagnoses:

a. intentional injuries (ICD–9–CM E950–E969; ICD–10–CA X60–Y09, Y870–Y871)
b. unintentional injuries (ICD–9–CM E800–E8699, E880–E9299; ICD–10–CA V01–X599)
c. undetermined (ICD–9–CM E980–E989; ICD–10–CA Y10–Y34, Y872, Y899)
d. other, such as legal intervention (ICD–9–CM E970–E978; ICD–10–CA Y35–Y36, Y890–Y891), operations of war (ICD–9–CM E990–E999), evidence of alcohol involvement determined by blood alcohol level (ICD–10–CA Y90), and evidence of alcohol involvement determined by level of intoxication (ICD–10–CA Y91)

over five–year time periods during **fiscal years** 2000/01–2009/10. This definition excluded out of province, newborn, stillborn, brain death hospital records, and surgical misadventures or adverse drug effects.

Inpatient Hospitalization

Hospital stay in which patients are admitted to a hospital.

Intensive Care Unit (ICU)

A hospital unit that specifically provides medical care to seriously ill patients.

International Classification of Diseases (ICD)

A classification system of diseases, health conditions, and procedures developed by the **World Health Organization**, which represents the international standard for the labeling and numeric coding of diseases and health related problems (morbidity). Within this system, all diseases/conditions are assigned numbers in hierarchical order. There are several versions of the ICD coding system, including ICD–9–CM (Clinical Modifications) and ICD–10–CA (Canadian Enhancements). ICD–9–CM is the 9th version of the ICD coding system and includes Clinical Modifications. This version was used extensively in Canadian hospitals. ICD–10–CA is the 10th Revision with Canadian Enhancements, developed by Canadian Institute for Health Information for use in Canadian hospitals and other medical facilities. The Canadian Classification of Health Interventions (CCI) is the companion classification system to ICD–10–CA for coding procedures in Canada. ICD–10–CA and CCI have been in use in Manitoba hospital abstracts since April 1, 2004.

Johns Hopkins Adjusted Clinical Group ® (ACG®) Case–Mix System

Formerly known as Ambulatory Care Group, the ACG case–mix system is a risk adjustment tool developed to measure the illness burden (morbidity) of individual patients and populations. This system quantifies morbidity by grouping individuals based on their age, gender, and all known medical diagnoses assigned by their health care providers over a defined time period (typically one year). This information can be used to develop **Aggregated Diagnosis Groups (ADGs)** for patients.

Latent Construct

A variable that cannot be measured directly but can be estimated by related variables.

Language and Cognitive Development

Set of 26 items on the **Early Development Instrument (EDI)** to assess a Kindergarten child's readiness for school in terms of their "basic literacy, interest in reading, recognition of numbers and shapes, awareness of time concepts", and other similar characteristics (Offord Centre for Child Studies, 2010).

Offord Centre for Child Studies. The Early Development Instrument (EDI) Guide. 2010. http://www.offordcentre.com/readiness/files/EDI_Guide_2010–2011_EN.pdf. Accessed August 15, 2012.

Level II and III Funding

Special education funding provided by the Department of Education to students with special needs who require extensive supports in the classroom (Manitoba Education, 2012). In this study, the rate of level II and III funding was calculated per 1,000 children aged 5 to 18 who have received funding approval from the Department of Education and who have at least one diagnosis of a sensory/mental handicap or an emotional/behavioural disorder in each **academic year** during 2000/01–2009/10.

Manitoba Education. Student Services: Special Needs Categorical Funding Criteria Level 2 and 3. Government of Manitoba. 2012. http://www.edu.gov.mb.ca/k12/specedu/funding/level2–3.html. Accessed May 14, 2012.

Logistic Regression

A regression technique used when the outcome is a binary, or dichotomous, variable. Logistic regression models the probability of an event as a function of other factors. These models are only able to state that there is a relationship ("association") between the explanatory and the outcome variables. This is not necessarily a causal relationship, since it is based on observational data for the most recent time period. The explanatory variable may be associated with an increase or decrease (not that it caused the increase or decrease).

Lorenz Curve

In this study, the Lorenz curve is a graphical display of the distribution of the cumulative percent of events by the cumulative percent of people in the ten neighbourhood income quintiles in the rural and urban populations, by increasing income. Each neighbourhood income quintile represents approximately 20% of the rural or urban population. In a perfectly equitable situation, one would expect that 20% of events (i.e., U1 would contribute 20% of all events in the urban population; U2 would contribute another 20% of all events in the urban population). When inequality is present in an urban or rural area, the Lorenz curve bends away from the line of equality: above the line if a larger proportion of events occur in lower income quintiles and below the line if a larger proportion of events occur in higher income (Lorenz, 1905). The **Gini coefficient** represents the total area lying between the line of equality and the Lorenz curve.

Lorenz MC. Methods of measuring the concentration of wealth. Journal of the American Statistical Association. *Journal of the American Statistical Association*. 1905;9:209–219.

Manitoba Education (MET) Number

Also referred to as the Manitoba Education & Training Number, MET is unique number assigned to each student upon registration with Manitoba Education for the purpose of record keeping of student progress through the education system. This number remains the same from Kindergarten to Grade 12, except in the case of child adoption when the existing MET number is retired and a new number is assigned to the new adoptive identity of the student (Manitoba Education, 2012). The MET number is different from any student number that may be assigned in a local school division.

Manitoba Education. Manitoba pupil file guidelines. Manitoba Government. 2012. http://www.edu.gov.mb.ca/k12/docs/policy/mbpupil/mbpupil.pdf. Accessed August 15, 2012.

Manitoba Health

A provincial government department responsible for providing healthcare services in Manitoba.

Updated November 1, 2012

Manitoba Health Insurance Registry

A longitudinal population–based registry of all individuals who have been registered with **Manitoba Health** at some point since 1970. It includes date fields for registration, birth, entry into province, migration in/out of province, and death. It provides the needed follow–up information to track residents for longitudinal and intergenerational analyses. Primary identification is achieved by two numbers: every family in Manitoba is assigned a family registration number and every individual is assigned a unique **Personal Health Identification Number (PHIN)** by the Ministry of Health. These components are also included in the Manitoba Health Insurance Registry. The PHIN is encrypted in the registry data received by the Manitoba Centre for Health Policy (MCHP) so that individuals cannot be identified. Individuals moving into the province and not yet eligible for coverage, families of military personnel (insured federally), and members of the RCMP (insured federally) are not included in the registry. "Snapshot files" of the Manitoba Health Insurance Registry data, received semi–annually at MCHP from Manitoba Health, are used to create and maintain information in the **MCHP Research Registry**.

Maternal Depression

A measure of whether a mother was depressed at any point from the child's birth to the child's fourth birthday. In this study, depression was defined as a mother with at least one of the following:

a. physician visit with an ICD–9–CM code of 311 (depressive disorder), 296 (affective psychoses), or 309 (adjustment reaction)
b. physician visit with an ICD–9–CM code of 300 (neurotic disorders) in conjunction with a prescription for an antidepressant medication or mood stabilizer (excluding anti–anxiety medications)
c. hospitalization with an ICD–9–CM code of 296.2–296.8, 300.4, 300, 309, or 311, in conjunction with a prescription for an antidepressant medication or mood stabilizer (excluding anti–anxiety medications)

This definition includes, but is not limited to, post–partum depression. See online appendix for a list of relevant **Anatomical Therapeutic Chemical (ATC)** drug codes and **Drug Identification Numbers (DIN)**.

MCHP Research Registry (Research Registry)

A longitudinal population–based research registry that is derived from data in the **Manitoba Health Insurance Registry** and other data files in the MCHP Data Repository. "Snapshot files" of the Manitoba Health Insurance Registry data, received semi-annually at the Manitoba Centre for Health Policy (MCHP) from **Manitoba Health**, are integrated with historical registry data at MCHP to maintain the MCHP Research Registry. Consistent programming efforts are applied to the repository data files in order to provide value-added data from the MCHP Research Registry. The Research Registry is a key resource for the research conducted at MCHP and is central to the use of the **Population Health Research Data Repository**.

Medical Claims

Provider (hospital/physician) claims for services submitted to the provincial government for payment. For further information, see **Physician Billings**.

Updated August 1, 2013

Mid

An aggregate geography, which includes all of the **Regional Health Authorities (RHAs)** in central Manitoba: Interlake, North Eastman, and Parkland[46].

Mood and/or Anxiety Disorders

Mood disorder is the term given for a group of diagnoses in the Diagnostic and Statistical Manual of Mental Disorders classification system where a disturbance in the person's mood is hypothesized to be the main underlying feature. Anxiety disorder is a group of diagnoses in this classification system that includes one or more anxiety disorders as the main diagnosis.

In this study, mood and anxiety disorders are defined as a person having at least one of the following within a designated five–year time period:

a. one or more hospitalizations with a diagnosis for a manic disorder, depressive disorder, affective psychoses, neurotic depression or adjustment reaction: ICD–9–CM codes 296.1, 296.2–296.8, 300.4, 309 or 311; ICD–10–CA codes F31, F32, F33, F341, F38.0, F38.1, F41.2, F43.1, F43.2, F43.8, F53.0, F93.0 or with a diagnosis for an anxiety state, phobic disorders, obsessive–compulsive disorders or hypochondriasis: ICD–9–CM codes 300.0, 300.2, 300.3, 300.7; ICD–10–CA codes F40, F41.0, F41.1, F41.3, F41.8, F41.9, F42
b. one or more hospitalizations with a diagnosis for anxiety disorders: ICD–9–CM code 300; ICD–10–CA codes F32, F341, F40, F41, F42, F44, F45.0, F45.1, F45.2, F48, F68.0, or F99 AND one or more prescriptions for an antidepressant, anxiolytic or mood stabilizer: ATC codes N05AN01, N05BA, N06A
c. one or more physician visits with a diagnosis for depressive disorder or affective psychoses: ICD–9–CM codes 296, 311
d. one or more physician visits with a diagnosis for anxiety disorders: ICD–9–CM code 300 AND one or more prescriptions for an antidepressant, anxiolytic or mood stabilizer: ATC codes N05AN01, N05BA, N06A
e. three or more physician visits with a diagnosis for anxiety disorders or adjustment reaction: ICD–9–CM code 300, 309

See online appendix for a list of relevant **Anatomical Therapeutic Chemical (ATC)** drug codes and **Drug Identification Numbers (DIN)**.

Multinomial Regression

A statistical analysis that estimates the probability of an event occurring as a function of other factors. Multinomial regression may be used on an outcome with more than two levels or categories (Chan, 2005). This statistical analysis is constrained by the ability to identify an "association" between the explanatory and the outcome variables that is not necessarily a causal relationship.

Chan YH. Biostatistics 305. Multinomial logistic regression. *Singapore Med J.* 2005;46(6):259–268.

Negative Binomial Distribution

A discrete probability distribution appropriate for analyzing count data when an event is relatively rare, but is highly variable over the entire population. The negative binomial distribution is often employed in regression analyses when the data are over–dispersed.

46 On June 1, 2012, the RHAs were amalgamated into larger regions, which do not correspond to the aggregate regions in this report.

Updated November 1, 2012

Non–Normed Fit Index (NNFI)

Incremental measure of goodness of fit for a statistical model, which takes into account the size of the correlations in the data and the number of parameters in the model. This index provides an adjustment to the Normative Fit Index that incorporates the degrees of freedom in the model.

StatSoft Inc. Single sample goodness of fit indices. 2012. http://documentation.statsoft.com/STATISTICAHelp.aspx?path=SEPATH/Sepath/Notes/SingleSampleGoodnessofFitIndices Accessed. Accessed October 12, 2012.

Ullman JB. Structural equation modeling. In: Tabachnick BG, Fidell LS, eds. Using Multivariate Statistics. 5th ed. Boston, MA: Pearson Education Inc.; 1996: 676-780.

North

An aggregate geography area, which includes all of the **Regional Health Authorities (RHAs)** in northern Manitoba: Burntwood, Nor–Man, and Churchill.[47]

Odds Ratio

The ratio of the odds (likelihood) of an event occurring in one group to the odds of it occurring in another group or to a data–based estimate of that ratio. These groups might be men and women, an experimental group and a control group, or any other dichotomous classification.

Personal Health Information Number (PHIN)

A unique numeric identifier assigned by **Manitoba Health** to every person registered for health insurance in Manitoba and to non–residents who are treated at facilities that submit claims electronically. Introduced as a linkage key in 1984, it was issued to the public in 1994 as the basic access identifier for the Pharmacare/**Drug Programs Information Network (DPIN)**. At the Manitoba Centre for Health Policy (MCHP), the PHIN is a scrambled (encrypted) version of the Manitoba Health PHIN assigned via the Research Registry. Unique numeric identifiers are assigned to individuals who do not have scrambled numeric PHINs.

Pharmaceutical Claims

Drug prescription claims submitted for reimbursed to Manitoba's Pharmacare and Family Services drug insurance programs by federal drug insurance programs, such as Health Canada and Veteran Affairs and by private drug insurance programs. For further information, see **Drug Program Information Network (DPIN)**.

Physical Health and Well–Being

A set of 13 items on the **Early Development Instrument (EDI)** used to assess a Kindergarten child's readiness for school in terms of their "physical independence, general health, gross and fine motor skills" and other similar characteristics (Offord Centre for Child Studies, 2010).

Offord Centre for Child Studies. The Early Development Instrument (EDI) Guide. 2010. http://www.offordcentre.com/readiness/files/EDI_Guide_2010–2011_EN.pdf. Accessed August 15, 2012.

47 See note 46.

Physician Billings

Claims (billings) for payments that are submitted to the provincial government by individual physicians for services they provide. Fee–for–service physicians receive payment based on these claims, while those submitted by physicians on alternate payment plans (APP) are for administrative purposes only (sometimes referred to as "shadow billing"). The physician claims are collected and stored in the Medical Services Database, which is part of the **Population Health Research Data Repository**.

Physician Visits

Also referred to as **ambulatory visits**. In this study, rates of physician visits per child aged 0 to 19 were calculated for every **fiscal year** from 2000/01 through 2009/10.

Poisson Distribution

A pattern followed by a set of results that are based on count measurements. Poisson distribution is a special case of the binomial distribution in which the number of individuals is very large and the chance of one of the two possible outcomes occurring is very small (Hassard, 1991).

Hassard T. *Understanding Biostatistics*. 3rd ed. St. Louis, MI: Mosby–Year Book, Inc.; 1991.

Population Health Research Data Repository (Repository)

A comprehensive collection of administrative, registry, survey, and other databases primarily comprising residents of Manitoba. This repository is housed at the Manitoba Centre for Health Policy (MCHP), where it was developed to describe and explain patterns of healthcare and profiles of health and illness. The repository was designed to facilitate inter–sectorial research in areas such as healthcare, education, and social services.

Population Pyramid (Population Profile)

A graph showing the age and sex distribution of a population. The percent of population within each five–year age bracket is shown for both males and females. Most developing countries of the world have a population pyramid triangular in shape, indicating a very young population with few people in the oldest age brackets. This population would have a high birth rate, high death rate, and low life expectancy. Most developed industrial countries have a population pyramid that looks more rectangular, with the young and middle–aged people representing similar and smaller percentages of the population and many more elderly people in the "top part" of the pyramid. This reflects a population with a stable fertility and mortality pattern, usually with low fertility, low mortality, and long life expectancy. In instances of an aging and relatively healthy population, the "pyramid" could actually constrict at its base, showing low birth rates and a high proportion of older adults (Martens et al., 2003).

Martens P, Fransoo R, Dik N, et al. The Manitoba RHA Indicators Atlas: Population–Based Comparisons of Health and Health Care Use. Manitoba Centre for Health Policy. 2003. http://appserv.cpe.umanitoba.ca/reference/RHA03_Atlas_web.pdf. Accessed June 1, 2012.

Prenatal Care

A series of regular contacts between a health care provider, typically a physician, and a pregnant woman, which take place at scheduled intervals between the confirmation of pregnancy and the initiation of labour. The primary function of this care is to monitor the progress of pregnancy to identify complications, to provide information to the women on beneficial practices, and to co–ordinate the involvement of other providers in the mother's labour and the delivery of the newborn.

Prevalence

Proportion of the population with a given disease at a given time. The measure of a condition in a population at a specific point in time is referred to as point prevalence. Period prevalence measures the number of individuals with a particular condition in the population during a period of time. Period prevalence is the most common measure of prevalence used in studies at the Manitoba Centre for Health (MCHP). Prevalence data provide an indication of the extent of a condition and may have implications for the provision of services needed in a community. Prevalence could potentially be affected by the age and sex distribution of an area; hence, prevalence is often **adjusted** for fair comparisons between areas.

Public Trustee Office

"A provincial government Special Operating Agency that manages and protects the affairs of Manitobans who are unable to do so themselves and have no one else willing or able to act. This includes mentally incompetent and vulnerable adults, deceased estates, and children" (The Public Trustee of Manitoba, 2012).

The Public Trustee of Manitoba. The Public Trustee of Manitoba. 2012. http://www.gov.mb.ca/publictrustee/index.html. Accessed August 2, 2012.

Public Trustee Wards

The **Public Trustee Office** has the responsibility to look after the financial and other affairs of residents unable to do so themselves. These are individuals of any age who cannot look after their own affairs such as: mentally incompetent adults or vulnerable adults who are not mentally capable of making decisions independently, people who have granted a Power of Attorney to The Public Trustee, people who have died in Manitoba with no one else capable or willing to act as administrator or executor, and people who are under 18 years of age or under a legal disability (The Public Trustee of Manitoba, 2012). Because this office has total responsibility for such persons, their address of record in the Manitoba Health Registry is that of the office. When looking at regional utilization, it should be noted that these individuals may represent a sizable portion of the Winnipeg core area and, possibly, Brandon populations.

The Public Trustee of Manitoba. The Public Trustee of Manitoba. 2012. http://www.gov.mb.ca/publictrustee/index.html. Accessed August 2, 2012.

Rate

The number of people with a given condition or procedure, divided by the number of people living in that area. Rates are helpful in determining the burden of disease and/or number of residents with that condition or procedure. Rates could potentially be affected by the age and sex distribution of an area; hence, most rates are **adjusted** for fair comparisons between areas.

Regional Health Authority (RHA)

Regional governance structure set up by the province to be responsible for the delivery and administration of health services in specified areas. In Manitoba, between July 1, 2002 and May 31, 2012, there were 11 RHAs: Winnipeg, Brandon, South Eastman, Assiniboine, Central, Parkland, North Eastman, Interlake, Burntwood, NOR–MAN, and Churchill. On June 1, 2012, the 11 RHAs were amalgamated into five larger regions, which were not used in this report: Winnipeg (Winnipeg, Churchill), Interlake–Eastern (Interlake, North Eastman), Western (Assiniboine, Brandon, Parkland), Southern (Central, South Eastman), and Northern (Burntwood, NOR–MAN) (Canadian Legal Information Institute, 2012).

Canadian Legal Information Institute. Amalgamation of Regional Health Authorities Regulation, 2012. C.C.S.M. c. R34. 2012.

Root Mean Square Error of Approximation (RMSEA)

A measure of goodness of fit for statistical models, where the goal is for the population to have an approximate or close fit with the model, rather than an exact fit, which is often not practical for large populations (Kaplan, 2000).

Kaplan DW. Structural Equation Modeling: *Foundations and Extensions*. Thousand Oaks, CA: Sage Publications, Inc.; 2000.

Rural South

An aggregate geography area, which includes all of the **Regional Health Authorities (RHAs)** in the south and the mid–province of Manitoba except the two urban centres of Winnipeg and Brandon. The RHAs included are: South Eastman, Central, and Assiniboine.[48]

Sexually Transmitted and Blood–Borne Infections (STBBIs)

Infections that are transmitted through sexual contact and/or by blood. Some sexually transmitted infections (STIs) such as the Human Immunodeficiency Virus (HIV), hepatitis B, and syphilis can also be transmitted through sharing of intravenous drug needles and through childbirth (Manitoba Health, 2012). In this study, the percent of children with chlamydia or gonorrhea was calculated.

Manitoba Health. Communicable Disease Control: Sexually Transmitted and Bloodborne Infections. 2012. http://www.gov.mb.ca/health/publichealth/cdc/sti/index.html. Accessed August 2, 2012.

Sexually Transmitted Infections (STIs) – see **Sexually Transmitted and Blood–Borne Infections (STBBIs)**

48 See note 46.

Social Assistance Management Information Network (SAMIN)

The SAMIN Research Data set combines variables from the various tables in the SAMIN database into a single SAS data set. The data set contains one record per person (client) for each month that they are present in the SAMIN database by **fiscal year.** Some variables are recorded on a person basis (client) and others on a family basis (case).

Social Competence

A set of items on the Early Development Instrument (EDI) used to assess a Kindergarten child's readiness for school in terms of their "responsibility and respect for others, approaches to learning, readiness to explore new things, sharing" and other similar characteristics (Offord Centre for Child Studies, 2010).

Offord Centre for Child Studies. The Early Development Instrument (EDI) Guide. 2010. http://www.offordcentre.com/readiness/files/EDI_Guide_2010–2011_EN.pdf. Accessed August 15, 2012.

Socioeconomic Status (SES)

Characteristics of economic, social, and physical environments in which individuals live and work, as well as, their demographic and genetic characteristics. As done in this study, it is often ranked from 1 (poor) to 5 (wealthy), based on income quintiles that measure mean household income, and grouped into five income quintiles, each quintile assigned to 20% of the population.

Special Education Funding – see **Level II and III Funding**

Statistics Canada

A federal government agency commissioned with producing statistics to help better understand Canada's population, resources, economy, society, and culture (Statistics Canada, 2012).

Statistics Canada. About Us. 2012. http://www.statcan.gc.ca/about–apercu/about–apropos–eng.htm. Accessed August 2, 2012.

Structural Equation Modeling (SEM)

Also known as simultaneous equation modeling or analysis of covariance structures, SEM is a statistical technique for modeling complex relationships among variables. Some of the variables in SEM can be unobserved (latent constructs). A response variable in one regression equation in an SEM can appear as a predictor in another equation. Variables in SEM may influence one another either directly or through other variables as intermediaries.

Suicide

Also referred to as "completed suicide" or the act of intentionally killing oneself. In this study, suicide was defined as the **rate** of death per 100,000 children aged 13 to 19 with the following causes of death in the **Vital Statistics** database:

a. accidental poisoning (ICD–10–CA X40–X42, X46, X47), poisoning with undetermined intent (ICD–10–CA Y10–Y12, Y16, Y17)
b. self–inflicted poisoning (ICD–10–CA X60–X69), which includes a large number of codes that potentially indicate intentional poisoning; these codes are considered individually
c. self–inflicted injury by hanging, strangulation and suffocation (ICD–10–CA X70); drowning (ICD–10–CA X71); firearms and explosives (ICD–10–CA X72–X75); smoke, fire, flames, steam, hot vapours, and hot objects (ICD–10–CA X76, X77); cutting and piercing instruments (ICD–10–CA X78, X79); jumping from high places (ICD–10–CA X80); jumping or lying before a moving object (ICD–10–CA X81); crashing of motor vehicle (ICD–10–CA X82);, or other and unspecified means (ICD–10–CA X83, X84)

over five–year time periods from **calendar year** 2000/01 through 2009/10.

Suppression

At the Manitoba Centre for Health Policy (MCHP), data are suppressed when the number of persons or events involved is five or less in order to avoid potential identification of individuals in an area. Data are not suppressed when the actual event count is zero. This process of suppressing data are conducted to protect the anonymity of study participants

Syphilis

A **sexually transmitted and blood–borne infection (STBBI)** that is caused by the spirochete Treponema pallidum subspecies pallidum. This infection cannot be distinguished through serology from other, non–sexually transmitted diseases with similar symptoms. Syphilis can increase the susceptibility and transmission of the **Human Immunodeficiency Virus (HIV)** two– to nine–fold (Communicable Disease Control Unit, 2007).

Communicable Disease Control Unit. Communicable Disease Management Protocol – Syphilis. Government of Manitoba. 2007. http://www.gov.mb.ca/health/publichealth/cdc/protocol/syphilis.pdf. Accessed August 2, 2012.

Teen Birth

The birth of a baby to a female under the age of 20. In this study, teen birth was defined as the **rate** of hospitalizations per 1,000 females 15 to 19 years for live birth (ICD–9–CM V27; ICD–10–CA Z37) over five–year periods from **fiscal year** 2000/01 through 2009/10.

Teen Pregnancy

Live births, stillbirths, abortions and ectopic pregnancies of women under the age of 20. In this study, teen pregnancy was defined as a **rate** per 1,000 females aged 13 to 19 with one or more of the following hospitalization reasons over five **fiscal years** during 2000/01–2009/10:

a. live birth (ICD–9–CM V27, ICD–10–CA Z37), missed abortion (ICD–9–CM 632, ICD–10–CA O02.1), ectopic pregnancy (ICD–9–CM 633, ICD–10–CA O00), abortion (ICD–9–CM 634–637, ICD–10–CA O03–O07), or intrauterine death (ICD–9–CM 656.4, ICD–10–CA O36.4)
b. surgical termination of pregnancy (ICD–9–CM 69.01, 69.51, 74.91; CCI 5.CA.89, 5.CA.90), surgical removal of extra–uterine (ectopic) pregnancy (ICD–9–CM 66.62, 74.3; CCI 5.CA.93), pharmacological termination of pregnancy (ICD–9–CM 75.0, CCI 5.CA.88), interventions during labour and delivery (CCI 5.MD.5, 5.MD.60)

Vital Statistics

A Manitoba government department responsible for keeping records and registries of all births, stillbirths, deaths, and marriages that take place in Manitoba.

Winnipeg Community Areas (CAs)

The 12 planning districts within the Winnipeg **Regional Health Authority (RHA)**, which have similar populations to the rural and northern RHAs, as designated between July 1, 2002 and May 31, 2012. The 12 CAs include St. James–Assiniboine, Assiniboine South, Fort Garry, St. Vital, St. Boniface, Transcona, River East (includes East St. Paul), Seven Oaks (includes West St. Paul), Inkster, Point Douglas, Downtown, and River Heights.

Withdrawn from School

A high school student who is not currently enrolled in school and has not been enrolled for the last two years.

Appendix 1: Statistical Analyses of Gini Coefficients by Indicator

Appendix Table A1.1: Summary of Statistical Analyses of Gini Coefficients for Indicators of Physical and Emotional Health

Indicator	Area	Gini in First Time Period	95% Confidence Interval for Gini in First Time Period	Gini in Last Time Period	95% Confidence Interval for Gini in Last Time Period	Statistical Difference First vs Last Time Period	Statistical Difference in Last Time Period Urban vs Rural
Child Mortality	Rural	0.229	0.166, 0.292	0.241	0.183, 0.295		
	Urban	0.272	0.189,0.367	0.314	0.221, 0.389		
Hospital Episodes	Rural	0.190	0.176, 0.202	0.246	0.231, 0.259	*	*
	Urban	0.168	0.151,0.184	0.182	0.164, 0.201		
Hospital Episodes (excluding pregnancy– and birth–related hospitalizations)	Rural	0.169	0.153, 0.182	0.235	0.221, 0.250	*	*
	Urban	0.126	0.110,0.143	0.149	0.128, 0.171		
Physician Visits	Rural	0.034	0.031, 0.037	0.043	0.040, 0.047	*	*
	Urban	0.016	0.013,0.019	0.003	0.001, 0.007	*	
Asthma	Rural	0.103	0.093, 0.113	0.077	0.066, 0.087	*	*
	Urban	0.005	0.000, 0.013	0.011	0.003, 0.020		
Diabetes	Rural	0.116	0.058, 0.161	0.081	0.019, 0.113		
	Urban	0.021	0.002, 0.082	0.003	0.001, 0.057		
Chlamydia	Rural	na	na	0.360	0.325, 0.405	na	*
	Urban	na	na	0.451	0.427, 0.490	na	
Gonorrhea	Rural	na	na	0.483	0.418, 0.551	na	*
	Urban	na	na	na	na	na	
Children with a Mother Diagnosed with Mood and Anxiety Disorders	Rural	0.004	0.000, 0.010	0.012	0.004, 0.019		*
	Urban	0.065	0.058,0.072	0.082	0.075, 0.088	*	
Child Mood and Anxiety Disorders	Rural	0.029	0.010, 0.053	0.022	0.005, 0.048		*
	Urban	0.023	0.004, 0.042	0.055	0.037, 0.072	*	
Attention–Deficit Hyperactivity Disorder	Rural	0.069	0.039, 0.103	0.079	0.056, 0.107		*
	Urban	0.012	0.001, 0.038	0.021	0.005, 0.038		
Fetal Alcohol Spectrum Disorder	Rural	0.401	0.342, 0.464	0.432	0.371, 0.487		*
	Urban	0.595	0.552,0.633	0.587	0.549, 0.628		
Suicide	Rural	0.463	0.322, 0.563	0.551	0.445, 0.632		
	Urban	0.324	0.100,0.551	0.492	0.312, 0.637		

* indicates statistically signigicant difference between Gini coefficients at $p<0.05$

na indicates that no Gini coefficients are available due to limited data availability for this indicator

Appendix Table A1.2: Summary of Statistical Analyses of Gini Coefficients for Indicators of Safety and Security

Indicator	Area	Gini in First Time Period	95% Confidence Interval for Gini in First Time Period	Gini in Last Time Period	95% Confidence Interval for Gini in Last Time Period	Statistical Difference First vs Last Time Period	Statistical Difference in Last Time Period Urban vs Rural
Injury Hospitalizations	Rural	0.223	0.209, 0.237	0.298	0.284, 0.315	*	*
	Urban	0.209	0.190, 0.228	0.219	0.200, 0.242		
Intentional Injury Hospitalizations	Rural	0.310	0.274, 0.365	0.379	0.327, 0.450		
	Urban	0.423	0.400, 0.494	0.394	0.349, 0.459		
Unintentional Injury Hospitalizations	Rural	0.191	0.176, 0.209	0.290	0.275, 0.309	*	*
	Urban	0.160	0.136, 0.185	0.182	0.158, 0.212		
Children in Care	Rural	0.324	0.310, 0.342	0.368	0.357, 0.385	*	*
	Urban	0.571	0.561, 0.581	0.582	0.572, 0.591		
Children in a Family Receiving Services From Child and Family Services	Rural	0.122	0.113, 0.132	0.242	0.231, 0.252	*	*
	Urban	0.385	0.378, 0.392	0.489	0.481, 0.495	*	

* indicates statistically signigicant difference between Gini coefficients at $p<0.05$

Appendix Table A1.3: Summary of Statistical Analyses of Gini Coefficients for Indicators of Successful Learning

Indicator	Area	Gini in First Time Period	95% Confidence Interval for Gini in First Time Period	Gini in Last Time Period	95% Confidence Interval for Gini in Last Time Period	Statistical Difference First vs Last Time Period	Statistical Difference in Last Time Period Urban vs Rural
Special Education Funding	Rural	0.107	0.077, 0.140	0.078	0.052, 0.098		*
	Urban	0.193	0.162, 0.214	0.165	0.141, 0.180		
Grade Repetition	Rural	0.220	0.202, 0.240	0.234	0.211, 0.254		*
	Urban	0.373	0.353, 0.392	0.408	0.391, 0.440	*	
Grade 3 Assessment in Reading	Rural	na	na	0.028	0.027, 0.065	na	
	Urban	na	na	0.048	0.026, 0.067	na	
Grade 3 Assessment in Reading (Cohort Approach)	Rural	na	na	0.059	0.034, 0.084	na	
	Urban	na	na	0.053	0.033, 0.073	na	
Grade 3 Assessment in Numeracy	Rural	na	na	0.025	0.016, 0.075	na	
	Urban	na	na	0.056	0.024, 0.074	na	
Grade 3 Assessment in Numeracy (Cohort approach)	Rural	na	na	0.061	0.037, 0.088	na	
	Urban	na	na	0.069	0.047, 0.092	na	
Grade 7 Assessment in Mathematics	Rural	0.046	0.023, 0.068	0.038	0.015, 0.060		*
	Urban	0.074	0.058, 0.090	0.072	0.053, 0.093		
Grade 7 Assessment in Mathematics (Cohort approach)	Rural	na	na	0.086	0.064, 0.113	na	
	Urban	na	na	0.093	0.071, 0.115	na	
Grade 8 Assessment in Reading and Writing	Rural	0.046	0.022, 0.068	0.040	0.013, 0.059		
	Urban	0.066	0.047, 0.084	0.057	0.038, 0.076		
Grade 8 Assessment in Reading and Writing (Cohort approach)	Rural	na	na	0.088	0.064, 0.115	na	
	Urban	na	na	0.077	0.059, 0.095	na	
Grade 12 Language Arts Standards Test	Rural	0.125	0.099 , 0.154	0.170	0.149 , 0.197	*	
	Urban	0.152	0.128 , 0.175	0.149	0.129 , 0.171		
Grade 12 Mathematics Standards Test	Rural	0.128	0.098, 0.156	0.181	0.152, 0.209	*	*
	Urban	0.147	0.122, 0.171	0.137	0.116, 0.158		
High School Completion (6-Year Cohort approach)	Rural	0.051	0.029, 0.071	0.023	0.004, 0.045		*
	Urban	0.086	0.067, 0.101	0.093	0.076, 0.110		

* indicates statistically signigicant difference between Gini coefficients at $p<0.05$

na indicates that no Gini coefficients are available due to limited data availability for this indicator

Appendix Table A1.4: Summary of Statistical Analyses of Gini Coefficients for Indicators of Social Engagement and Responsibility

Indicator	Area	Gini in First Time Period	95% Confidence Interval for Gini in First Time Period	Gini in Last Time Period	95% Confidence Interval for Gini in Last Time Period	Statistical Difference First vs Last Time Period	Statistical Difference in Last Time Period Urban vs Rural
Grade 7 Student Engagement	Rural	0.044	0.023, 0.067	0.030	0.009, 0.052		*
	Urban	0.098	0.080, 0.119	0.067	0.048, 0.083	*	
Grade 7 Student Engagement (Cohort approach)	Rural	na	na	0.076	0.053, 0.104	na	
	Urban	na	na	0.092	0.068, 0.113	na	
Teen Pregnancy	Rural	0.273	0.256, 0.288	0.293	0.276, 0.306		*
	Urban	0.381	0.367, 0.396	0.408	0.395, 0.423	*	
Teen Births (ages: 15-19)	Rural	0.350	0.336, 0.375	0.345	0.337, 0.371		*
	Urban	0.488	0.478, 0.510	0.492	0.482, 0.517		
Youths on Income Assistance	Rural	0.213	0.173, 0.252	0.059	0.026, 0.095	*	*
	Urban	0.496	0.472, 0.515	0.479	0.456, 0.501		

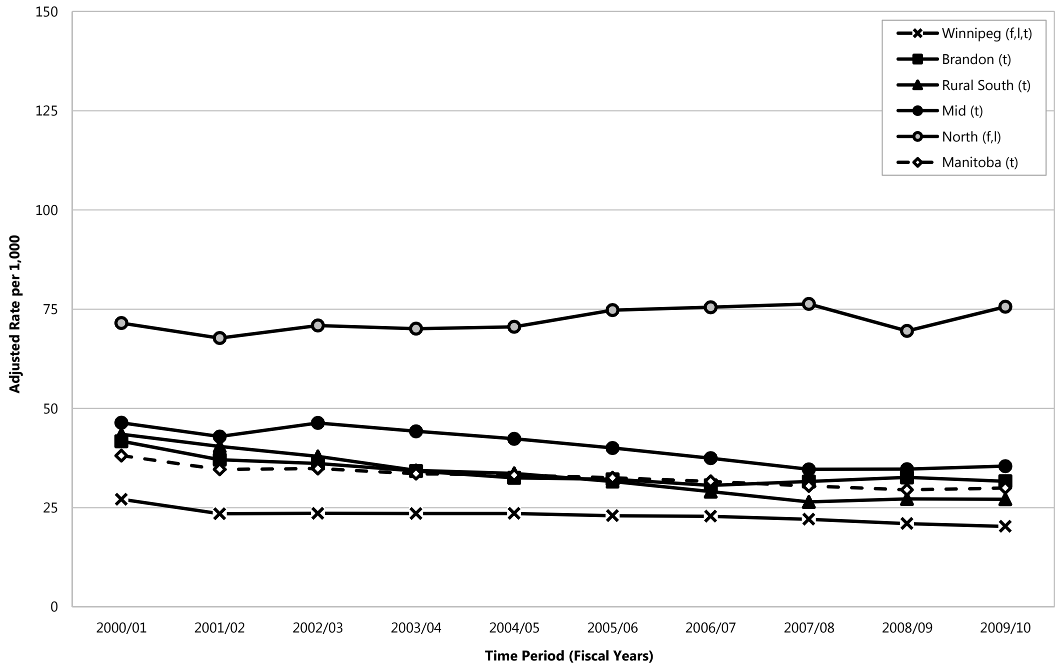
* indicates statistically signigicant difference between Gini coefficients at $p<0.05$

na indicates that no Gini coefficients are available due to limited data availability for this indicatoı

Appendix 2: Hospital Utilization Excluding Pregnancy and Childbirth–Related Hospitalizations

Regional Trends Over Time

Appendix Figure A2.1: Hospital Episode Rates by Aggregate Region, 2000/01–2009/10
Age– & sex–adjusted rates per 1,000 children 0–19 years, excluding pregnancy– & birth–related hospitalizations

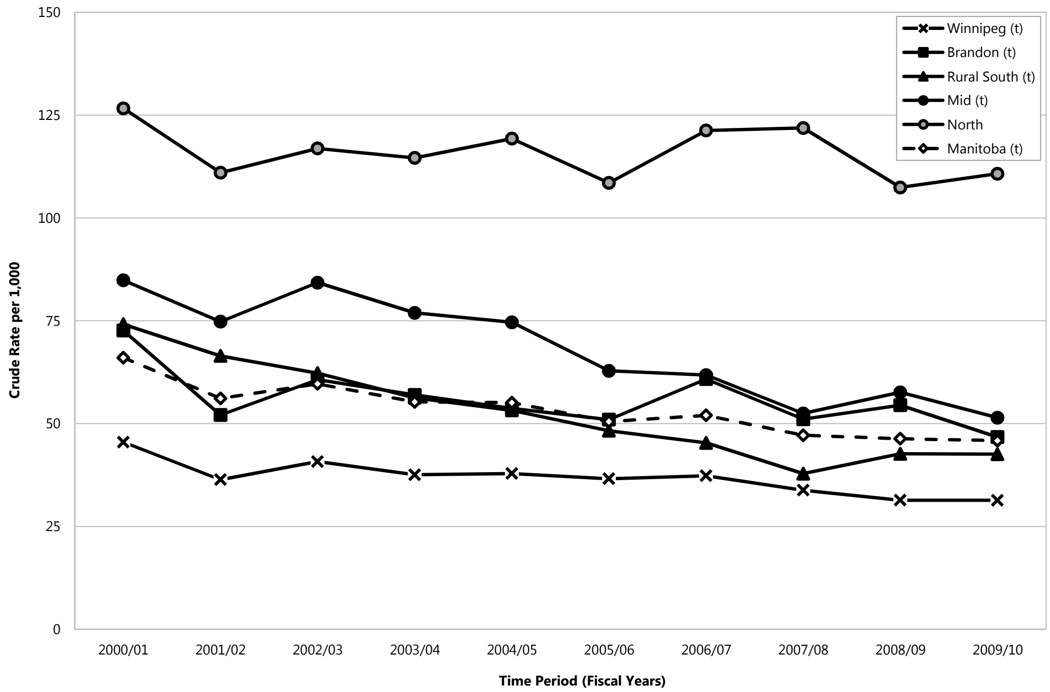


f indicates region's rate was statistically different from Manitoba average in first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in last time period at p<0.01
t indicates change over time was statistically significant for that region at p<0.05

Trends by Age Group

Appendix Figure A2.2: Hospital Utilization Rates by Aggregate Region and Age Group 0 to 5, 2000/01–2009/10

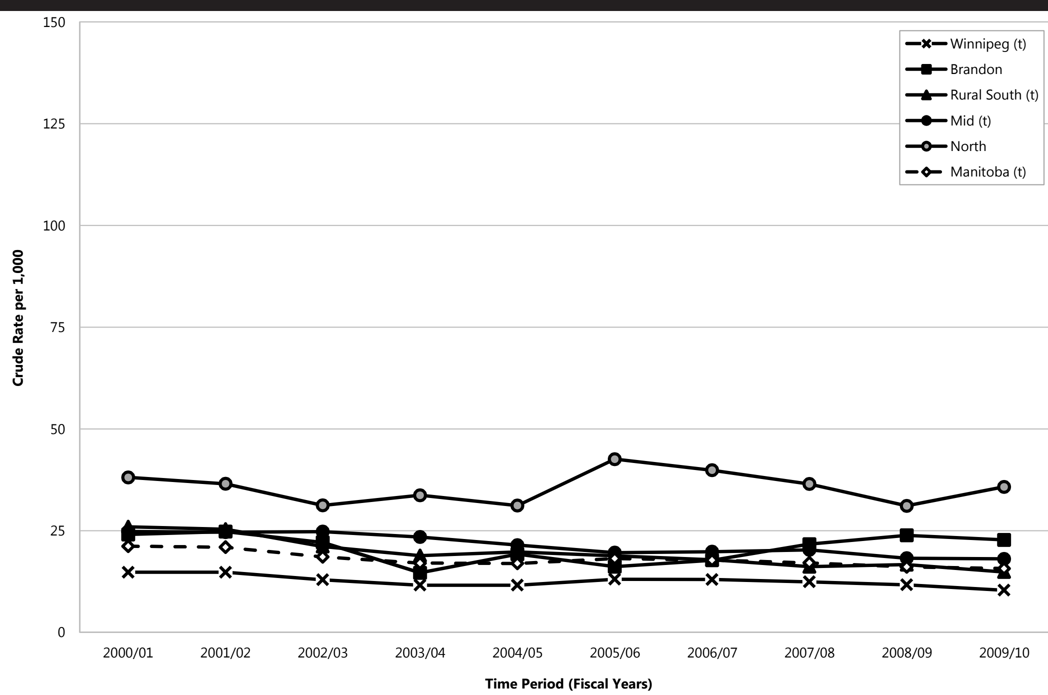
Crude rates per 1,000 children, excluding pregnancy– & birth–related hospitalizations



t indicates change over time was statistically significant for that region at $p<0.05$

Appendix Figure A2.3: Hospital Utilization Rates by Aggregate Region and Age Group 6 to 12, 2000/01–2009/10

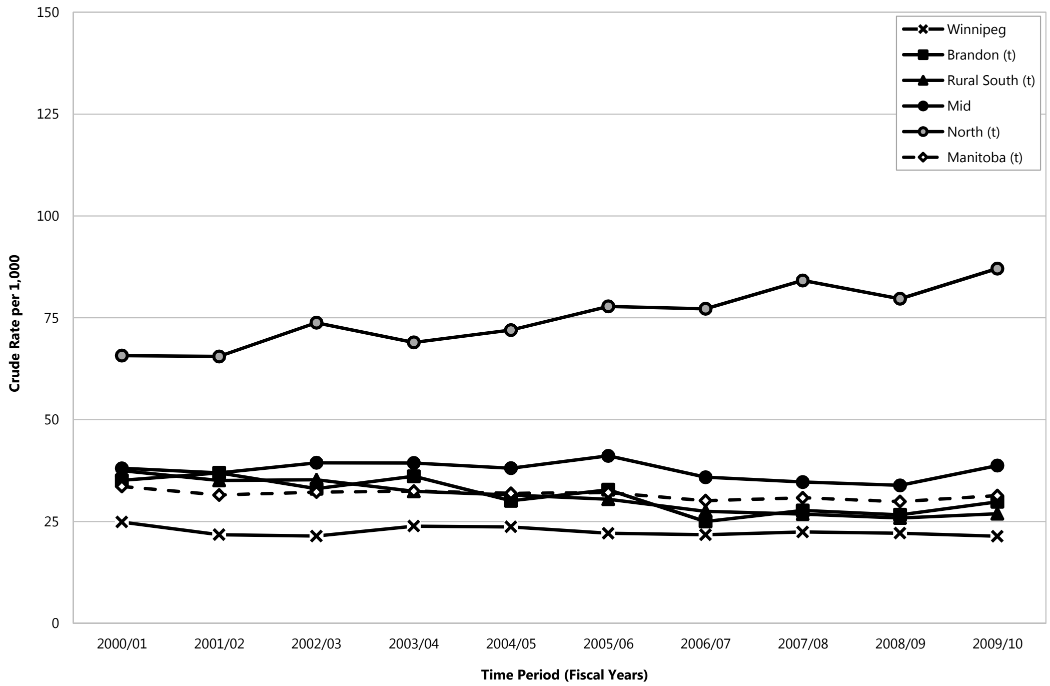
Crude rates per 1,000 children, excluding pregnancy– & birth–related hospitalizations



t indicates change over time was statistically significant for that region at $p<0.05$

Appendix Figure A2.4: Hospital Utilization Rates by Aggregate Region and Age Group 13 to 19, 2000/01–2009/10

Crude rates per 1,000 children, excluding pregnancy– & birth–related hospitalizations

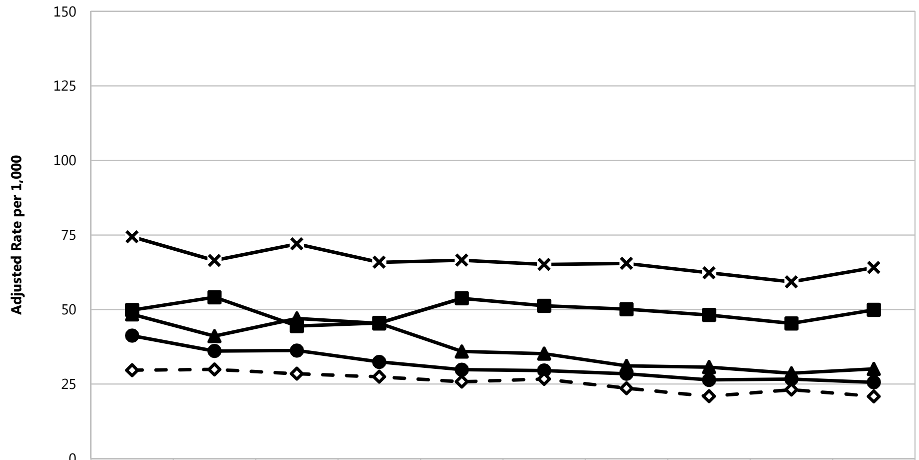


t indicates change over time was statistically significant for that region at $p<0.05$

Trends by Socioeconomic Status

Appendix Figure A2.5: Hospital Episode Rates by Rural Income Quintile, 2000/01–2009/10

Age– & sex–adjusted rates per 1,000 children 0–19 years, excluding pregnancy– & birth–related hospitalizations



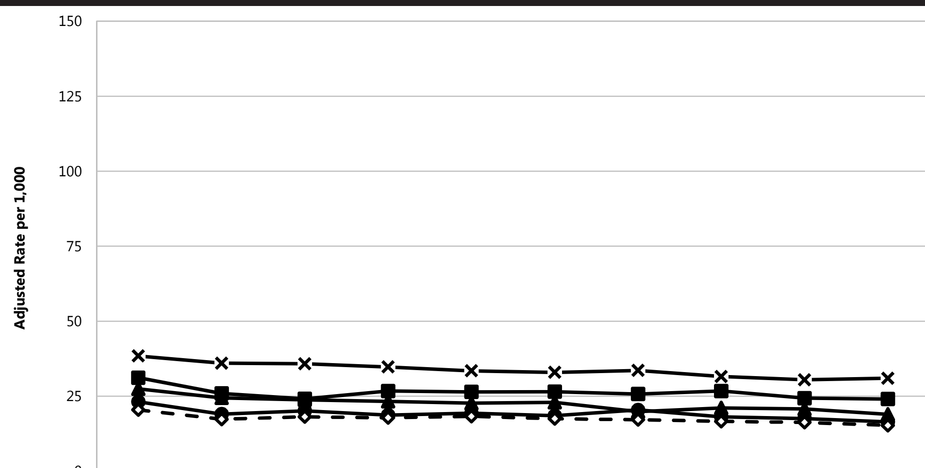
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	76.80	76.37	83.31	59.66	61.11	59.02	59.66	66.81	52.59	56.99
R1 – Lowest Income	74.38	66.43	71.99	65.84	66.53	65.10	65.46	62.29	59.26	64.05
R2	49.82	54.09	44.42	45.48	53.74	51.24	50.09	48.14	45.33	49.87
R3 (t)	48.37	41.07	46.99	45.33	35.93	35.17	31.08	30.65	28.61	30.05
R4 (t)	41.24	36.07	36.24	32.40	29.80	29.51	28.43	26.36	26.65	25.58
R5 – Highest Income (t)	29.61	29.88	28.44	27.43	25.76	26.64	23.58	20.89	23.09	20.85
Linear trend across R1–R5	*	*	*	*	*	*	*	*	*	*

Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across rural income quintiles for that time period at p<0.05

Appendix Figure A2.6: Hospital Episode Rates by Urban Income Quintile, 2000/01–2009/10

Age– & sex–adjusted rates per 1,000 children 0–19 years, excluding pregnancy– & birth–related hospitalizations



	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Income Unknown (t)	76.80	76.37	83.31	59.66	61.11	59.02	59.66	66.81	52.59	56.99
U1 – Lowest Income (t)	38.39	35.97	35.78	34.73	33.44	32.93	33.57	31.53	30.44	30.96
U2	31.14	25.89	24.10	26.70	26.43	26.49	25.70	26.72	24.34	24.03
U3 (t)	27.45	24.42	23.79	23.26	22.65	22.94	19.85	21.07	20.77	18.95
U4 (t)	23.15	19.02	20.12	18.68	19.29	18.51	20.39	18.12	17.53	16.43
U5 – Highest Income (t)	20.42	17.30	18.12	17.78	18.28	17.48	17.15	16.59	16.23	15.24
Linear trend across U1–U5	*	*	*	*	*	*	*	*	*	*

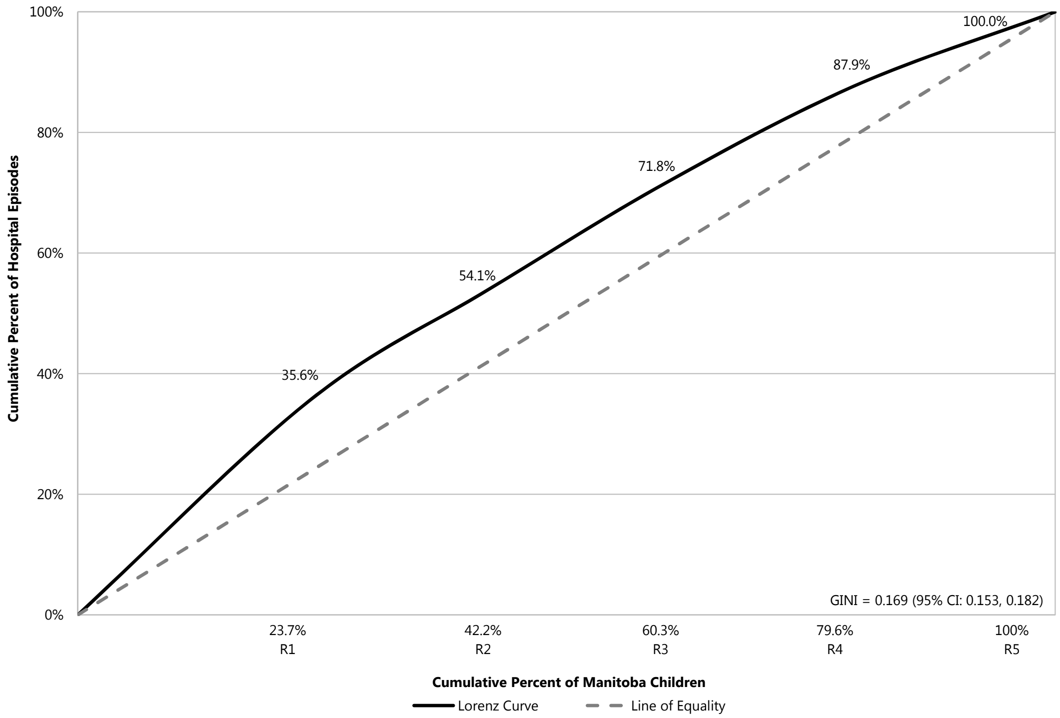
Time Period (Fiscal Years)

t indicates change over time was statistically significant for that income quintile at p<0.05
* indicates statistically significant differences across urban income quintiles for that time period at p<0.05

Changes in Inequity Over Time

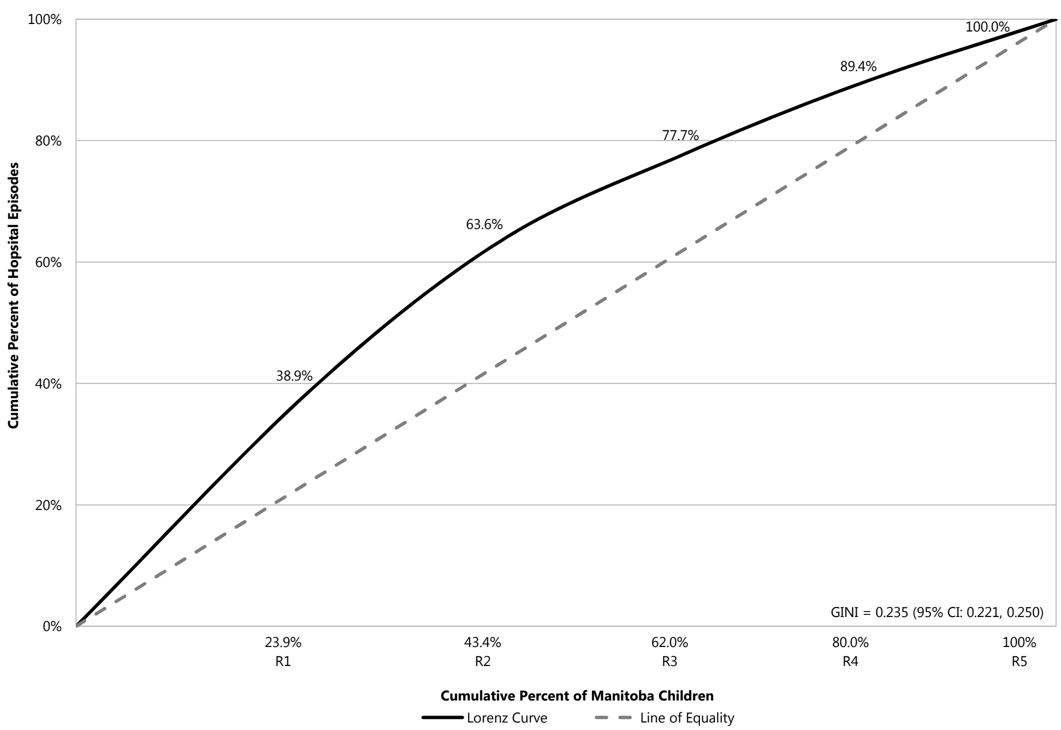
Appendix Figure A2.7: Lorenz Curve for Hospital Episodes in Rural Areas, 2000/01

Adjusted by age & sex for children 0–19 years, excluding pregnancy– & birth–related hospitalizations



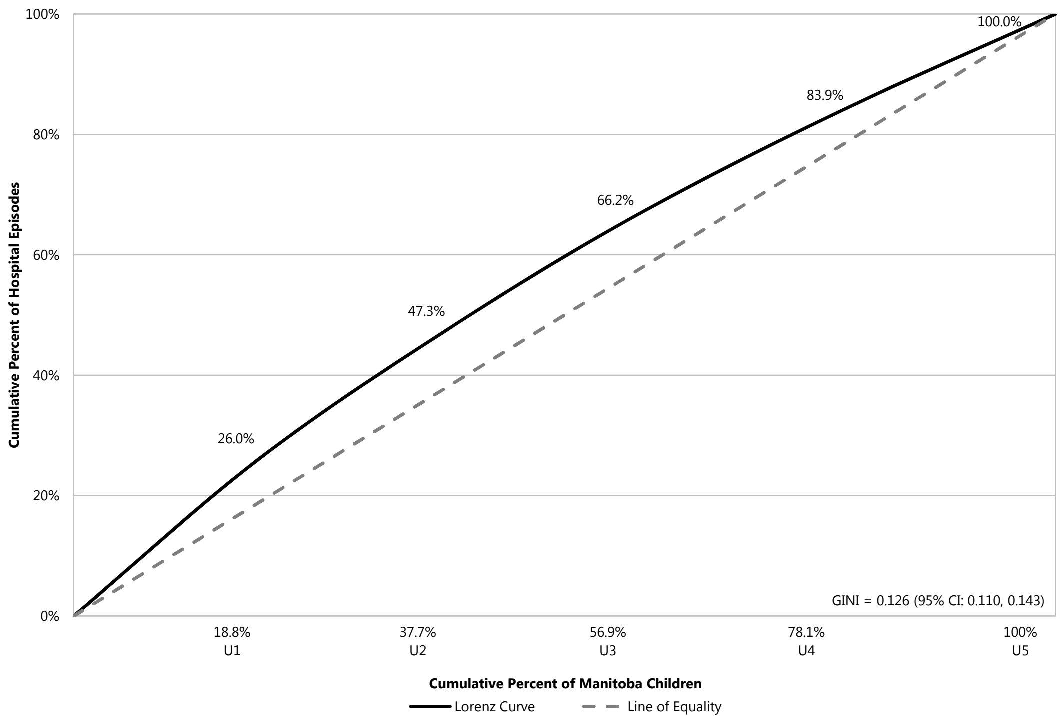
Appendix Figure A2.8: Lorenz Curve for Hospital Episodes in Rural Areas, 2009/10

Adjusted by age & sex for children 0–19 years, excluding pregnancy– & birth–related hospitalizations



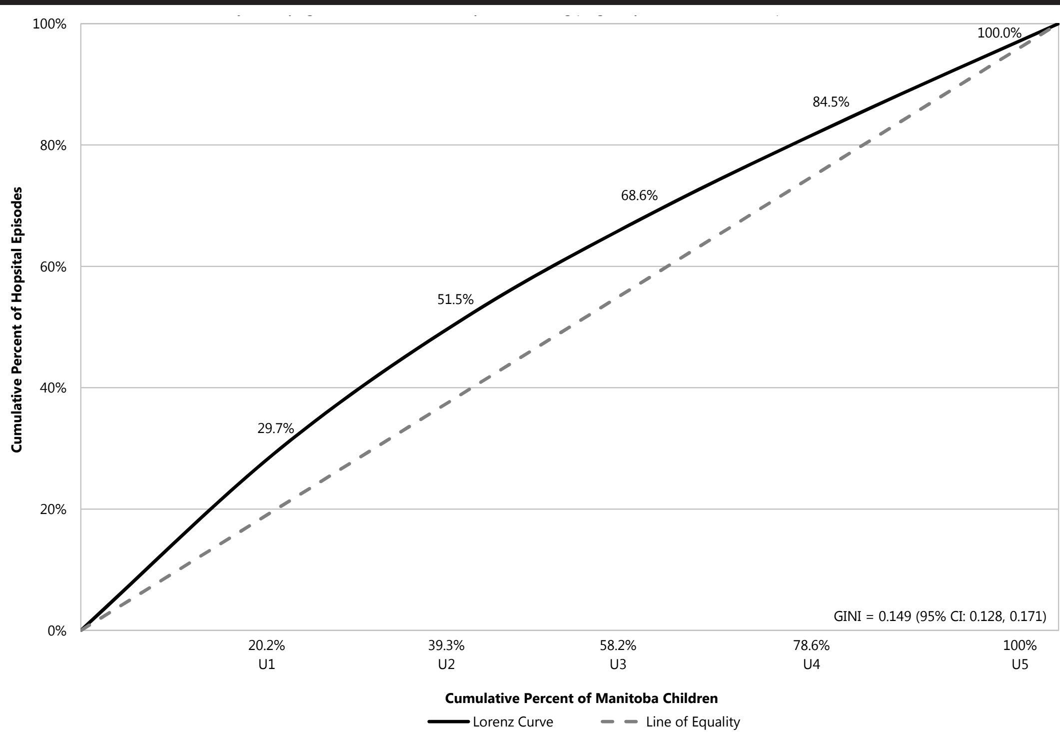
Appendix Figure A2.9: Lorenz Curve for Hospital Episodes in Urban Areas, 2000/01

Adjusted by age & sex for children 0–19 years, excluding pregnancy– & birth–related hospitalizations



Appendix Figure A2.10: Lorenz Curve for Hospital Episodes in Urban Areas, 2009/10

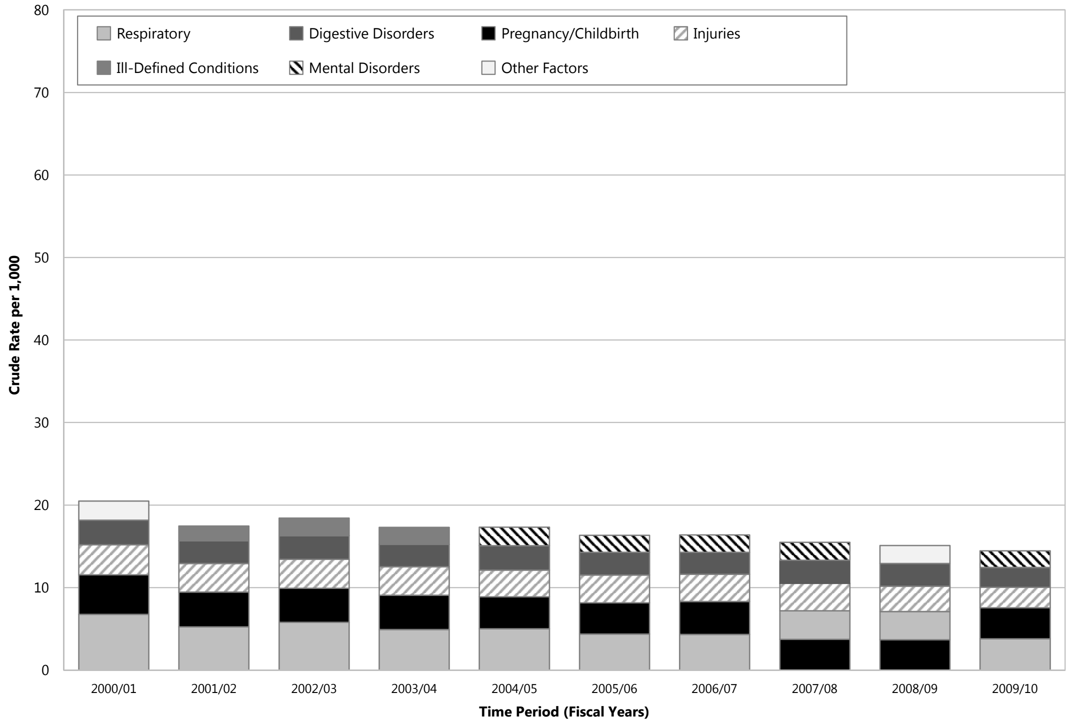
Adjusted by age & sex for children 0–19 years, excluding pregnancy– & birth–related hospitalizations



Appendix 3: Top 5 Causes of Hospitalization

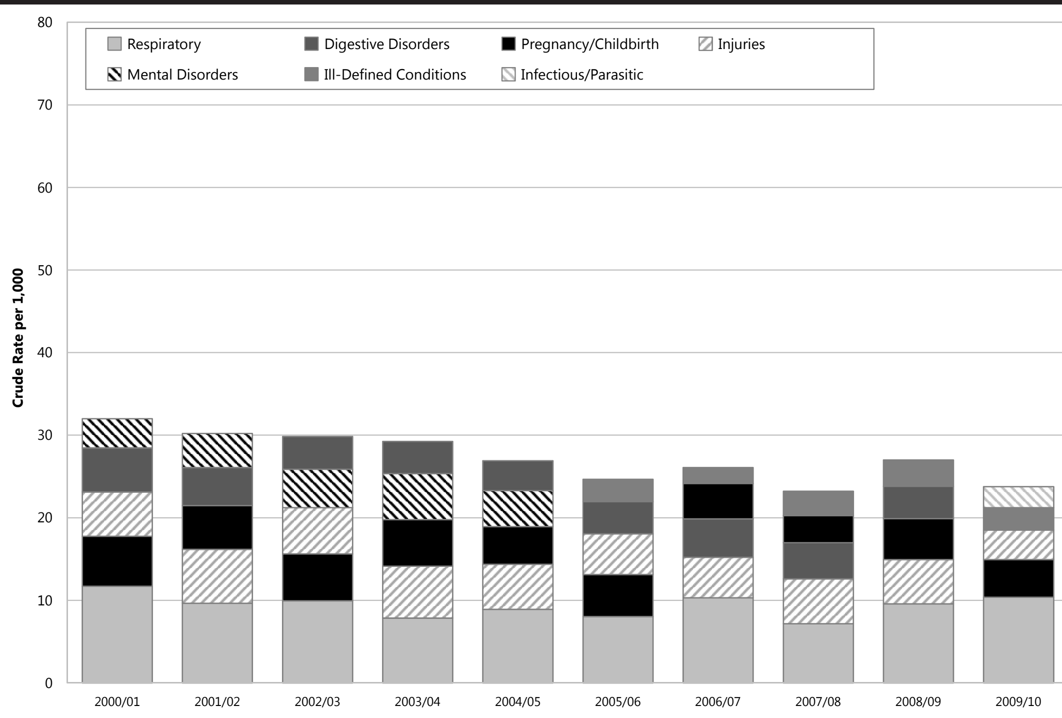
Appendix Figure A3.1: Top 5 Causes of Hospitalization in Winnipeg by Fiscal Year, 2000/01-2009/10

Crude rate per 1,000 children 0-19 years

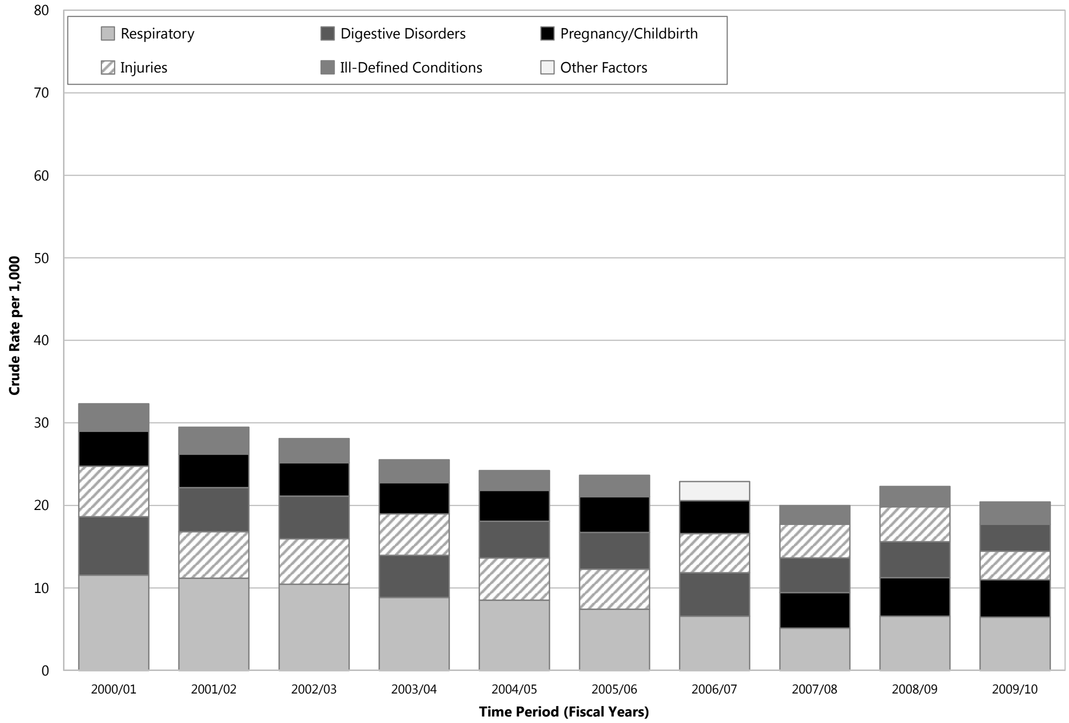


Appendix Figure A3.2: Top 5 Causes of Hospitalization in Brandon by Fiscal Year, 2000/01-2009/10

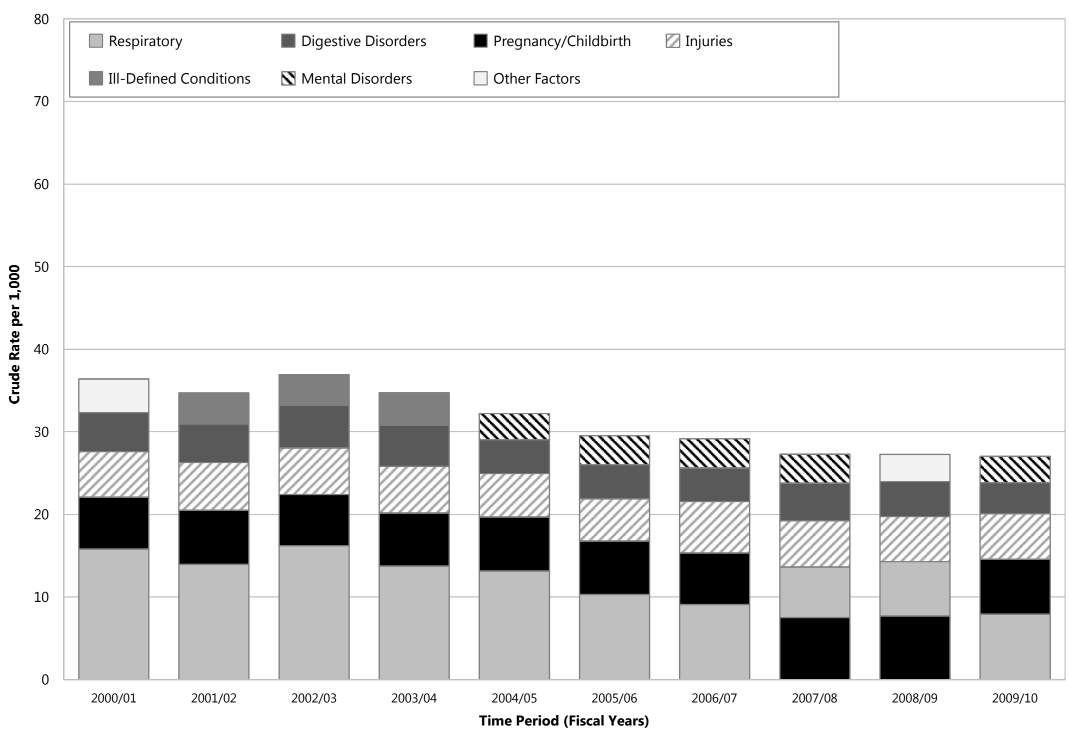
Crude rate per 1,000 children 0-19 years



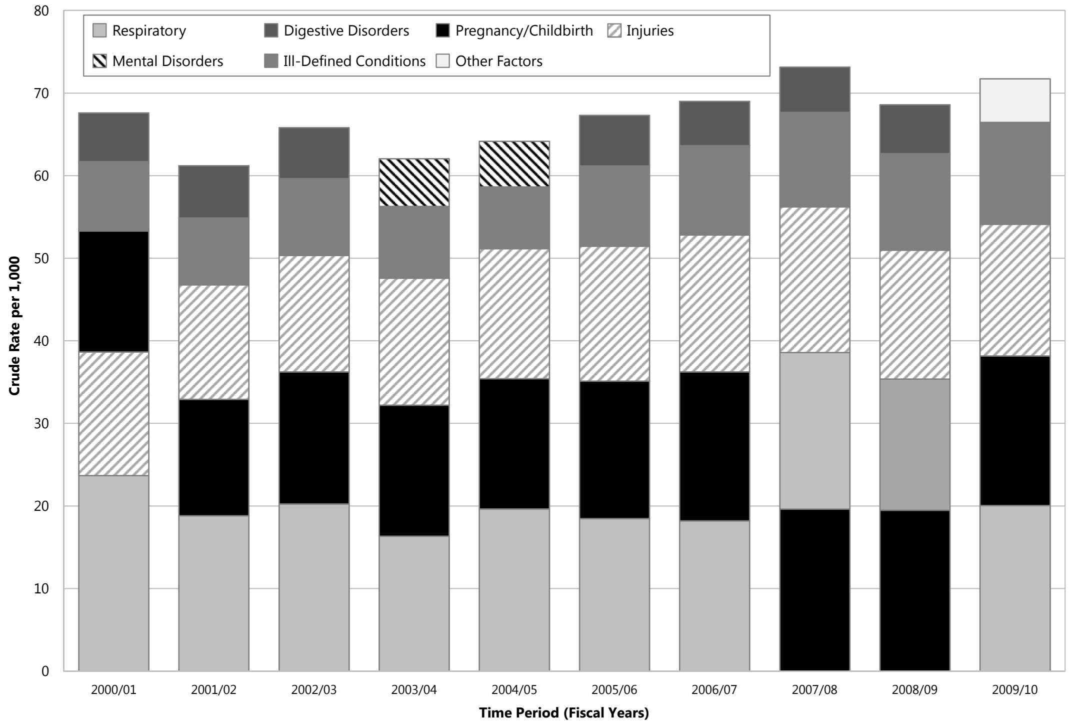
Appendix Figure A3.3: Top 5 Causes of Hospitalization in Rural South by Fiscal Year, 2000/01-2009/10
Crude rate per 1,000 children 0-19 years



Appendix Figure A3.4: Top 5 Causes of Hospitalization in Mid by Fiscal Year, 2000/01-2009/10
Crude rate per 1,000 children 0-19 years



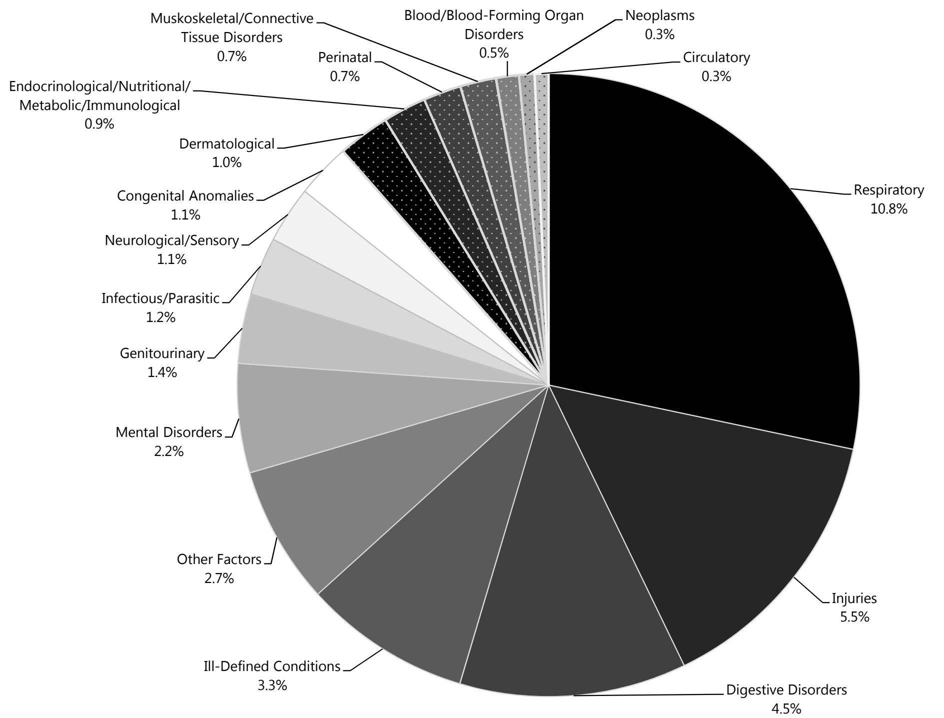
Appendix Figure A3.5: Top 5 Causes of Hospitalization in North by Fiscal Year, 2000/01-2009/10
Crude rate per 1,000 children 0-19 years



Appendix 4: Causes of Hospital Utilization Excluding Pregnancy and Childbirth–Related Hospitalizations

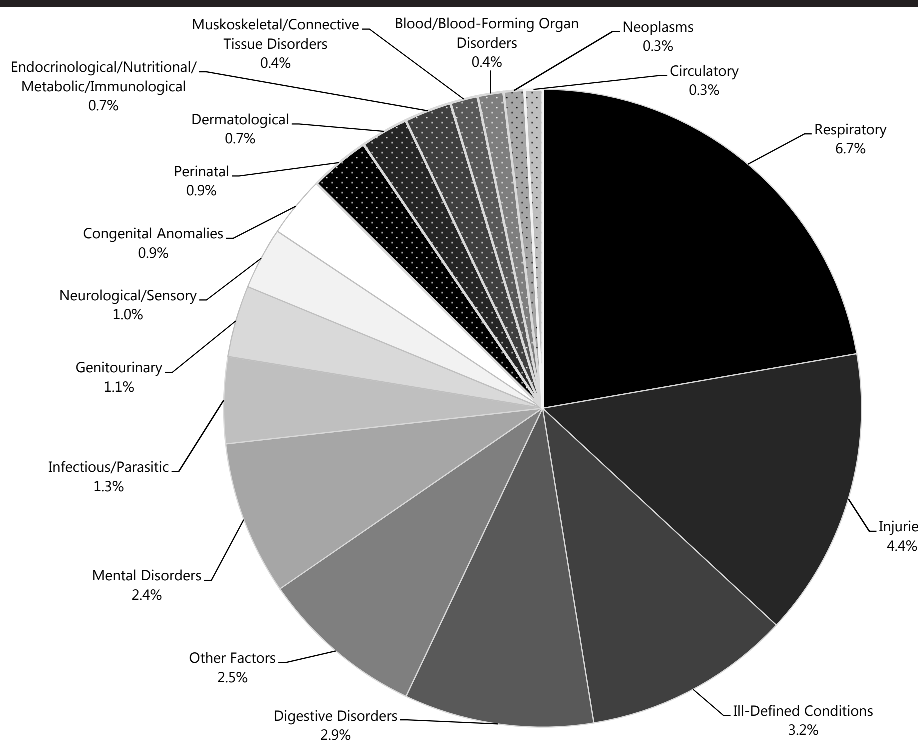
Appendix Figure A4.1: Causes of Hospitalizations, 2000/01

Crude percent of children 0–19 years, excluding pregnancy– & birth–related hospitalizations



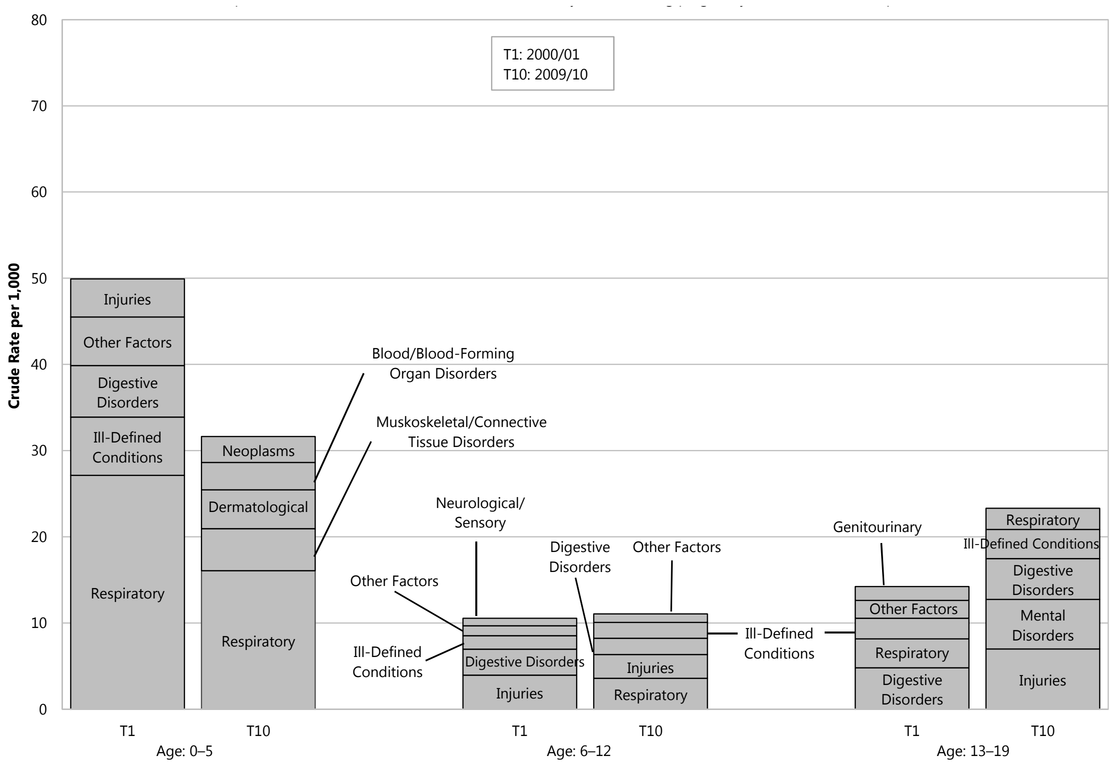
Appendix Figure A4.2: Causes of Hospitalizations, 2009/10

Crude percent of children 0–19 years, excluding pregnancy– & birth–related hospitalizations



Appendix Figure A4.3: Top 5 Causes of Hospitalizations by Age Group, 2000/01 and 2009/10

Crude rate per 1,000 Manitoba children 0–5, 6–12, and 13–19 years, excluding pregnancy– & birth–related hospitalizations



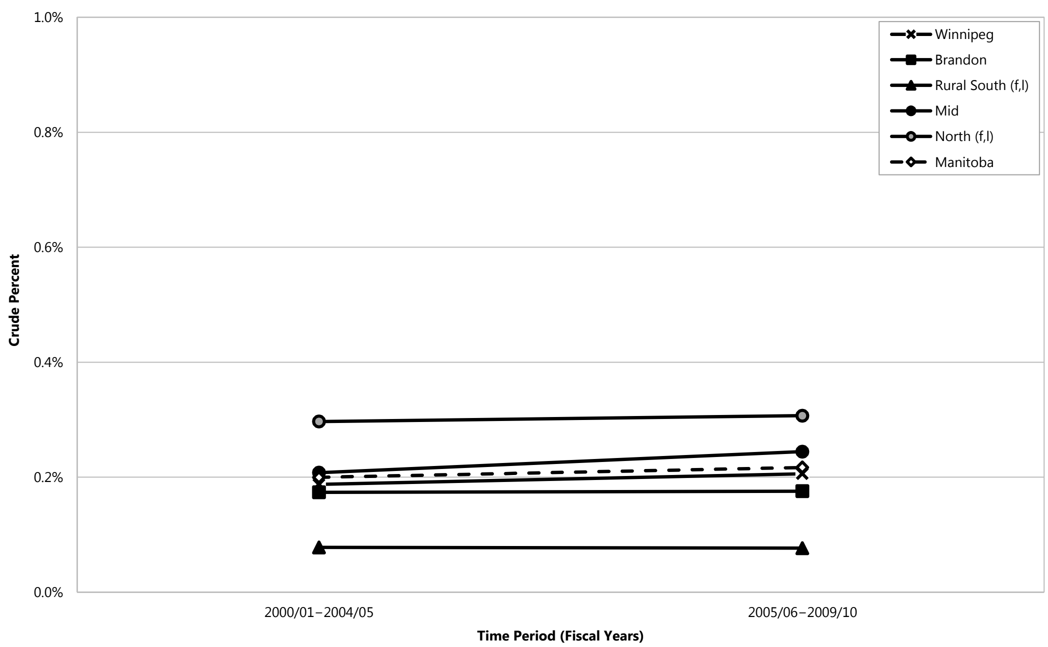
Appendix 5: Fetal Alcohol Spectrum Disorder (FASD)

In this report we use data from the Manitoba FASD Centre, which does assessments of children with suspected FASD using the Canadian guidelines for diagnosis (Chudley et al., 2005). We know that not all children with FASD in Manitoba will have an assessment done at the Manitoba FASD Centre, so we cannot determine the actual prevalence of FASD in Manitoba. What we report here is the percentage of children who have been given an FASD diagnosis through the Manitoba FASD Centre. Patterns for these percentages should not be considered to necessarily be indicative of patterns of prevalence.

Regional Trends Over Time

Figure A5.1 shows the percent of children diagnosed with FASD over time for 2000/01–2004/05 and 2005/06–2009/10 by aggregate regions of Manitoba for children 0 to 19 years. The overall Manitoba percent of children diagnosed with FASD was 0.20% in time 1 and 0.22% in time 2, a change that was not statistically significant. In the North, the percent of children diagnosed with FASD was significantly higher than the Manitoba average in both time periods, at 0.30% in time 1 and 0.31% in time 2. Rural South had significantly lower percentages than the provincial average in both time periods, at 0.08% in both time periods. None of the regions showed significant changes over time in the percent of children diagnosed with FASD. Whether the differences shown in the figure reflect actual differences in prevalence across regions, or reflect who gets assessed at the Manitoba FASD Centre cannot be determined from the data.

Appendix Figure A5.1: Rate of Children Diagnosed with Fetal Alcohol Spectrum Disorder (FASD) by Aggregate Region, 2000/01–2004/05 to 2005/06–2009/10
Crude percent of children 0–19 years



f indicates region's rate was statistically different from Manitoba average in the first time period at p<0.01
l indicates region's rate was statistically different from Manitoba average in the last time period at p<0.01
t indicates statistically significant difference between the first and last time periods for that region at p<0.05

Trends by Socioeconomic Status

Figure A5.2 shows the percent of children diagnosed with FASD by rural income quintiles over the study period. There was a significant SES gradient for most years, with the lower income areas having higher percent of children diagnosed with FASD compared to the higher income areas. For example, in the second time period, the percent of children diagnosed with FASD in R1 was 0.48%; whereas in R5, it was 0.06%. Only R3 showed a significant change over the study period, decreasing from 0.16% to 0.09%. Whether this change reflects a change in capacity for diagnosing children from R3 cannot be determined from the data.

Figure A5.3 shows the percent of children diagnosed with FASD by urban income quintiles; and it is evident that there is a significant SES gradient in urban areas, with a higher percent in the lowest compared to the higher income quintiles. For example, in the second time period, the percent of children diagnosed with FASD in U1 was 0.71% compared to 0.02% in U5. None of the urban income quintiles showed a statistically significant change in the percent of children diagnosed with FASD over time.

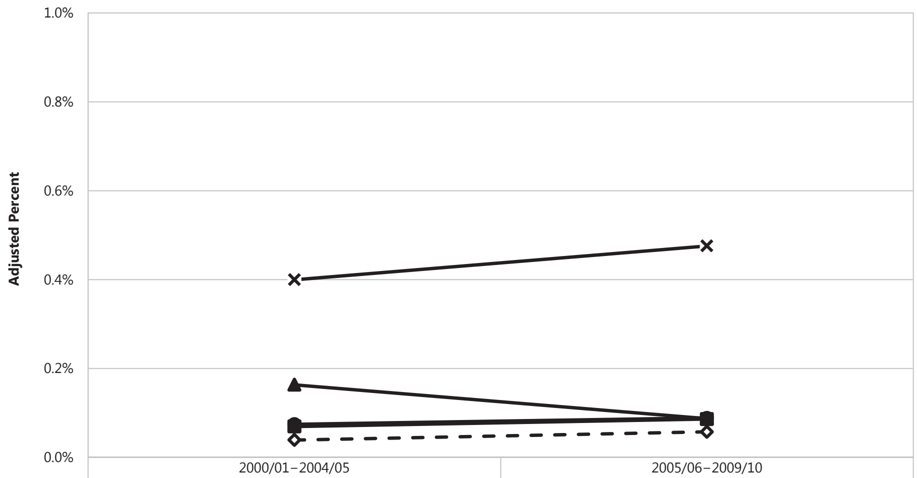
Changes in Inequity Over Time

Figures A5.4 and A5.5 show the inequities in the percent of children diagnosed with FASD in both time periods for rural areas. The figures show substantial disparity, with the lowest income quintile (R1) having much higher percentages of children diagnosed with FASD than expected given the proportion of the population. In the first time period, 59.9% of the children diagnosed with FASD were found in the 24.1% of the population in R1. The Gini coefficient was 0.401, indicating substantial disparity across rural income quintiles. In the last time period, 65.3% of the children diagnosed with FASD were found in the 23.9% of the child population in R1. The Gini coefficient 0.432, also indicating substantial disparity. The change in the Gini coefficient over the study period in the rural areas was not statistically significant, indicating no change in disparity over time.

Figures A5.6 and A5.7 show that in urban areas there was also substantial disparity in percent of children diagnosed with FASD in both time periods. Both figures show that U1 had a much higher percent of children diagnosed with FASD than expected given the proportion of the population. In the first time period, 67.8% of the children diagnosed with FASD were found in the 19.2% of the population in U1. The Gini coefficient of 0.595 indicated substantial disparity. In the second time period, 69.5% of the children diagnosed with FASD were found in the 19.9% of the population in U1, with a Gini coefficient was 0.587, indicating a substantial disparity. The change in the Gini Coefficient was not statistically significant in urban areas. A comparison of the Gini coefficients in the last time period indicated that inequity in urban areas was significantly greater than in rural areas.

Appendix Figure A5.2: Rate of Children Diagnosed with Fetal Alcohol Spectrum Disorder (FASD) by Rural Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Sex–adjusted percent of children 0–19 years



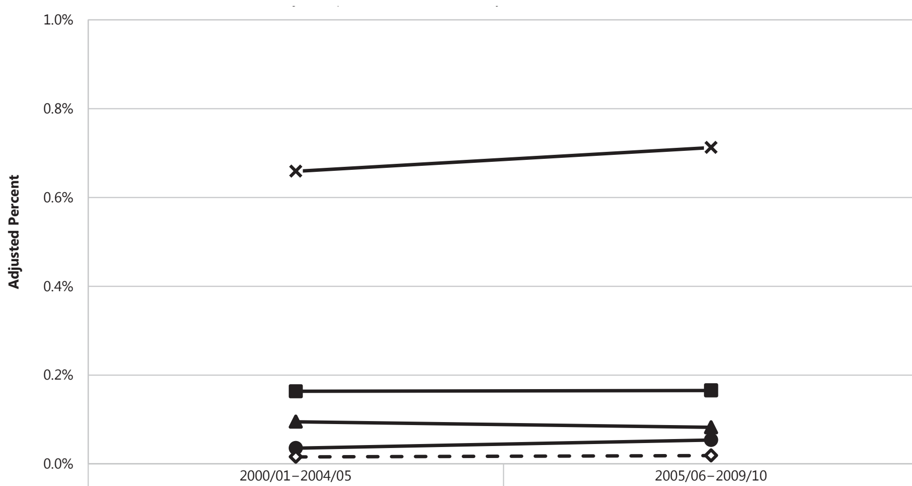
	2000/01–2004/05	2005/06–2009/10
Income Unknown	3.51%	3.47%
R1 – Lowest Income	0.40%	0.48%
R2	0.07%	0.09%
R3 (t)	0.16%	0.09%
R4	0.07%	0.09%
R5 – Highest Income	0.04%	0.06%
Linear trend across R1–R5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time period for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

Appendix Figure A5.3: Rate of Children Diagnosed with Fetal Alcohol Spectrum Disorder (FASD) by Urban Income Quintile, 2000/01–2004/05 to 2005/06–2009/10

Sex–adjusted percent of children 0–19 years



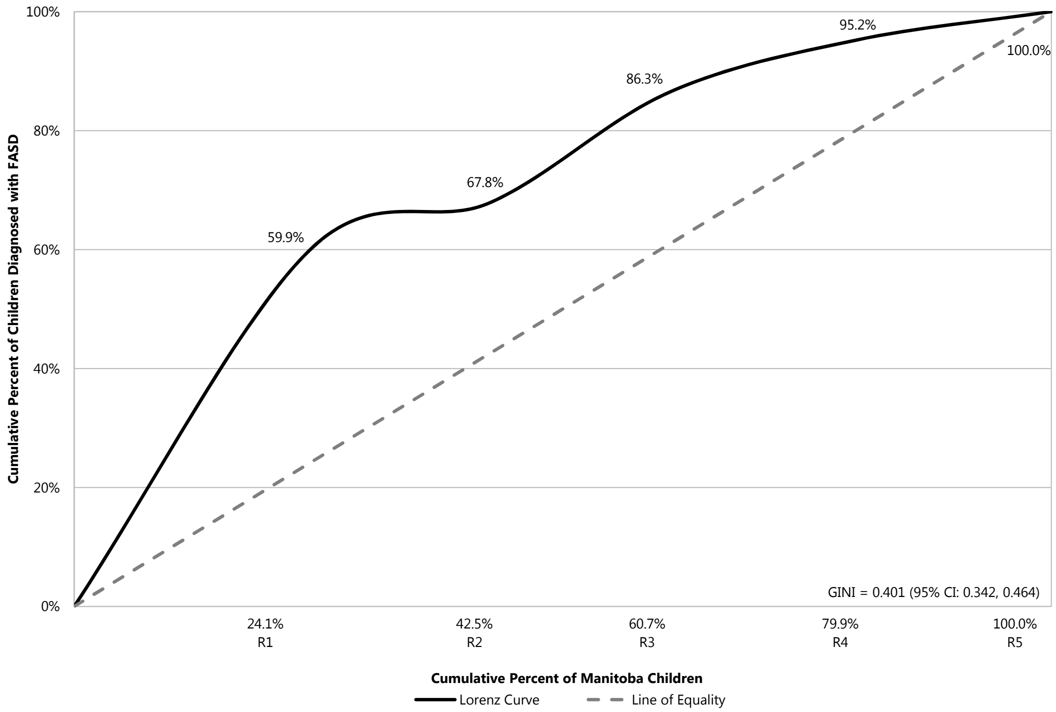
	2000/01–2004/05	2005/06–2009/10
Income Unknown	3.51%	3.47%
U1 – Lowest Income	0.66%	0.71%
U2	0.16%	0.17%
U3	0.09%	0.08%
U4	0.04%	0.05%
U5 – Highest Income	0.02%	0.02%
Linear trend across U1–U5	*	*

Time Period (Fiscal Years)

t indicates statistically significant difference between the first and last time period for that income quintile at p<0.05
* indicates statistically significant differences across income quintiles for that time period at p<0.05

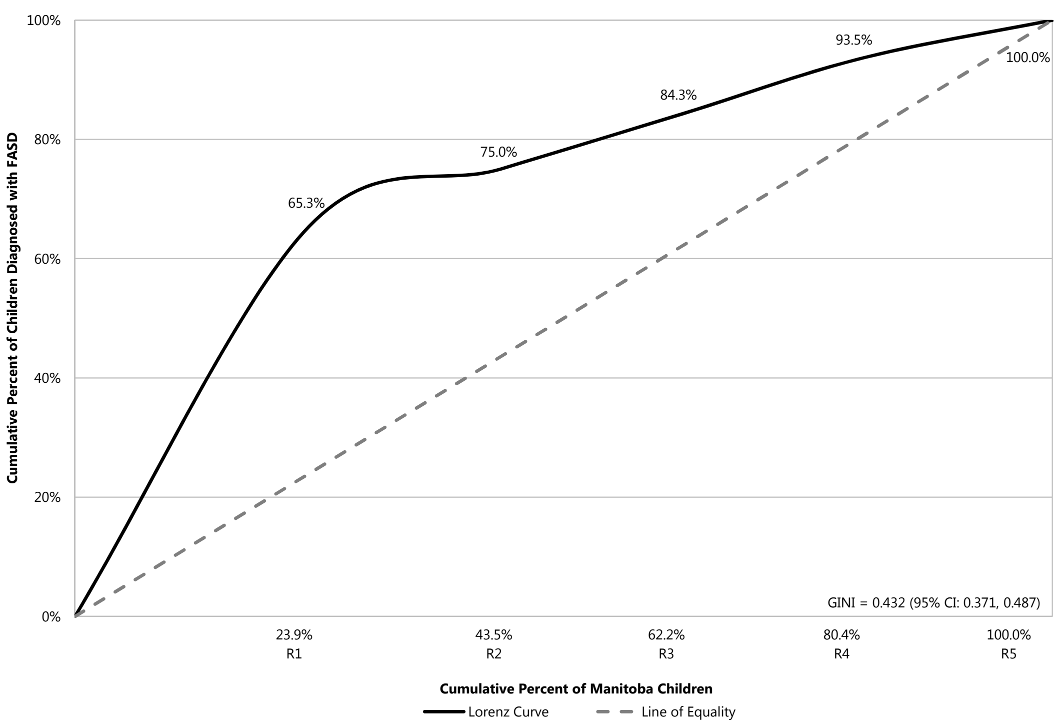
Appendix Figure A5.4: Lorenz Curve for Fetal Alcohol Spectrum Disorder (FASD) in Rural Areas, 2000/01–2004/05

Adjusted by sex for children 0–19 years



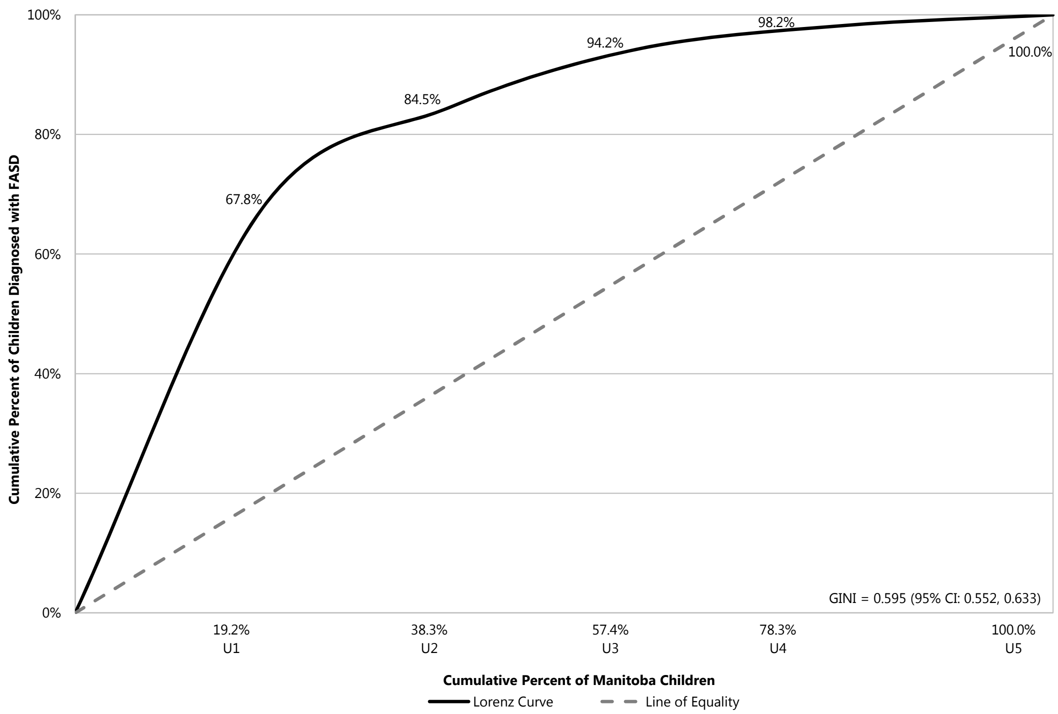
Appendix Figure A5.5: Lorenz Curve for Fetal Alcohol Spectrum Disorder (FASD) in Rural Areas, 2005/06–2009/10

Adjusted by sex for children 0–19 years



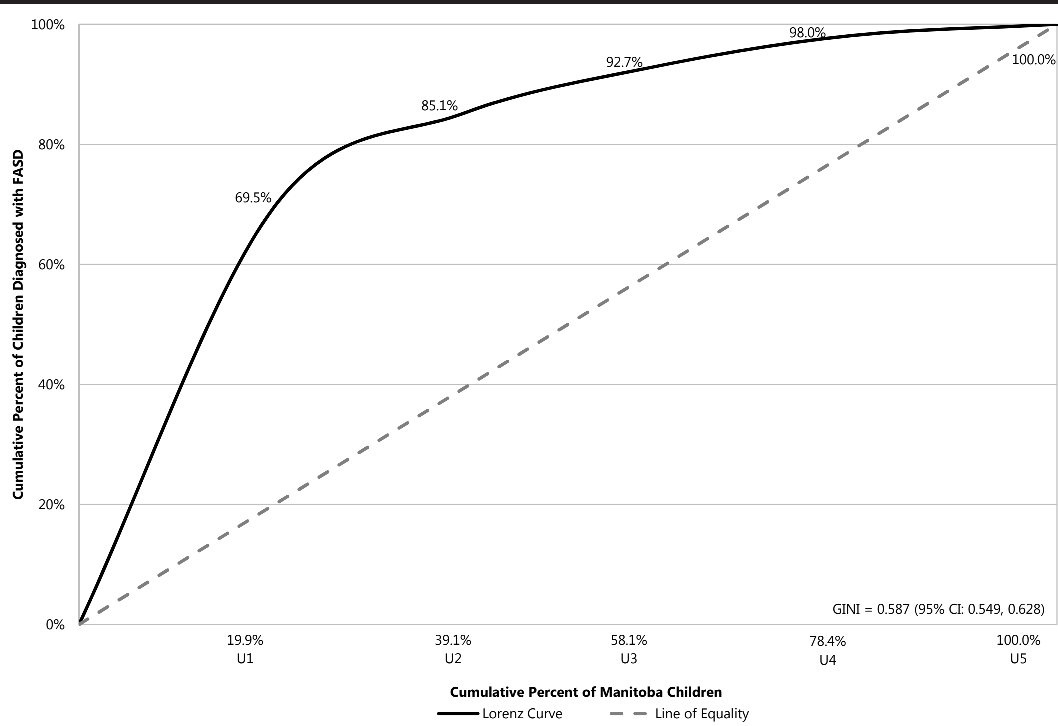
Appendix Figure A5.6: Lorenz Curve for Fetal Alcohol Spectrum Disorder (FASD) in Urban Areas, 2000/01–2004/05

Adjusted by sex for children 0–19 years



Appendix Figure A5.7: Lorenz Curve for Fetal Alcohol Spectrum Disorder (FASD) in Urban Areas, 2005/06–2009/10

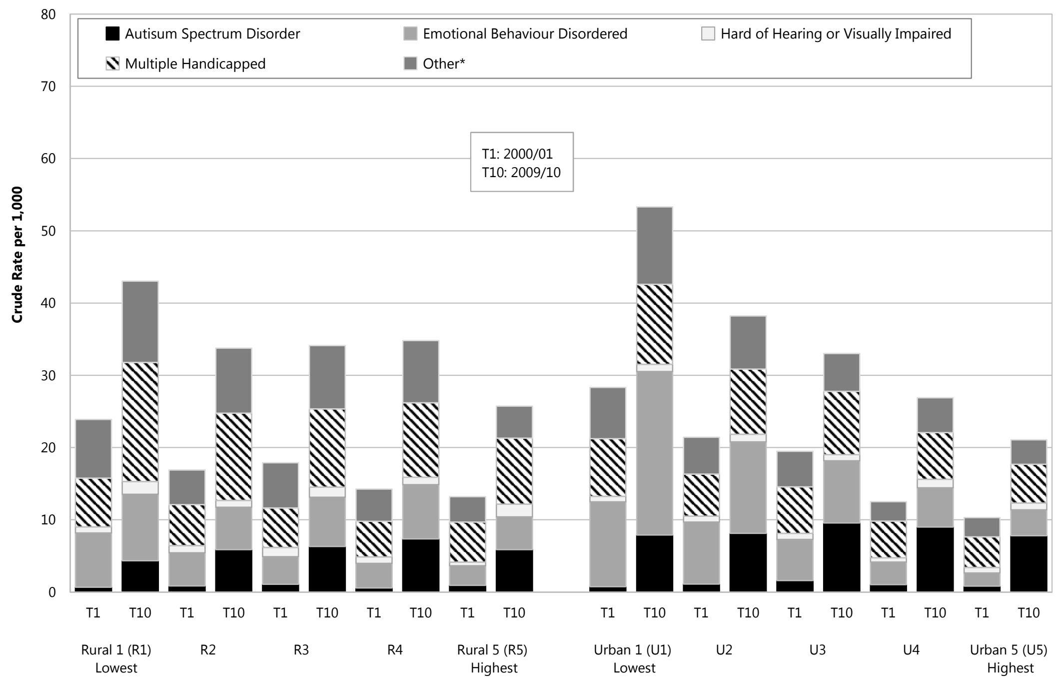
Adjusted by sex for children 0–19 years



Appendix 6: Special Funding

Appendix Figure A6.1: Level II and III Funding by Income Quintile and Funding Category, 2000/01 and 2009/10

Crude rates per 1,000 children 5–18 years



* This funding category includes student profiles that include a borderline IQ, low adaptive skills on a formal measure, and very challenging behaviour

Appendix 7: Grade 12 Mathematics Achievement Indices and Their Variations

Previous analyses have combined results of the provincial Grade 12 Language Arts (LA) and Mathematics examinations with enrollment information from Manitoba Education to study educational achievement among Manitobans of different backgrounds; not all those in any given birth cohort make it to Grade 12 or take the examination. Starting with children born in 1978, each member of a Manitoba birth cohort (including those not taking the examination) has been assigned a score using a statistical technique for developing indices from various data sources. Lower index scores indicate lower educational achievement; higher scores indicate taking the examination and doing relatively well. Information on the development of these measures is provided in Roos et al. (2008) and Roos et al. (2011). Further details are provided in MCHP's Concept Dictionary.

In this report, we were able to validate these indices through linkage to the Canadian Community Health Surveys (CCHS). Appendix Table A7.1 shows the results of such validation of the Grade 12 LA index. The strong relationship between the CCHS results and scores on the LA index provides strong evidence of the usefulness of the measure based on administrative data. The category with somewhat discrepant results (respondents with some post–secondary education score more highly on the index than those completing diploma courses) may disproportionately include younger individuals who are enrolled but have not yet completed post–secondary studies. Moreover, high performing, verbal individuals (scoring well on the LA index) may initiate—but not complete—post secondary education.

Linkage between the Grade 12 Mathematics Index and the CCHS shows similar results (Appendix Table A7.2). Scores for those respondents with some post–secondary education are not as close to scores for university graduates as is the case with the LA index. Overall, the analysis highlights the meaningfulness of the population–based measures of high school educational achievement.

Appendix Table A7.1: Grade 12 LA Standards Test Scores by Educational Attainment Categories*

Scaled logit scores for 2,708 CCHS respondents born in 1978-1989 (except 1983), 15 and 18 years or older at time of survey

Educational Attainment Variable Categories	Number of Respondents	Mean Scaled Logit Score	Median Scaled Logit Score
Grade 8 or Lower	39	-1.52	-1.85
Grades 9-10	209	-1.17	-0.96
Grades 11-13	297	-0.47	-0.55
Secondary/Post-Secondary	859	0.08	0.05
Some Post-Secondary	524	0.39	0.41
Trade Certificate/Diploma	170	-0.05	0.04
College Certificate/Diploma	319	0.2	0.08
University Certficate (No Bachelor's Degree)	80	0.46	0.45
Bachelor's Degree or Higher †	205	0.71	0.73
Not Stated	6	-0.93	-0.7

* indicates statistically significant rank correlation between attainment categories (in order of appearance) and scaled logit scores at p<0.0001 (r=0.44)

† indicates non-standard CCHS category that combines Bachelor's Degree and University Certificate

Appendix Table A7.2: Grade 12 Math Standards Test Scores by Educational Attainment Categories*

Adjusted logit scores for 2,341 CCHS respondents born in 1978-1989 (except 1983), 15 and 18 years or older at time of survey

Educational Attainment Variable Categories	Number of Respondents	Mean Adjusted Logit Score	Median Adjusted Logit Score
Grade 8 or Lower	33	-1.51	-1.86
Grades 9-10	174	-1.22	-1.07
Grades 11-13	253	-0.46	-0.69
Secondary/Post-Secondary	743	0.15	0.18
Some Post-Secondary	454	0.35	0.27
Trade Certificate/Diploma	157	0.12	0.23
College Certificate/Diploma	276	0.26	0.24
University Certficate (No Bachelor's Degree)	65	0.42	0.41
Bachelor's Degree or Higher †	180	0.53	0.41
Not Stated	6	-0.93	-0.69

* indicates statistically significant rank correlation between attainment categories (in order of appearance) and scaled logit scores at p<0.0001 (r=0.44)

† indicates non-standard CCHS category that combines Bachelor's Degree and University Certificate

Appendix 8: High School Completion Calculations

There are different ways to calculate high school completion, which may result in somewhat different results. Manitoba Education uses a cross–sectional, or "proxy cohort" method, looking at the number of students graduating from high school in a given year, and dividing that by the number of students enrolled in Grade 9 four years previous. In past MCHP reports (e.g., Brownell et al., 2008; Martens et al., 2010b), we have used a cohort method, following a cohort of students in Grade 9 for six years. Students who move into or out of the province or who die are not included in this cohort method. Students are followed for six years, even though the majority of graduates will complete high school within four years; this allows us to include as graduates those students who take additional years to complete.

There are advantages and disadvantages of both methods. The cross–sectional (proxy cohort) method may under–estimate graduation rates if the number of students who move away from Manitoba after Grade 9 and eventually graduate is greater than the number who move into Manitoba after Grade 9 and eventually graduate. On the other hand, rates may be over–estimated using this method if the number of students who move into the province after Grade 9 and eventually graduate is greater than the number of students who move away from Manitoba after Grade 9 and eventually graduate. These possible over and under estimations will, however, be limited to the net difference, if any, between the two counts in each four–year period. Rates may also be over–estimated if some students take more than four years to complete high school. For example, in any given year, graduates may be students who have been in high school for four, five, or even six years. These students will all be included in the numerator of the cross–sectional method of high school completion, but only those who completed within four years would be included in the denominator. By excluding students who move into the province after Grade 9, the cohort method may underestimate true graduation rates.

In this section, we compare results using the cross–sectional (proxy cohort) method used by Manitoba Education and the true cohort method used by MCHP. For all methods discussed in this appendix and in the report, we used the same exclusion criteria used by Manitoba Education when they calculate graduation rates (see Chapter 5 for more detail on these exclusions).

As a first step in this comparison, we wanted to see how close our calculations using the cross–sectional (proxy cohort) method would be to the Manitoba Education published graduation rates. Although we used the same exclusions and methodology, as explained in Chapter 5 of the report, prior to 2009/10 not all schools used the "year–end status" variable consistently, so not all graduates were identified using this variable. Manitoba Education had access to paper records of graduates for calculating graduation rates whereas MCHP did not; so in order to capture as many graduates as possible, for years prior to 2009/10, we counted credits obtained through high school and in Grade 12.[49]

49 It should be kept in mind that when counting credits to determine graduates, no attempt was made to determine whether the credits obtained were the 'required' credits, thus this method could over–estimate graduation rates if students do not have the appropriate credits required for graduation.

Appendix Table A8.1 shows the comparison between the Manitoba Education published graduation rates using the cross–sectional (proxy cohort) method and MCHP graduation rates using this cross–sectional method (first two columns of table). As can be seen, in 2009/10 (the year when the year–end status variable was consistently used by Manitoba schools), the MCHP and Manitoba Education graduation rates using the cross–sectional (proxy cohort) method are very close: we found that 80.8% of youths in Manitoba graduated from high school in that year and the value published by Manitoba Education was 82.7%.[50] Even in pre–2009/10 years, when the year–end status variable was incomplete and we supplemented graduate counts by counting high school credits, the MCHP calculations using the cross–sectional method come very close to the Manitoba Education calculations for most years. The exception was 2001/02, when the MCHP calculation was far below that reported by Manitoba Education.

Appendix Table A8.1: High School Completion Rates of Students Enrolled in Grade 9 in 1997/98-2006/07*, Measured Using Cross-Sectional and Cohort Methods

Grade 9 Enrolment Academic Year*	Percent of Grade 9 Students Completing High School			
	Manitoba Education** Cross-Sectional	**MCHP** Cross-Sectional	**MCHP** 4-Year Cohort	**MCHP** 6-Year Cohort
1997/98	72.4%	73.7%	70.2%	76.2%
1998/99	71.1%	63.2%	71.0%	77.7%
1999/2000	74.3%	82.0%	73.4%	79.7%
2000/01	74.0%	75.3%	74.4%	80.5%
2001/02	76.2%	76.1%	76.1%	81.5%
2002/03	77.1%	79.7%	76.4%	81.2%
2003/04	76.6%	76.4%	76.2%	81.8%
2004/05	79.0%	79.8%	76.6%	82.1%
2005/06	80.9%	81.0%	77.3%	†
2006/07	82.7%	80.8%	77.9%	†

* Graduation rates for all methods in this table are aligned according to enrolment in grade 9. For example, enrolment year 1997/98 corresponds to graduation year 2000/01 for the cross-sectional methods and the 4-year cohort method. Enrolment year 1997/98 corresponds to graduation year 2002/03 for the 6-year cohort method

** These values come from Manitoba Education (2012a)

† Graduations up to 2009/10 are included in this table for the cross-sectional and 4-year cohort methods. Graduations up to 2008/09 and 2009/10 are not calculated for the 6-year cohort method for these grade 9 cohorts because the full 6 years of follow up data were not available

50 The rates are not exactly the same because in order to categorize students into regions and income quintiles, they must have non–missing and valid PHINs and postal codes; due to these exclusions, MCHP numbers are somewhat lower than those reported by Manitoba Education. The numerator of "graduates" in 2010 reported by Manitoba Education was 12,922, whereas it was 12,551 by MCHP calculations (difference of 371 graduates). The denominator of Grade 9 students four years earlier reported by Manitoba Education was 15,625, whereas it was 15,531 by MCHP calculations (difference of 94 Grade 9 students). It should be noted that we found there were 209 students in Grade 12 in 2009/10 who were not graduates according to the year–end status variable, but who had 30 or more credits; whether these students were really graduates who were not captured using the year–end status variable or whether they did not have the required type of credits to complete high school was not explored further.

As a next step in our comparisons, we wanted to see how different results were for cross–sectional compared to cohort methods for calculating high school graduation. For the comparisons, we ran the cohort method two ways to determine which members of the cohorts completed high school: following a cohort of Grade 9 students for four years (four–year cohort method) and following them for six years (six–year cohort method). For both cohort methods, only students who attended Grade 9 in Manitoba and remained in Manitoba four (or six) years later were included in the analysis. In Appendix Table A8.1, the third column of graduation rates comes from the four–year cohort method, and the fourth column from the six–year cohort method. As can be seen in the table, the four–year cohort method tends to produce somewhat lower rates of graduation compared to the cross–sectional methods, particularly in the two most recent years. The six–year cohort method tends to produce somewhat higher rates of graduation compared to the four–year cohort and the cross–sectional methods. This is not surprising given that the six–year cohort method allows two additional years for students to graduate and therefore includes more students as graduates. In fact, using the six–year cohort method results in including as graduates anywhere from 634 to 934 additional students, depending on the year, compared to the four–year cohort method. Because some students do take longer than four years to complete high school, we decided that the six–year cohort method would provide a better indication of high school completion than the four–year cohort or the cross–sectional (proxy cohort) methods.

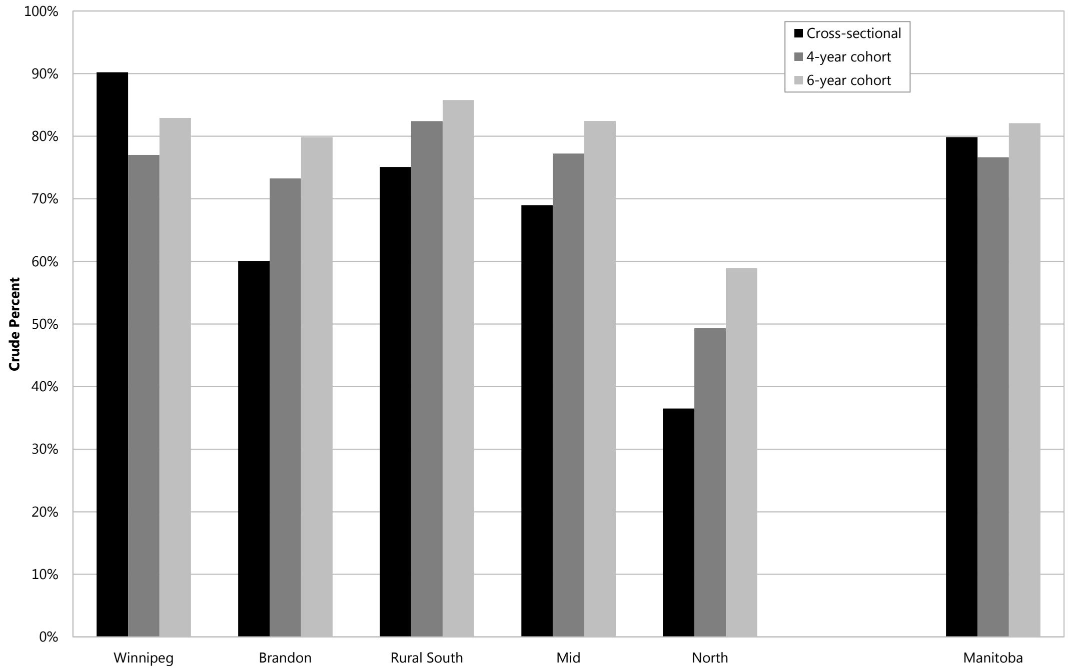
How much difference is there using the cross–sectional and cohort methods when we look at graduation results across aggregate region and across income quintiles? To determine this we chose one year of data for comparisons. The year chosen corresponded to graduation rates for students starting Grade 9 in 2004/05. Graduation for these students was calculated using data from 2007/08 for the cross–sectional method and for the four–year cohort method and using data up to 2009/10 for the six–year cohort method. Appendix Figure A8.1 shows the cross–sectional and cohort graduation rates by aggregate region. For the province as a whole there is not much difference in the graduation rates across methods: the four–year cohort yielded the lowest rate at 76.6%, the cross–section method yielded a rate of 79.8%, and the six–year cohort had the highest rate at 82.1%. The pattern differs, though, across regions. For all regions except Winnipeg, the cross–sectional method yields the lowest rates and the six–year cohort the highest rates. The differences may be due to there being more students who eventually graduate moving out of Manitoba after Grade 9 than students who graduate moving into these regions after Grade 9. In Winnipeg, the cross–sectional method yields the highest graduation rates. Higher rates using this method could be due to there being more students moving into the province after Grade 9 who eventually graduate than students moving away. Higher rates may also be due to students taking longer than four years to complete. That is, there may be students from the 2003/04 and 2002/03 Grade 9 cohorts graduating in 2007/08; these students would be in the numerator for 2007/08 graduate rates but not the denominator, resulting in higher graduation rates.

When broken down by income quintile, the pattern of differences between the cross–sectional and cohort methods are again evident across rural and urban areas. For rural income quintile areas, the six–year cohort method yields the highest graduation rates whereas the cross–sectional method yields the lowest. In urban areas, the cross–sectional method yields the highest graduation rates, followed by the six–year cohort method. Differences across methods are largest for the lowest two urban income quintiles, perhaps because students in these areas are more likely to take additional years to graduate, possibly inflating the rates calculated using the cross–sectional method (Appendix Figure A8.2).

Updated November 1, 2012

Appendix Figure A8.1: High School Completion Rates by Aggregate Region for Students Enrolled in Grade 9 in 2004/05*, Measured Using Cross-Sectional and Cohort Methods

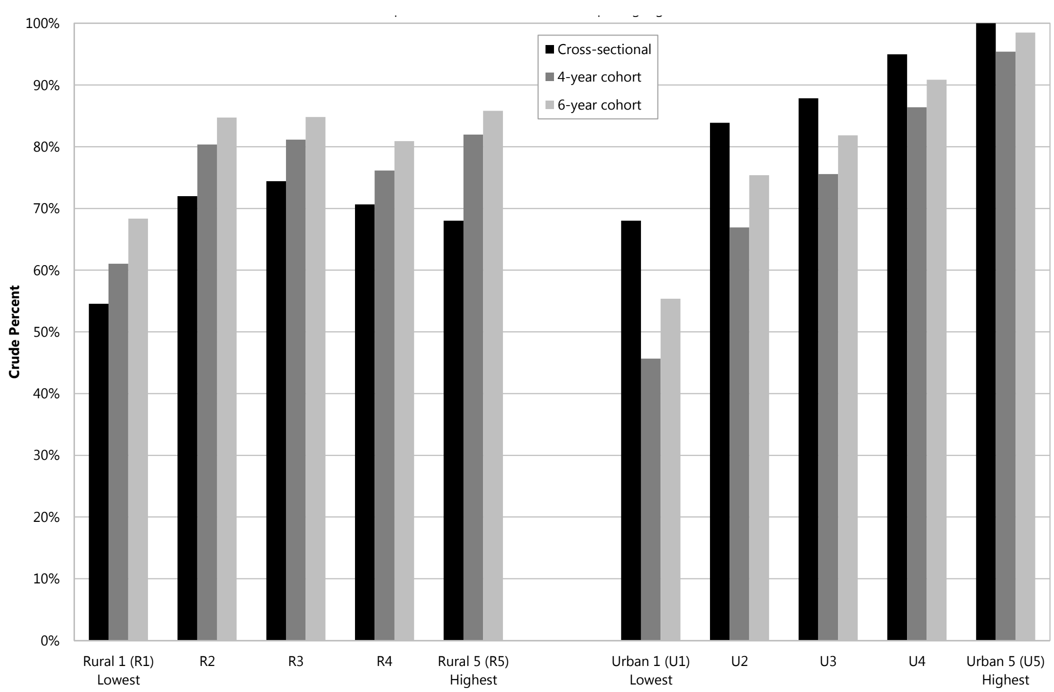
Crude percent of Grade 9 students completing high school



* Grade 9 enrolment year 2004/05 corresponds to graduation year 2007/08 for the cross-sectional and 4-year cohort methods, and to graduation year 2009/10 for the 6-year cohort method

Appendix Figure A8.2: High School Completion Rates by Income Quintile for Students Enrolled in Grade 9 in 2004/05*, Measured Using Cross-Sectional and Cohort Methods

Crude percent of Grade 9 students completing high school



Appendix 9: Aggregated Diagnostic Group (ADG) Codes Used in this Study

Minor ADGs	Major ADGs
Time Limited: Minor 558.9 Noninfectious Gastroenteritis 691.0 Diaper or Napkin Rash	**Time Limited: Major** 451.2 Phlebitis of Lower Extremities 560.3 Impaction of Intestine
Time Limited: Minor – Primary Infections 079.9 Unspecified Viral Infection 464.4 Croup	**Likely to Recur: Progressive** 250.10 Adult Onset Type II Diabetes with ketoacidosis 434.0 Cerebral Thrombosis
Time Limited: Major – Primary Infections 573.3 Hepatitis, Unspecified 711.0 Pyogenic Arthritis	**Chronic Medical: Unstable** 282.6 Sickle-Cell Anemia 277.0 Cystic Fibrosis
Allergies 477.9 Allergic Rhinitis, Cause Unspecified 708.9 Unspecified urticarial	**Chronic Specialty: Stable – Orthopedic** 721.0 Cervical sponsylosis without myelopathy 718.8 Other joint derangement
Asthma 493.0 Extrinsic Asthma 493.1 Intrinsic Asthma	**Chronic Specialty: Stable – Ear, Nose, Throat** 389.14 Central Hearing Loss 385.3 Cholesteatoma
Likely to Recur: Discrete 274.9 Gout, unspecified 724.5 Backache, unspecified	**Chronic Specialty: Unstable – Eye** 365.9 Unspecified Glaucoma 379.0 Scleritis / Episcleritis
Likely to Recur: Discrete – Infections 474.0 Tonsillitis 599.0 Urinary tract infection	**Psychosocial: Recurrent or Persistent, Unstable** 295.2 Catatonic Schizophrenia 291.0 Alcohol Withdrawal with Delirium Tremens
Chronic Medical: Stable 250.00 Adult-onset Type I Diabetes 401.9 Essential hypertension	**Malignancy (Cancer)** 174.9 Malignant Neoplasm of Breast NOS 201.9 Hodgkin's Disease, Unspecified
Chronic Specialty: Stable – Eye 367.1 Myopia 372.9 Unspecified disorder of conjunctiva	
Chronic Specialty: Unstable – Orthopedic 724.02 Spinal Stenosis of Lumbar Region 732.7 Osteochondritis Dissecans	
Chronic Specialty: Unstable – Ear, Nose, Throat 383.1 Chronic Mastoiditis 386.0 Meniere's Disease	
Dermatologic 078.1 Viral Warts 448.1 Nevus, Non-Neoplastic	
Injuries/Adverse Events: Minor 847.0 Neck Sprain 959.1 Injury to Trunk	
Injuries/Adverse Events: Major 854.0 Intracranial Injury 972.1 Poisoning by Cardiotonic Glycosides and Similar Drugs	
Psychosocial: Time Limited, Minor 305.2 Cannabis Abuse, Unspecified 309.0 Brief Depressive Reaction	
Psychosocial: Recurrent or Persistent, Stable 300.01 Panic Disorder 307.51 Bulimia	
Signs/Symptoms: Minor 784.0 Headache 729.5 Pain in Limb	
Signs/Symptoms: Uncertain 719.06 Effusion of Lower Leg Joint 780.7 Malaise and Fatigue	
Signs / Symptoms: Major 429.3 Cardiomegaly 780.2 Syncope and Collapse	
Discretionary 550.9 Inguinal Hernia NOS 706.2 Sebaceous Cyst	
See and Reassure 611.1 Hypertrophy of Breast 278.1 Localized Adiposity	

Appendix 10: Summary Table of SEM

Appendix Table A10.1: Summary of Structural Equation Models of EDI Domains and Grade 3 Outcomes

Appendix Table A10.1: Summary of Structural Equation Models of EDI Domains and Grade 3 Outcomes

Model Pathways	Language and Cognitive Development				Communication Skills and General Knowledge				Emotional Maturity				Social Competence				Physical Health and Well-Being				Not Ready in One or More Domains			
	Reading		Numeracy		Reading		Numeracy		Reading		Numeracy		Reading		Numeracy		Reading		Numeracy		Reading		Numeracy	
	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model	Base Model	MD* Model
EDI → Grade 3 Skills	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	−	−	−	−
Prenatal Health → Health at Birth	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns
Prenatal Health → EDI	−	ns	−	ns	−	ns	−	ns	−	ns	−	ns	−	ns	−	ns	−	ns	−	ns	+	ns	+	ns
Health at Birth → EDI	−	−	−	−	−	−	−	−	−	ns	−	ns	−	ns	−	ns	−	−	−	−	+	ns	+	ns
Health at Birth → Grade 3 Skills	ns	ns	−	−	ns	ns	−	−	ns	ns	−	−	ns	ns	−	−	ns	ns	−	−	ns	ns	−	−
Emotional Health → Grade 3 Skills	−	−	−	−	−	−	−	−	−	−	−	−	−	ns	ns	ns	−	−	−	−	−	−	−	−
Material Deprivation → Prenatal Health		+		+		+		+		+		+		+		+		+		+		+		+
Material Deprivation → Health at Birth		+		+		+		+		+		+		+		+		+		+		+		+
Material Deprivation → EDI		−		−		−		−		−		−		−		−		−		−		+		+
Material Deprivation → Grade 3 Skills		−		−		−		−		−		−		−		−		−		−		−		−
Child's Age at Testing → EDI	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	−	−	−	−
Sex → EDI	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+
4+ Children → EDI	−	−	−	−	−	−	−	−	−	ns	−	ns	−	ns	−	ns	−	−	−	−	+	+	+	ns
Breasfeeding Initiation → EDI	+	ns	+	ns	+	ns	+	ns	ns	−	ns	−	+	−	+	−	+	ns	+	ns	−	ns	−	ns
Intellectual Disability → EDI	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+
Maternal Age → EDI	+	ns	+	ns	+	−	+	−	+	−	+	−	+	−	+	−	+	ns	+	ns	−	+	−	+
In CFS → EDI	−	ns	−	ns	−	ns	−	ns	−	−	−	−	−	−	−	ns	−	ns	−	ns	+	ns	+	ns
Maternal Depression → EDI	ns	ns	ns	ns	ns	ns	ns	ns	−	−	−	−	−	−	−	ns	−	−	−	−	+	ns	+	ns
Physician Visits → EDI	ns	ns	ns	ns	ns	+	ns	+	−	ns	−	ns	−	ns	−	ns	ns	ns	ns	ns	ns	ns	ns	ns
90%+ Minor ADGs → EDI	ns	ns	ns	ns	−	−	−	−	ns	ns	ns	ns	ns	ns	ns	ns	−	−	−	−	ns	ns	ns	ns
Sex → Grade 3 Skills	−	−	+	+	−	−	+	+	−	−	+	+	−	−	+	+	−	−	+	+	−	−	+	+
4+ Children → Grade 3 Skills	−	−	−	ns	−	−	−	ns	−	−	−	−	−	−	−	ns	−	−	−	ns	−	−	−	ns
Breastfeeding Initiation → Grade 3 Skills	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns	+	ns
Intellectual Disability → Grade 3 Skills	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Maternal Age → Grade 3 Skills	+	ns	+	ns	+	ns	+	ns	+	ns	+	−	+	ns	+	−	+	ns	+	−	+	ns	+	−
In CFS → Grade 3 Skills	ns	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+
Maternal Depression → Grade 3 Skills	ns	ns	ns	ns	−	ns	−	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Physician Visits → Grade 3 Skills	ns	ns	−	−	ns	ns	−	ns	ns	ns	ns	ns	ns	ns	−	−	ns	ns	ns	ns	ns	ns	−	ns
90%+ Minor ADGs → Grade 3 Skills	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

* MD indicates Material Deprivation

\+ indicates a statistically significant positive correlation between the model variables at $p<0.05$, $p<0.01$ or $p<0.001$

\- indicates a statistically significant negative correlation between the model variables at $p<0.05$, $p<0.01$ or $p<0.001$

ns indicates that the correlation between the model variables is not statistically significant at $p<0.05$, $p<0.01$ or $p<0.001$

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