

# How Do Educational Outcomes Vary With Socioeconomic Status?

## Key Findings from the Manitoba Child Health Atlas 2004

June 2004

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ISBN 1-896489-26-5

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Members of MCHP consult extensively with government officials, health care administrators, and clinicians to develop a research agenda that is topical and relevant. This strength along with its rigorous academic standards enable MCHP to contribute to the health policy process. MCHP undertakes several major research projects every year under contract to Manitoba Health. In addition, our researchers secure external funding by competing for other research grants. We are widely published and internationally recognized. Further, our researchers collaborate with a number of highly respected scientists both nationally and internationally.

We thank the University of Manitoba, Faculty of Medicine, Health Research Ethics Board and the provincial Health Information Privacy Committee for their review of this project. The Manitoba Centre for Health Policy 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.

## ACKNOWLEDGEMENTS

Many individuals contributed efforts and expertise which made it possible for us to produce this report. We gratefully acknowledge the following and apologize in advance for anyone we may have overlooked:

- Those from the Department of Education, Citizenship and Youth, who played an essential role throughout the development of this report, providing invaluable advice on the development of variables and concepts and constructive feedback on preliminary results and drafts, including John VanWallegghem, Richard Perrault, Carol Crerar, Jean Britton, Ken Clark, Shirley McLellan, and Irene Huggins.
- Educators and policy-makers who took time to listen to preliminary findings and offer insightful feedback, including Doug Edmond, Brent Guinn, Karen Botting, Jean-Yves Rochon, Edie Wilde, Lorraine Henley, Connie Allsopp, Brett Lough, Lynda Baxter, Barb Isaak, Heather Demetrioff, Larry Budzinski, Stephen Power, Carol-Anne Browning, and Heather Hunter.
- Others who provided us with valuable comments on preliminary results as well as drafts of the report, including Ben Levin, Jan Sanderson, Rob Santos, Leanne Boyd, Tom Carson, Strini Reddy, Harvey Stevens, and Jan Roberts.
- MCHP personnel who helped extensively in preparing data for this report including Patrick Nicol, Charles Burchill, and Randy Walld; in organizing and coordinating the research, including Ruth Bond and Jen Bodnarchuk; and in the reviewing, editing and producing of this report and the summary, including RJ Currie, Shannon Lussier, Eileen Bell, Janine Harasymchuk, Dan Chateau, Norm Frohlich, Evelyn Shapiro, and Les Roos.
- The many individuals who worked so hard to ensure that a safe and secure protocol was in place for the transfer of the education data into the Manitoba Population Health Research Data Repository, including Ben Levin, Pat Rowantree, John VanWallegghem, Louis Barre, and Paulette Collins.

We thank the following organizations for data provision and preparation: Systems and Technology Services, and Assessment and Evaluation Branch, Manitoba Education, Citizenship and Youth; the Western Canadian Institute for Reading Recovery; Health Information Management, Manitoba Health.

This research has been funded by the Canadian Population Health Initiative (CPHI), a program of the Canadian Institute for Health Information (CIHI). The views expressed herein do not necessarily represent the views of the Canadian Institute for Health Information.

Marni Brownell holds a New Investigator Award from the Canadian Institutes of Health Research. Noralou Roos holds the Canada Research Chair in Population Health. Anne Guèvremont is an RBC Financial Group Research Fellow.

# TABLE OF CONTENTS

INTRODUCTION .....	1
BACKGROUND .....	1
SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF WINNIPEG .....	3
HIGH SCHOOL PERFORMANCE AND COMPLETION .....	4
OUTCOMES AT EARLIER AGES .....	6
THE FIT BETWEEN RESOURCES AND NEED .....	9
CONCLUSION .....	11
REFERENCES .....	13

## LIST OF FIGURES

Figure 1: Map of Winnipeg Child Population Numbers .....	3
Figure 2: Winnipeg SES Groups 2001 Census Data Neighbourhood Socioeconomic Status .....	3
Figure 3: Grade 12 (S4) Performance, by Winnipeg SES Group, Language Arts Standards Test, 2001/02 .....	4
Figure 4: High School Completion Rates, by Winnipeg SES Group .....	5
Figure 5: High School Completion Rates, by Winnipeg Neighbourhood .....	6
Figure 6: Grade 3 Performance, by Winnipeg SES Group, Language Arts Standards Test, 1998/99 .....	7
Figure 7: Healthiness of Children at Birth (1984), by Winnipeg SES Group .....	8
Figure 8: Per cent of Grade 1 Students in Reading Recovery Program, by Winnipeg SES Group, 2000/01 .....	9
Figure 9: Child Care Spaces for 0 to 12 year olds, by Winnipeg Neighbourhood, 2000 .....	10



## INTRODUCTION

We all know that children from disadvantaged neighbourhoods are more likely to be in poorer health and have difficulties in school. But can you answer these questions:

**When do they start to fall behind?**

- At birth?
- In the early grades?
- In high school?

**How seriously are they disadvantaged?**

**How important are the long term implications?**

**How well are we targeting services which may alleviate the disadvantage to those who most need them?**

Answering these questions is what this report is about; it summarizes the key findings related to educational outcomes from the Manitoba Child Health Atlas 2004, which is available online at [http://www.umanitoba.ca/centres/mchp/reports/child\\_inequalities](http://www.umanitoba.ca/centres/mchp/reports/child_inequalities).

## BACKGROUND

Years of research, including previous work done at the Manitoba Centre for Health Policy (MCHP), have demonstrated that health status is affected by many factors outside the health care system. Certainly, once a child is ill, doctors and hospitals contribute a great deal toward alleviating that illness. But it is also well known that there is a strong relationship between health status and socioeconomic status. Those with higher incomes, higher levels of education, and higher status jobs, live longer and healthier lives than those with lower incomes, lower levels of education, and jobs lower down in the hierarchy. This relationship between socioeconomic status and health is referred to as 'the socioeconomic gradient in health.' This pattern is known as a gradient because it does not have a simple threshold. It is not just a question of the poor having bad health and everyone else doing pretty well. Those in the lower-middle and the middle class also have room to improve when compared to the most advantaged groups. The challenge for researchers and policy makers has been figuring out how to translate this knowledge into policies that change the gradient. What we need are ways of improving the conditions for those in lower socioeconomic groups. This would increase the health of the most disadvantaged group, decrease the inequalities between socioeconomic groups, and increase the average health of the population (Lynch et al., 2004).

Education is often seen as one of the key policy levers for changing this gradient. Investment in education has been seen as society's investment in creating equality of opportunity and health across different groups. Research shows that a person's level of education is strongly related to

health—people with more education have better health and live longer lives (Backlund, Sorlie, Johnson 1999; Federal, Provincial, and Territorial Advisory Committee on Population Health, 1999; Sarginson, 1997). We also know that children from less advantaged families are at higher risk for school failure. But how well do we really understand existing differences in educational achievement? If we want to influence policies and programs aimed at changing the gradient, we first have to understand the gradient: How big is it? When does it develop? Answering these kinds of questions is the purpose of this report, which compares differences in educational achievements among Winnipeg children who live in different socioeconomic circumstances.<sup>1</sup>

The new databases at MCHP provide a unique resource to examine educational outcomes for all Manitoba children at specific points in time (see shaded box below). By combining data on student enrolment, high school course marks, and standards tests scores for Grade 3 and Grade 12 students, with population data on area residents, this report examines educational outcomes from a population-based perspective. Findings focusing more extensively on the health characteristics of Manitoba's children can be found in the Manitoba Child Health Atlas, 2004.

<sup>1</sup> For illustration purposes, all analyses discussed in this report focus on children living in Winnipeg. Analyses looking at non-Winnipeg children and all Manitoba children are included in the Manitoba Child Health Atlas, 2004 ([http://www.umanitoba.ca/centres/mchp/reports/child\\_inequalities](http://www.umanitoba.ca/centres/mchp/reports/child_inequalities)).

*The Manitoba Population Health Research Data Repository is a comprehensive database that holds records for Manitobans' contacts with the health care system. The Repository also includes a population-based registry, which includes all Manitobans registered with Manitoba Health; this makes it possible to determine such things as the number of residents, the number of children, and the number of babies born in the province and in various regions throughout the province. All records in the Repository are anonymous—containing no names or addresses. These data have been used for several years to provide accurate and timely information to health care decision-makers, analysts and providers, so they in turn can offer services which are effective and efficient in improving the health of Manitobans throughout the province. More recently, the Repository has been expanded to include data on educational achievement and social assistance.*

*This report focuses on the education data, which includes enrolment information on all students from Kindergarten to Grade 12, course marks for senior students (Grades 9 through 12), as well as scores for Language Arts and Math standards tests written in Grade 12 and Grade 3.*

*For Grade 12 students, Manitoba has had a provincial testing system in place since 1993. The current 'Standards Tests' are curriculum-based and mandatory for all students, with adaptations available for many special needs students (and exemptions 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.*

*Data for Grade 3 students came from the 1998/99 'Provincial Examinations' in Language Arts. Standardized Grade 3 testing was discontinued after that year.*

*Like the health data, the education records are anonymous. Strict procedures and guidelines are in place with respect to maintaining security, confidentiality and privacy of all data in the Repository.*



## SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF WINNIPEG

Figure 1 shows a map of the city of Winnipeg. In 2001, there were close to 650,000 people living in Winnipeg, about a quarter of whom were children between the ages of 0 and 19 years. Winnipeg can be divided into 25 neighbourhood areas, used by the Winnipeg Regional Health Authority for planning purposes, and this is what the lines on Figure 1 show. In this report we present findings on educational outcomes based on where children live, as opposed to where they go to school, in order to focus on the important relationship between socioeconomic conditions and educational outcomes. Most children (85%) attend schools close to the area in which they live. We categorized these 25 neighbourhood areas into four groups based on the socioeconomic characteristics of local residents (see shaded box next page for more details about how this was done). Low SES areas have more unemployment,

more lone-parent families, fewer adults with high school education, and fewer women in the workforce than higher SES areas. The groups also differ on other important dimensions: for example, the average selling value of houses in 1999 ranged from \$38,400 for houses in the Low SES areas to \$132,218 for houses in the High SES areas.

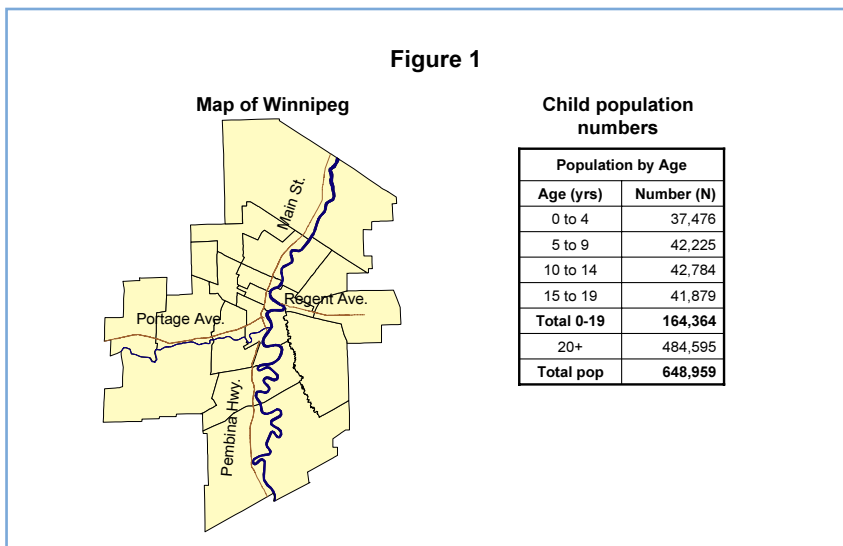
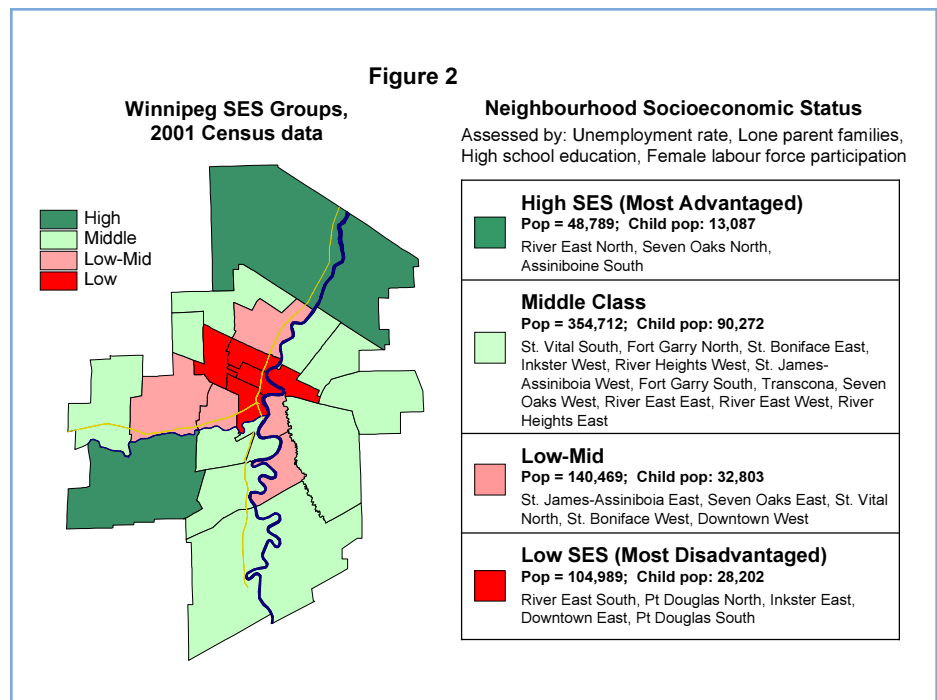


Figure 2 shows where each of these four groups is located in Winnipeg. It is clear that the more disadvantaged areas (those areas in red on the map) tend to be found in the central part of Winnipeg, with the most advantaged areas (those areas in dark green on the map) on the outskirts of the city.



There are a variety of socioeconomic characteristics that can be used to describe neighbourhoods—for example unemployment rates or high school completion rates. At MCHP, we have developed an index that combines those socioeconomic characteristics most strongly related to health outcomes into a single score (for a more detailed description see Martens et al., 2002). These characteristics include unemployment, high school completion, lone parent households, and female workforce participation.

We calculated this index for 1,146 small areas within Winnipeg\* using publicly available data from the 2001 Census. For ease of presentation, we calculated a socioeconomic index score for each of the 25 Winnipeg neighbourhood areas using a weighted average of the scores for each small area in that neighbourhood. The scores for these 25 neighbourhoods were then divided into four groups based on how different they were from the average score for all 25 Winnipeg neighbourhoods: Low SES (or most disadvantaged), Low-Mid SES, Middle Class SES, and High SES (see Figure 2 above).

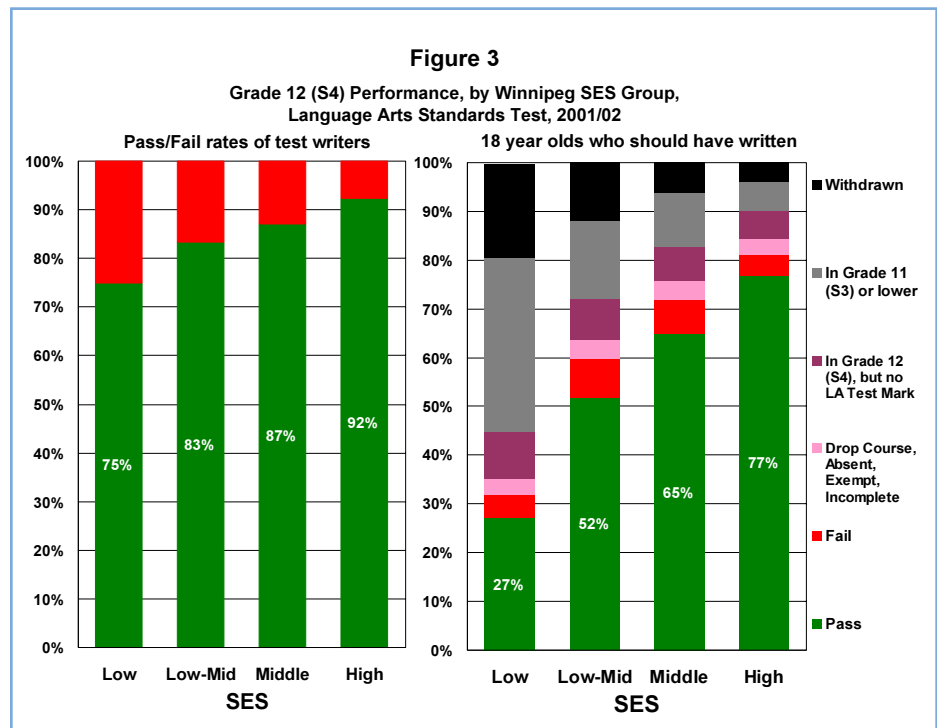
Note that the number of children and total number of people in these SES groups are not equal; the Middle SES category has almost half of Winnipeg's total population. Socioeconomic characteristics within each neighbourhood area of Winnipeg and for each non-Winnipeg district can be found in the full report at [http://www.umanitoba.ca/centres/mchp/reports/child\\_inequalities](http://www.umanitoba.ca/centres/mchp/reports/child_inequalities).

\* These small areas are known as Dissemination Areas (DA), and are the smallest standard geographical areas for which Census data are reported. DAs are composed of one or more neighbouring blocks, with a population of 400 to 700 persons. More information on DAs is available at: <http://www12.statcan.ca/english/census01/Products/Reference/dict/geo021.htm>.

### HIGH SCHOOL PERFORMANCE AND COMPLETION

So how well are we preparing students, who live in these very different areas of Winnipeg, for life? Figure 3 shows performance on the Grade 12 standards tests in the language arts (Grade 12 students are also referred to as Senior 4 or S4). This test mark counts for 30% of students' final mark in the course. The graph on the left reflects what the schools see when they review the performance of students taking the tests: 92% of students who live in the High SES areas passed, along with 75% of those from Low SES areas. So, there are systematic differences across the groups, though these differences seem modest. But these numbers do not tell the whole story—they just report results for those who are in school, in Grade 12, and writing the standards tests. The larger question is: What happens when we focus on who should have been writing the standards test at that time? This very different story is told by the graph on the right side. To develop this graph we first identified all children who were born in Manitoba in 1984, and who remained in Manitoba until 2001/02 (84%). Then, for those residing in Winnipeg in 2001/02, we figured out where they were in the school system at that time

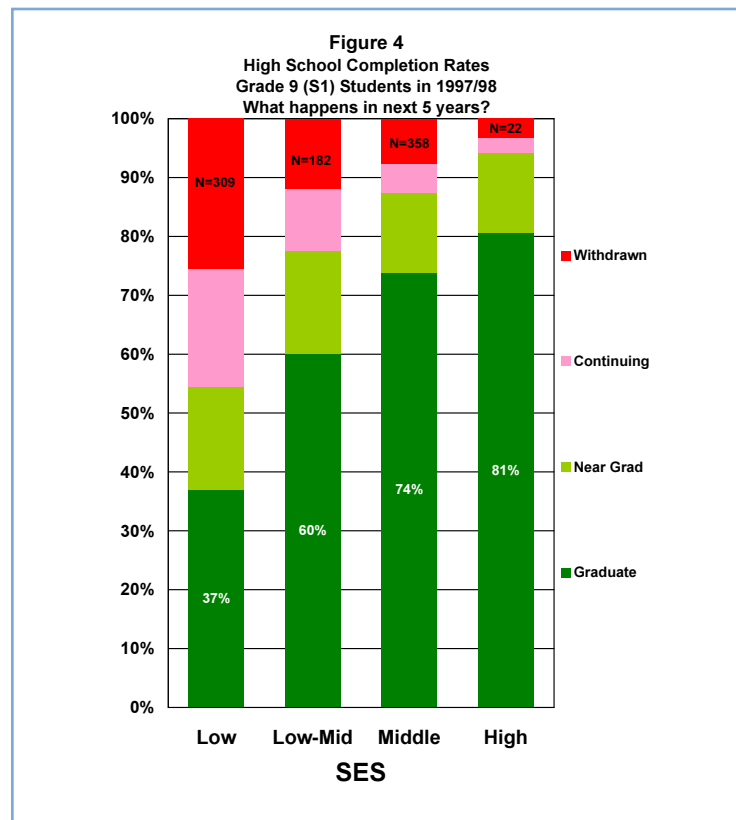
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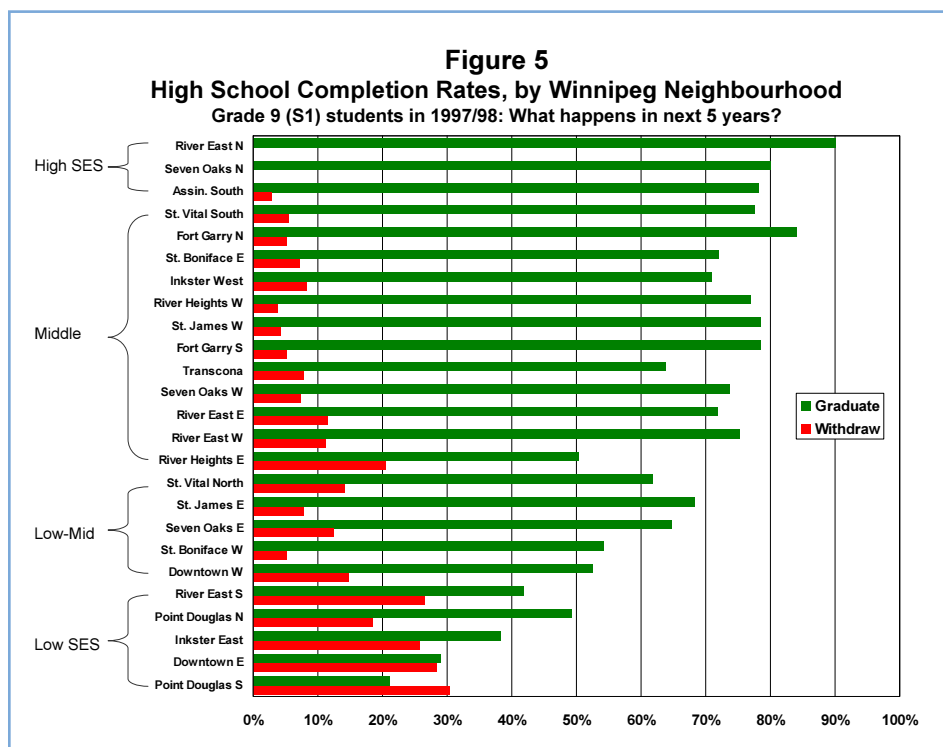
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(i.e., what should have been their final year in school). The graph on the right shows this very different reality: in fact only 27% of the youths who lived in the Low SES areas and who should have been writing the standards test that year actually wrote and passed the standards test. The pass rate was over two-and-a-half times higher for students in the High SES group (77%). A very large proportion of the students from the Low SES areas (almost 36%) were behind at least one year (in Grade 11 (S3) or lower), and almost 20% had withdrawn from school (not enrolled in school for at least 2 years). In other words, for all four SES groups, if students were in Grade 12 and wrote the test—the great majority passed. But many of the kids from Low SES areas had not yet made it to Grade 12, and almost one in five were not in school at all.

Figure 3 suggests that at least most students were still in school. But what proportion of kids in each SES group will graduate? To answer this question, we took all students in grade 9 (S1) in 1997 and tracked them for five years. Figure 4 shows what we found. Only 37% of the students from the Low SES neighbourhoods graduated by the end of five years.<sup>2</sup> Already one in four students had withdrawn before completing high school. An additional 20% were still in school after five years, but they had not yet made it to Grade 12 (shown as "continuing" on the graph). The picture was very different for students living in other neighbourhoods. In the High SES areas, 81% had completed high school within five years, and less than 5% had withdrawn.



<sup>2</sup> An additional 17% of students from Low SES neighbourhoods were "near graduation", meaning that they'd made it to Grade 12 but hadn't yet graduated at the end of five years. Follow-up analysis will allow us to determine what percentage of these students do end up graduating in subsequent years.

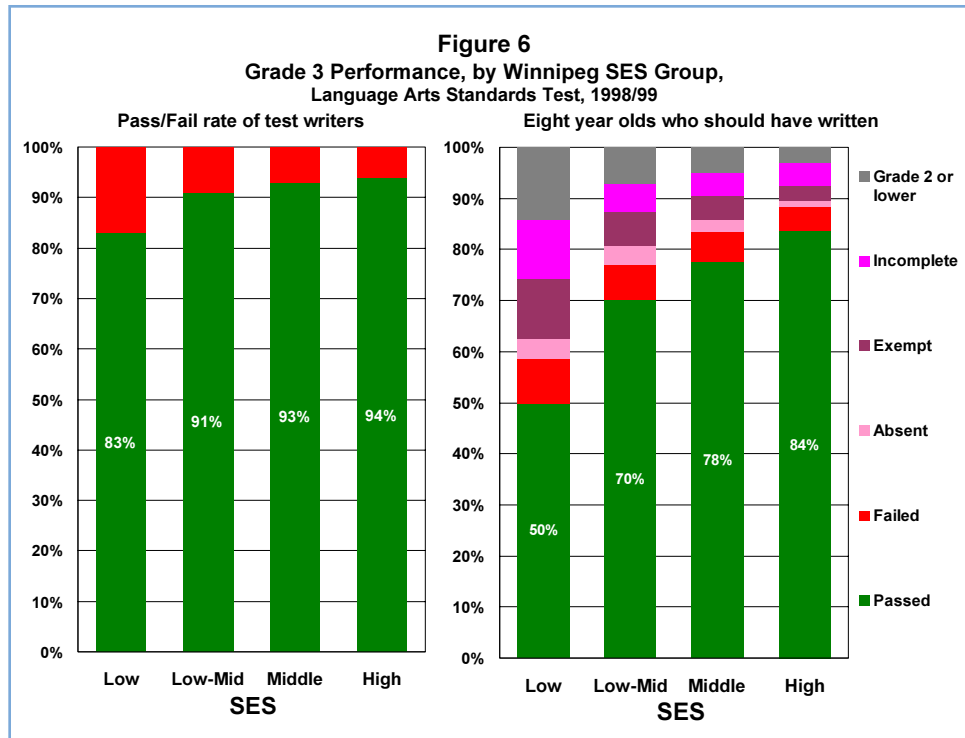


A more detailed picture is displayed in Figure 5, which shows the percentage of students graduating and withdrawing within five years of Grade 9 enrolment, by the 25 Winnipeg neighbourhoods. The neighbourhoods are ordered by SES, with the most advantaged neighbourhoods at the top of the graph and the least advantaged neighbourhoods at the bottom of the graph. This more detailed look reveals that rates of graduation within five years range from 90% to just over 20%, whereas withdrawal rates range from less than 5% to over 30%.

Although it is tempting to conclude from these figures that poor educational outcomes are a problem only for those students who live in lower SES areas, the numbers at the top of each bar in Figure 4 tell another story. While the withdrawal *rate* is highest among those from Low SES areas, the actual *number* of children living in each area must be considered. The number of youths living in the Middle Class SES group is much larger than in the other areas—almost half of Winnipeg residents live there. Even though the percentage of Middle Class SES youths withdrawing from school is less than one-third the percentage of Low SES youths withdrawing (8% compared to 25%), the numbers of withdrawals in these two areas are very similar: 309 students from Low SES areas had withdrawn from school, but so had 358 students who lived in the middle class neighbourhoods.

### OUTCOMES AT EARLIER AGES

Both the Grade 12 language arts exam and the high school completion results demonstrate a strong socioeconomic gradient in educational outcomes: students who live in lower SES neighbourhoods are less likely to pass the Grade 12 standards tests, are less likely to graduate from high school within five years of entering, are more likely to have failed a grade at some point, and are more likely to withdraw before completing high school. When do children from lower SES areas start falling behind? To try to answer this question, we looked at Grade 3 standards test results for Winnipeg children. As can be seen in Figure 6, already by Grade 3, children from Low SES neighbourhoods are much less likely to be performing well—passing the Grade 3 standards test at an age appropriate time. When we look only at the performance of those who wrote the test (left side Fig. 6), the differences across SES areas do not seem very large—they go from 83% passing in the Low SES areas to 94% passing in the High SES areas. But once again, this does not tell the whole story. To see the complete picture, we identified all children born in Manitoba in 1990, and living in Winnipeg in the 1998/99 school year, who should have been



writing the Grade 3 standards test that year. As can be seen in the graph on the right of Figure 6, only 50% of those living in Low SES neighbourhoods passed the test on schedule, compared with 84% of those living in Winnipeg's High SES neighbourhoods (a difference of over one-and-a-half-times). Fifteen per cent of students living in Low SES neighbourhoods were enrolled in Grade 2 or lower, and compared with other neighbour-

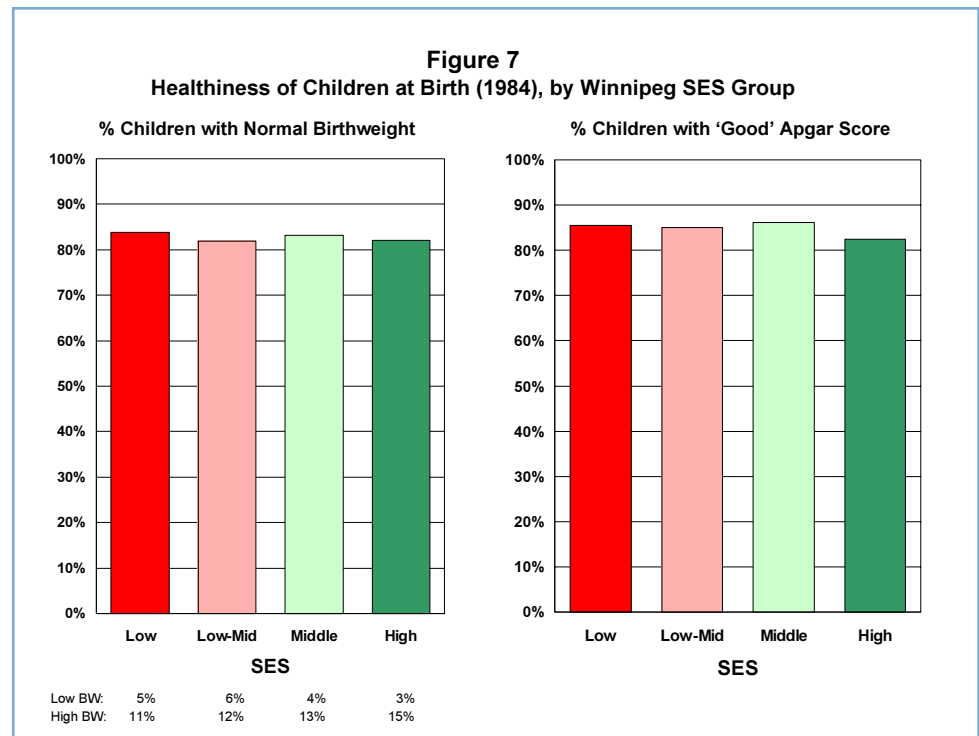
hoods, more children from the Low SES neighbourhoods failed the test, did not complete it, were exempt, or were absent on the day (or days) the test was written.

We've shown that big differences in educational outcomes across SES groups are present even in the primary school years. Indeed, evidence from Vancouver shows that socioeconomic gradients are present at school entry, with children from lower SES neighbourhoods entering kindergarten less prepared for school learning than children from higher SES neighbourhoods (Hertzman et al., 2002).

Are these differences in children apparent at birth? We've heard a lot about the problems of poor nutrition, smoking and inadequate prenatal care facing pregnant women in disadvantaged neighbourhoods. These factors potentially put them at risk of having babies whose birth weights are too low or too high, or are at higher risk of having other problems at birth (Perinatal Education Program of Eastern Ontario, 1998). Low birth weight babies (less than 2500 grams) are at risk of a number of developmental, cognitive and health problems, and high birth weight babies (greater than 4000 grams) are at greater risk of birth complications as well as later health problems (Perinatal Education Program of Eastern Ontario, 1998; Saskatchewan Health, 2000). Babies born with low or borderline Apgar scores (see shaded box next page) may also be at increased risk of later health and developmental problems. We looked at both the birth weights and Apgar scores for our 1984 cohort (the kids we focused on for the Grade 12 language arts standards tests) and our 1990 cohort (the kids we focused on for the Grade 3 language arts standards tests) to see if differences in children from different socioeconomic groups<sup>3</sup> were apparent at birth. Results were similar for both cohorts, and so we report on the kids born in 1984 below.

<sup>3</sup> Assignment of SES group was based on residence at the time the standards test was taken.

The left side of Figure 7 shows the percentage of children with normal birth weight (i.e., neither low nor high) across the four SES groups in Winnipeg (bars in the graph are coloured to correspond to the SES groups shown in Figure 2). Remarkably, there was little difference across the SES groups: 84% of the kids in the Low SES group had been normal weight at birth compared to 82% for the High SES group. There is some variation across



SES groups in the rates of low and high birth weight babies, but these differences are quite small.

The right side of Figure 7 shows the percentage of children with "good" 5-minute Apgar scores across SES groups. As with birth weights, there is remarkably little difference in Apgar scores, and, if anything, the small differences suggest a higher percentage of good scores for the Low SES group: 86% of kids from Low SES areas had good 5-minute scores at birth, compared to 82% of kids from High SES areas. This lack of difference across SES groups in both healthy birth weights and healthy Apgar scores is even more remarkable when one considers the differences in life expectancy for these children. For example, males born in Winnipeg's Low-Mid SES neighbourhoods are expected to live three years less than males born in the High SES neighbourhoods (the two groups have life expectancies of 76.6 and 79.6 years respectively). And males born in Low SES neighbourhoods have even lower life expectancy: only 71.8 years, despite the fact that children from all neighbourhoods seem similarly robust at birth. These differences may seem small, but three years is the same difference in life expectancy that we'd gain if we wiped out all cancers (Manton, 1991). We need to do more to reclaim the three years of life lost for males of lower middle class areas, and the almost eight years of life lost for males born in Low SES neighbourhoods. (Slightly smaller differences were found for females.)

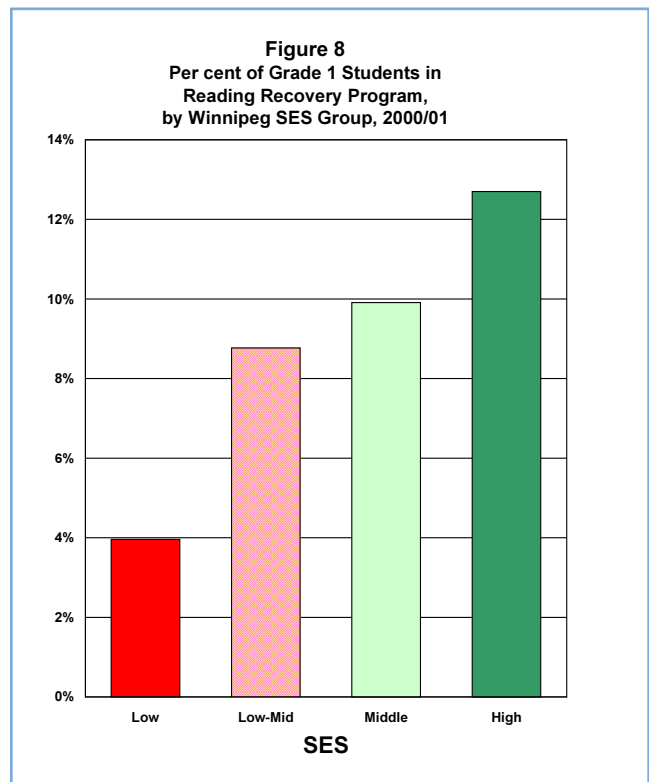
*Apgar scores measure the physiological well-being of newborn babies, and are recorded for virtually all births in hospital. A score of zero, one, or two is given for each of five vital signs that are assessed at one and five minutes after birth. These five scores are added up to give a total score between 0 and 10. The five vital signs are: appearance, pulse, reflex, muscle tone, and breathing pattern. Very low scores are associated with poor neurologic outcomes (Stanley 1994), whereas "borderline" scores are associated with decreased visual attentiveness in the first year of life, compared with "good" scores (Lewis et al. 1967). For our analysis we considered scores of 9 or 10 at five minutes as "good".*

## THE FIT BETWEEN RESOURCES AND NEED

The preceding graphs clearly show that children from the most disadvantaged neighbourhoods of Winnipeg are at higher risk of poor educational outcomes compared to those from more advantaged neighbourhoods. This raises the question: are we directing resources in such a way as to help these children and their families overcome the major challenges they face? We would expect that where we find higher concentrations of children with more risk factors and poor outcomes, we would also find greater concentrations of efforts aimed at helping children overcome these disadvantages.

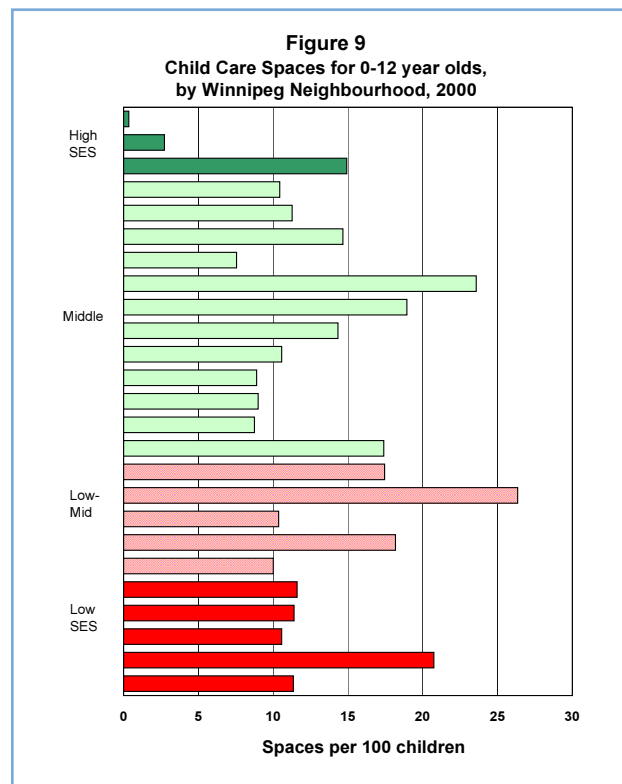
In a sense, this is the way the health care system works—it shows a good fit between resources and need. When we look at children's health outcomes, as with educational outcomes, we find important differences across SES groups: children from the most disadvantaged neighbourhoods have poorer health status than those from more advantaged neighbourhoods (for child health status measures, please see [http://www.umanitoba.ca/centres/mchp/reports/child\\_inequalities](http://www.umanitoba.ca/centres/mchp/reports/child_inequalities)). Thankfully, our universal health-care system is very good at delivering more care to those who need it most: people from lower SES areas make more doctor visits and are admitted to hospital more frequently than those from higher SES areas, reflecting their greater need for care (Roos, Brownell, Menec, in press).

Is this also the case with education and early child development resources? Although the health care system delivers more care to sicker children, other child support systems appear to be less designed to target extra funds to high need groups. Several years ago the province made a commitment to improving literacy and initiated an early literacy grant to achieve this goal. A widely used program for early literacy in Manitoba schools is called Reading Recovery. This program is intensive and requires a teacher to work one-on-one or with small groups of children for several hours each week. There is a pre-test to enable teachers to pick the neediest children for the program. Figure 8 shows the percentage of Grade 1 children in Reading Recovery programs by the four Winnipeg areas. As shown in the figure, children from the Low SES group have the lowest overall participation rate, even though we would expect many of those kids to need the extra help. It should be stressed that there are other early intervention literacy programs used in Winnipeg schools and throughout the province besides Reading Recovery, but we do not have data for these other programs. Thus the low percentages seen for Low SES groups in Figure 8 could be due to the implementation of other programs. In our talks with educators from these Low SES areas, they reported that so many of their Grade 1 students need



remedial reading instruction, that they could not afford to provide the resource-intensive Reading Recovery program to all the students (the funding formula assumes that around 20% of all students will need early literacy programming). The high need schools therefore use their early literacy funds for programs which are less intensive but reach more children. The result is that the most extensive use of the effective Reading Recovery program is in the schools in High SES areas, where almost 13% of Grade 1 students receive this program, compared to only 4% of students in the Low SES areas (these percentages vary widely by school—three-quarters of the schools in the Low SES area had no children in Reading Recovery in 2000/01, whereas other schools in this area had almost half their Grade 1 students in this program). While the other early literacy programs may be as effective as Reading Recovery, the marked differences in educational performance which exist across Grade 3 and Grade 12 students make a compelling case for needs-based investments in the early years.

A somewhat similar problem of distribution and access applies to child care spaces. We know high quality child care can help prepare children for school, providing them with improved cognitive, language and social skills (Peisner-Feinberg et al., 2001). High quality child care has been shown to be particularly effective at enhancing early development for children from more disadvantaged backgrounds (Kohen, Hertzman and Willms, 2002). For this reason, we would expect to find the most generous supply of provincially licensed child care spaces in the Low SES areas of the city. Figure 9 shows the per cent of licensed child care spaces for children 0 to 12 years by Winnipeg neighbourhoods. It illustrates that there is a wide range of supply across the city, from a low of less than 0.5 spaces to a high of 26 spaces per 100 children. The neighbourhoods in this graph are ordered from highest SES at the top to lowest SES at the bottom, and it is clear that the number of child care spaces is not related to SES.





## CONCLUSIONS

Our finding that kids from poor areas do less well in school is not new. What this report contributes is information on the full extent of the inequalities in educational outcomes across SES groups. The findings reveal that kids from Low SES groups are doing dramatically worse than Middle Class and High SES kids—both in terms of staying in school, and doing well when there. By using information on the entire population, we have provided a more complete picture of the socioeconomic gradient in educational outcomes for Winnipeg children and youth. The results are more sobering than what educators generally see and what is often reported in surveys, but they also point to some potential solutions.

These inequalities appear to start early in a child's development—prior to school entry. Children who begin school already behind their peers will likely fall further behind, and it may become more difficult to engage them in the educational process. This makes it imperative to provide effective early childhood programs (starting in the first few years of life) to enhance the experiences of children at risk. Such programs need to be continuously monitored to ensure their effectiveness and ongoing improvement. An important tool for monitoring early childhood programs is the Early Development Instrument (EDI) which was developed by the Offord Centre for Child Studies. It has been used in British Columbia (Hertzman et al., 2002) and in other provinces to assess key dimensions of child development at school entry. With funding from Healthy Child Manitoba<sup>4</sup>, Manitoba schools began administering the EDI to kindergarten students in 2003, with over half of the school divisions in the province participating. It is important that use of this tool be encouraged throughout the province, as this would provide population-based information which could be used to monitor early childhood initiatives.

Based on the disparities in outcomes in the early school grades, school-based programs should also be supported. Over the past few years, the Department of Education, Citizenship and Youth in Manitoba has initiated several projects aimed at improving outcomes for children in the early grades. It is important to point out that the outcomes discussed in this report focused on children born in 1990 or earlier, and these new initiatives would not have been in place when these children entered the school system. It will be important to continue to monitor the kinds of educational outcomes presented in this report to determine whether these recent initiatives are effective at reducing inequalities.

School-based programs need not be restricted to school-aged children. Early childhood development programs for pre-school children within primary schools have been proposed in other jurisdictions as a way to not only enhance early developmental experiences, but also to help connect children and their families to local schools (McCain & Mustard, 1999, 2002). Such programs would be beneficial to all children, particularly those at risk of poor educational outcomes.

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<sup>4</sup> Led by the Healthy Child Committee of Cabinet, Healthy Child Manitoba bridges several government departments and works with the community to improve the well-being of Manitoba's children and youth. For more information go to <http://www.gov.mb.ca/healthychild/index.html>.

Programs for older school children and youth, designed to engage them and keep them interested in school, while at the same time providing them with the skills necessary to complete high school, should also be supported and enhanced. Whereas it may be easier and more cost effective in the long term to invest in early child development in an attempt to prevent poor school outcomes from occurring in the first place, there will always be teens having trouble in high school, and there are effective programs that can help struggling adolescents to stay in school and improve their outcomes (Alvermann, 2002; Langer, 2001).

Although the rates of poor educational outcomes are much higher for children and youths in low SES areas, most of the children who are doing poorly are not from Low SES areas, because most children do not live in those areas. This is the rationale for providing universally available programs: programs directed only at low SES areas would not substantially reduce the total number of children with poor educational outcomes. Universal programs are also more likely to win the support of the middle class and businesses which employ mothers and fathers of young children (Skocpol, 1991). However, delivering universal programs does not necessarily mean equal funding per child: targeting within a universal approach should ensure that those children with the greatest needs receive whatever extra support is required to help them improve their outcomes, regardless of where they live. That said, this report makes clear that more needs to be done for children and families in low SES areas.

Although the analyses shown in this report are based on Winnipeg residents only, we have found similar patterns for children living outside of Winnipeg. Likewise, similar patterns probably exist for children and youth across Canada. Although the results are sobering, they are also instructive, and can be used to stimulate change: we need to do a better job of preparing kids for school entry, and a better job of engaging them in school through graduation—especially kids from Low SES areas. The evidence in this report can be used to inform the development of policies and programs aimed at helping young people and their families, and work towards improving educational outcomes for all children and youth.

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