Community Resources and Determinants of the Future Health of Manitobans

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ABSTRACT

Background: Life history studies in health show that some of the key determinants of health inequalities lie in biological and social experiences at the earliest times of life. The objectives of this research were to describe the regional distribution of childhood determinants of adult health, such as school achievement, and the environments which contribute to their development.

Methods: Using Manitoba data from the National Population Health Survey, the National Longitudinal Survey on Children and Youth, the Department of Education, Training and Youth, the Department of Family Services and Housing, the Library Association website and the Agriculture and Food website, the regional distribution of Grade 3 standards test scores and neighbourhood resources such as child care services, libraries, sports participation and food costs were determined for 12 Regional Health Authorities and 12 Winnipeg Community Areas, ranked by a measure of population healthiness, the premature mortality rate. Findings were also reported by income level and larger geographic regions.

Results: Children living in neighbourhoods with less healthy populations were more likely to have poorer school performance, as indicated by Grade 3 math standards test scores. They were also more likely to change schools, less likely to participate in sports, and had decreased access to affordable food and licenced day care. They had similar access to library books as children living in more healthy neighbourhoods, although book lending rates were not measured.

Conclusion: We documented regional variation in the availability of resources to support healthy childhood development.

La traduction du résumé se trouve à la fin de l'article.

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Life history studies provide preliminary evidence that some of the key determinants of health inequalities lie in biological and social experiences at the earliest times of life.¹⁻³ Good health in adulthood is predicated by good health in childhood. Chronic conditions in childhood, such as diabetes or seizure disorders, continue to affect quality of life throughout the lifespan. Events such as teen pregnancy also have a long-term impact; young lone parents are more likely to live in poverty.^{4,5} Other childhood determinants of adult health include school achievement and the acquisition of risk factors for chronic disease. The latter has a direct effect on the development of cardiovascular disease in adulthood.^{6,7} The former sets the child on a lifelong trajectory. Children who have poor school performance are less likely to complete high school.⁸ Level of education influences health through its association with work conditions (e.g., being employed, fewer economic burdens, more satisfying occupations), social-psychological factors (e.g., sense of control and self-efficacy with regard to life generally and health), and healthy lifestyle factors (e.g., smoking, exercise).⁹ It is well known that the chances of living in poverty increase as level of education decreases.¹⁰

The objectives of this research were to describe the regional distribution of childhood determinants of adult health and the environments which contribute to their development. Children encounter three major social environments from birth to adolescence: household, neighbourhood and school.¹¹ The household environment is important in early childhood to outcomes such as injury, but also influences school achievement.^{12,13} As children grow older, the neighbourhood environment becomes more influential.¹⁴ In this paper, we present information on neighbourhood resources that affect determinants of adult health: school achievement and health risk factors. Such an approach is consistent with the broader portrait of child health and additionally, identifies a developmental pathway that fosters healthy adulthood.¹⁵ Further, the distribution of neighbourhood resources is related to the socioeconomic status of the neighbourhood, contributing to evidence on the uneven allocation of resources and their impact on the child, and eventual impact on adult health.¹⁶⁻²²

Statistical Significance:
* - Rate significantly different from Manitoba mean at $p < 0.05$

Figure 1. Grade 3 mean math scores by RHA, 1998 (Manitoba Education, Training and Youth)

Statistical Significance:
* - Rate significantly different from Manitoba mean at $p < 0.05$
W - Rate significantly different from Winnipeg mean at $p < 0.05$

Figure 2. Grade 3 mean math scores by Winnipeg CA, 1998 (Manitoba Education, Training and Youth)

METHODS

Findings are presented in two sections: school achievement and availability of neighbourhood resources. The rationale for measures and data sources used are described under each section. The common framework described in Brownell et al.²³ was employed; findings are presented by Regional Health Authority (RHA) and Winnipeg Community Area (Winnipeg CA), and ranked by the premature mortality rate (PMR), a measure of the healthi-

ness of a population.^{24,25} Using t-test methodology developed by Carriere and Roos,²⁶ treatment prevalence rates for individual RHAs and Winnipeg CAs were compared, at the 99% level of confidence, to the total Manitoba child population, Winnipeg, Non-Winnipeg (all children residing outside of Winnipeg), rural south (children residing in rural regions below the 53rd parallel) and north (children residing in regions above the 53rd parallel). Visual inspections of the regional rates, ranked according to PMR (lowest to high-

est), were performed to provide insight into the relationship with the healthiness of the population within a region (PMR). To further assess the association with PMR, treatment prevalence rates for regions were correlated with region PMR, using Spearman's rank. In the absence of data at the level of the RHA and Winnipeg CA, findings were also reported by income level and rural/urban area.

RESULTS

School achievement and household mobility

Documenting population-based indicators of educational achievement in children represents the first step towards determining the importance of education in moderating the socioeconomic gradient in health. We present area-based data on the educational achievements of Manitoba children available from the database of Manitoba Education, Training and Youth. These data include the publicly available results of the 1997-98 Grade 3 mathematics standards tests. Standards tests are developed to reflect learning outcomes in the school curriculum and are pilot tested in a sample of students prior to use at the provincial level. All schools in the province participated in writing these exams, with the exception of First Nations-operated schools and non-funded independent schools. Given that standard tests were administered on a province-wide basis and were centrally marked, comparisons across regions were possible. Test scores were school-based and aggregated to RHAs and Winnipeg CAs. Mean test scores were weighted by the number of students writing the exam. Data from funded independent schools were excluded because test scores could not always be attributed to specific geographical areas (i.e., students travelling out of their neighbourhood to attend a particular independent school). Overall, 8% of grade 3-aged Manitoba children who were enrolled in First Nations-operated schools did not write the standards tests. However, in the RHAs of Burntwood, North Eastman and Nor-Man, this statistic increased to over one third of grade 3-aged children enrolled in First Nations-operated schools.

Figures 1 and 2 show the mean score on a province-wide Grade 3 Mathematics test,

by RHA and Winnipeg CA, respectively. Presented also are the percentage of children registered in Grade 3 who wrote the exam, recognizing that this may vary by region and be a potential source of bias in the findings. Students who did not write the exam were those who were either absent on exam day, or exempt from writing (e.g., students with special needs or in modified programs). Little variation was observed across RHAs where mean scores varied from 45.2 in Burntwood to 56.3 in North Eastman. However, these findings may not represent the educational achievements of children in RHAs which had a very high percentage of children attending First Nations-operated schools. In Winnipeg areas, we documented greater variability in mean scores across areas, ranging from 42.1 and 42.0 in the Downtown and Point Douglas areas, respectively, to 63.9 in the Fort Garry area. Examination of Figure 2 also reveals some variation in the percent of students writing exams across Winnipeg areas. The highest percentage of students not writing was observed in areas where scores also tended to be lower. We might speculate that the addition of absent students would enhance the observed gradient across areas. The correlation between PMR rank and mean scores was relatively weak for RHAs ($r=-0.11$, ns). Across Winnipeg areas, however, we observed a clear pattern of lower test scores in areas where the populations have relatively poorer health and higher socioeconomic risk. ($r=-0.84$, $p<0.001$).

Household mobility is one of many factors that influence a child's ability to take advantage of the educational opportunities afforded. Children who move frequently are less likely to complete school.²⁷ Household mobility also affects neighbourhood stability. To better understand the regional distribution of household mobility, the percent of enrolled students in each RHA and Winnipeg CA who transferred from a school in each of the areas to some other school (all grades included) were obtained from Manitoba Education, Training and Youth. Figures 3 and 4 present these data by RHA and Winnipeg CA, respectively. While we observed regional variation across both RHAs and Winnipeg CAs, the results across Winnipeg areas appear to parallel the gradient observed for Grade 3 math scores; a

Figure 3. Percent of school transfers by RHA, 1997-98 (Manitoba Education, Training and Youth)

Figure 4. Percent of school transfers by Winnipeg CA, 1997-98 (Manitoba Education, Training and Youth)

higher percentage of transfers were found in areas in which populations are at higher health and socioeconomic risk. Correlations between rank PMR and percent transfers were much weaker for RHAs ($r=0.43$, ns) than for Winnipeg CAs ($r=0.66$, $p<0.05$).

Neighbourhood resources

Healthy communities, or neighbourhoods, provide opportunities for residents to maintain or improve their physical and mental health, and for children to learn.¹⁸ The impact of communities,

beyond the influence of the family, has been documented. For example, at age three years, children from more affluent neighbourhoods have higher IQ scores than children from less affluent neighbourhoods, even after controlling for differences in family resources.²⁸ At early school age, independent of family factors, higher neighbourhood socioeconomic status and less neighbourhood crowding remain significantly related to higher cognitive functioning.²⁹ Adjusting for family characteristics such as income

Figure 5. Public library books per person by Winnipeg CA

Figure 6. Child day care spaces for children aged 0-12 years by Winnipeg CA, 2000

level, children from more affluent communities continue to show better developmental outcomes through adolescence, as evidenced by lower teenage pregnancy and school dropout rates.¹⁴ More affluent communities often have more resources such as libraries, community programs, museums, and sports facilities. The presence of neighbourhood resources has been known to influence children's behaviour and development.^{30,31} In this section, we present information about the distribution of select community resources in Manitoba.

Libraries

Public libraries are places for children to improve their reading skills, to participate in story times or other reading programs, and for parents to find information on many topics such as healthy child development.³² "Libraries cannot solve all of the problems kids have, but they can and do make a tremendous difference".³³

In Manitoba, there are over one hundred public libraries. The number of books stocked by individual libraries was determined from the Manitoba Library Association web site (www.mla.mb.ca/) and

totalled across libraries located within RHAs and Winnipeg CAs. Figure 5 shows the number of library books per person in each Winnipeg CA, excluding the number of books in school libraries. The large number of books per person in the Downtown Winnipeg area is due to the location of the main branch of the Winnipeg Public Library. Child access to books was also similar across RHAs. The number of library books in a region was not significantly correlated with PMR for either RHAs (Spearman $r=0.22$, ns) or Winnipeg CAs (Spearman $r=-0.10$, ns). Further, children may have access to many more books than indicated because the regional library systems share books and bookmobiles visit smaller communities that may not have their own libraries (L. Innerst, Dauphin Public Library, July 20, 2000).

Child Care

High quality child day care encourages children to develop social, language, and cognitive skills, and often compensates for poor family conditions.³⁴ Quality child care also benefits families, communities and society when access to high quality child care allows parents to find and keep jobs, a key step in improving the health of their children.^{35,36} Although not the only criterion for quality, licensure of a child care facility has been associated with higher quality care. According to the Childcare Research and Resource Unit,³⁷ Manitoba has the fourth highest number of regulated child day care spaces available (105) per 1000 children age 0-12 years in Canada, after Prince Edward Island (154), Quebec (149), and British Columbia (108).

The number of licenced child day care spaces per RHA and Winnipeg CA was obtained from Manitoba Family Services and Housing. Figure 6 shows the number of licenced child day care spaces per 1000 children aged 0-12 years across Winnipeg CAs. Similar to RHA patterns, regions with healthier populations had more day care spaces per 1000 children, but these correlations were non-significant at both the RHA (Spearman $r=-0.09$, ns) and Winnipeg CA (Spearman $r=-0.40$, ns) levels. Information on unlicenced home day cares is available from the National Longitudinal Survey of Children and Youth (NLSCY), where results show an additional 131 children per 1000 were in unregulated care.

Sports Programs and Physical Activity
Sports programs, both supervised and unsupervised, are part of many children's community resources. According to Sport Manitoba (B. Moroz, Sport Manitoba Communications, January 4, 2000), 95% of all schools in Manitoba have a basketball court and almost every community has either indoor or outdoor ice rinks. These facilities may or may not get used by children, and aspects of the community itself may affect participation. In addition to preventing traffic injuries in children,³⁸ the presence of parks, playgrounds, and other play spaces, or having a supportive neighbourhood, tends to increase participation in sports.³⁹ When children participate in community sports programs – they benefit in many ways – for example, by developing preventive strategies to protect themselves against the potentially negative effects of stress and trauma.⁴⁰

Physical activity also has positive effects on both physical health and emotional well-being. Children can gain a sense of mastery and competence from participating in both organized and unorganized sports. According to the 1996 NLSCY, almost 35% of Manitoba children under the age of 14 years watched one or less hours of television a day. On the other hand, close to 25% of Manitoba children spent three or more hours a day watching television. Seventy percent of Manitoba children frequently (more than once per week) participated in some form of organized or unorganized sport. In *urban* areas (Winnipeg and Brandon) children from low-income families were less likely to participate frequently in sports (54.1%) than children from high-income families (71.8%). (Caution must be exercised in interpreting group differences found with NLSCY data, as significance tests controlling for sampling variability were unavailable). In *rural* areas, participation in sports did not vary according to family income. In both urban and rural areas, children in families with mothers who had some post-secondary education were somewhat more likely to participate frequently in sports (77.4%) than those with mothers who did not have this level of education (66.4%).

One possible outcome of inactivity in children is obesity. Obesity in childhood can have serious consequences in adulthood,^{41,42} including continued obesity.⁴³⁻⁴⁶

There is ample evidence linking obesity with health problems including coronary heart disease⁴⁷ and diabetes.⁴⁸ Childhood obesity has increased over the past several years, with approximately one in four children experiencing problems of overweight.^{49,50} Increased rates of obesity in children have been paralleled by dramatic increases in sedentary activities such as TV watching, and computer and video games.⁵¹ The Body Mass Index (kilogram/metres²) of Manitoba children was calculated from weight and height data in the 1996 National Population Health Survey (NPHS).⁵² Values in excess of age-gender cutoffs for the 85th percentile of Body Mass Index, based on the NHANES I survey, were selected as indicators of obesity or risk for obesity.⁵³ Almost 29% of Manitoba children were obese or at risk for obesity, ranging from 23% to 36% across RHAs. Regional differences were not statistically significant, possibly due to the high sampling variability in the NPHS data.

Nutrition

Healthy diets are important for children's health, not only with respect to obesity and overweight, but also with respect to malnourishment. Child hunger affects school performance.⁵⁴ Further, longitudinal research has shown that adult health is influenced by nutrition in childhood.⁵⁵ The cost of food in a region is another neighbourhood resource that can affect child health when healthy food intake is more difficult for children in regions where food costs are high. A study by Alderson and Ogden⁵⁵ reported that the quality of food was an important motivator for mothers when choosing food for their children, but cost and availability were motivators when mothers chose food for themselves. Both cost and quality of food have been found to vary by geographic location; families living in lower income or inner-city urban areas have less access to healthy and affordable food.^{56,57}

Yearly food costs in different regions of Manitoba were obtained from the Manitoba Agriculture and Food web site (<http://www.gov.mb.ca/agriculture/home-cba24s01.html>). Food basket costs were obtained from stores in each region in October 1998. A food basket contained 5-12 servings of grain products, 5-10 serv-

ings of vegetables and fruits, 2-4 servings of milk products, and 2-3 servings of meat and alternatives per day per person, based on a family of two adults and two children. The yearly cost of a food basket for a family of four in a small northern community was nearly \$1,400 higher than for the same family in Winnipeg. The most expensive places to feed an infant were small communities in South Westman, where it was approximately \$500 more expensive per year than in Winnipeg.

DISCUSSION

Thirty percent of Winnipeg children under the age of 15 and 30% of children aged 15 to 24 years lived in poverty in 1995.¹⁰ Poor children are beset with numerous material, environment, and social burdens that impact on future health. We obtained information from a variety of data sources to describe future determinants of health in children and the neighbourhood resources which shape these determinants. There were several limitations to the measures created, namely resulting from the lack of available data. For example, we had no regional information on unlicensed day care or the availability of children's books in libraries. However, within the constraints of some of these measures, we were able to identify potential risks to health faced by children living in neighbourhoods with the least healthy populations. We know that neighbourhoods with the least healthy populations also had lower socioeconomic status.⁵⁸

Our findings indicate that children living in neighbourhoods with less healthy populations were more likely to have poorer school performance, as indicated by Grade 3 math standards test scores. This places them at increased risk for not completing high school and following a pathway to poorer health in adulthood.⁸ While these children had similar access to library books as children living in more healthy neighbourhoods, they were also more likely to change schools and to have decreased access to licensed day care, circumstances which can lead to poor school performance.^{27,34} There was also some indication that low-income children in urban areas were less likely to participate in sports, and children residing in northern rural areas had decreased access to affordable healthy food.

Although not borne out by our data, these examples of decreased access to health-enhancing neighbourhood resources may predispose children to the development of obesity and future cardiovascular disease.

The provision of the basic necessities for healthy human growth and development, in addition to being a basic human right, lays the foundation for the reduction of inequalities in health. Some have likened the underinvestment in children in low-income neighbourhoods to a policy of 'compound disinterest,' which leads to a cumulative and accelerating societal deficit in health, well-being, and productivity.⁵⁹ While the availability and use of neighbourhood resources are closely tied, availability does not guarantee use. Resources may not be used because people choose not to use them or do not know about them, or because of barriers to use, such as language, transportation, and user fees.³¹ Investigation into actual use of neighbourhood resources is required to fully understand the influence of neighbourhoods as a determinant of the current and future health of children.

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RÉSUMÉ

Contexte : Les études sur les cycles évolutifs de l'état de santé montrent que certains déterminants clés des inégalités en matière de santé découlent d'expériences biologiques et sociales vécues pendant l'enfance. On examine ici la répartition régionale des déterminants de la santé des adultes qui datent de l'enfance (comme la réussite scolaire) et les milieux qui contribuent au développement de ces déterminants.

Méthode : À l'aide des données manitobaines de l'Enquête nationale sur la santé de la population, de l'Enquête longitudinale nationale sur les enfants et les jeunes et des données du ministère de l'Éducation, de la Formation professionnelle et de la Jeunesse, du ministère des Services à la famille et du Logement et des sites Web de l'Association des bibliothécaires et du ministère de l'Agriculture et de l'Alimentation, on a déterminé la répartition régionale des notes aux examens standardisés de 3^e année, des ressources de quartier (garderies, bibliothèques), de l'activité sportive et du coût des aliments dans 12 ORS et 12 CR de Winnipeg, classés selon une mesure de l'état de santé de la population (le TMP). Les constatations sont également présentées selon le niveau de revenu et la sous-région.

Résultats : Les enfants des quartiers dont l'état de santé de la population est relativement mauvais étaient plus susceptibles d'avoir de piètres résultats scolaires, comme en témoignent les résultats aux examens standardisés de 3^e année. Ils étaient aussi relativement plus nombreux à changer d'école, relativement moins nombreux à pratiquer un sport et avaient moins accès à des aliments à bon prix et à des garderies agréées. Leur accès aux livres de bibliothèque était semblable à celui des enfants des quartiers en meilleure santé, mais les taux de prêt des livres n'ont pas été mesurés.

Conclusion : Il existe des écarts régionaux dans la disponibilité des ressources à l'appui du développement de l'enfant.