

# **Considering the Health Care Needs of Children Living in Households Receiving Income Assistance in Manitoba**

## **Family Services and Manitoba Health Pilot Project**

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## EXECUTIVE SUMMARY

In this pilot study we describe the use of health care services by some of the poorest children in Manitoba, the approximately 10% of children in Manitoba who lived in single-parent households which received income assistance for one or more months in the 12 month study period from April 1994 to March 1995.

The objectives of this study were two-fold. First, the study assessed the technical feasibility of linking anonymous records of income assistance households with records of the use of insured health care services. If this first objective was determined to be feasible, the study sought to describe the use of health care services by children in income assistance households and to compare aspects of the use of health care services between children in income assistance households and children in non-assistance households.

There are a number of definitions of household material deprivation in use in Canada. Statistics Canada routinely reports two approaches to classifying the proportion of households in Canada with incomes below a threshold defined as low income. These measures are: 1) Low Income Measure (LIM), defined as household incomes which, after adjustment for household size, are below 50% of the median Canadian household income; and 2) Low Income Cutoffs (LICO), a series of measures which estimate income thresholds below which families spend more than 55% of income on food, shelter and clothing. The Statistics Canada low income measures are relative measures, anchored to median household income, and both measures typically find approximately 20% of Canadian households below the low income threshold. In contrast, provincial income assistance programs define eligibility for income assistance on the basis of estimates of the minimum costs of sustaining a household. By these very much lower income thresholds, approximately 10% of Canadian households are in poverty. Children in these income assistance households are the focus of this pilot study.

It is important to note that for the majority of households in conditions of material deprivation which are headed by adults of occupational age (20-65 years), the duration of deprivation spells is, on average, relatively short. However, this is not the case for households with young children. For single-parent families in particular, the duration of spells of material deprivation can be especially long. It is in response to the needs of single parent families that income assistance programs emphasize support to households with dependent children.

The study describes the use of insured health care services in the complete sample of 24,000 Manitoba children aged 1-15 who resided in a household receiving income assistance for dependent children in the period April 1994 to March 1995.

The health care utilization of children in income assistance households was compared to the complete population of Manitoba children. These comparisons were made within three age groups (1-5, 6-10, 11- 15 years of age) and within groups defined by urban or rural residence. In addition, children in both income assistance and non-assistance households were classified to one of five groups of equal size on the basis of the average household income of their neighbourhood of residence. These groups, called neighbourhood income quintiles, are ranked from the 20% of the population of children residing in the poorest neighbourhoods to the 20% of the population of children residing in the wealthiest neighbourhoods.

Information on health care use was derived from administrative records of health care use maintained by the Manitoba Health Services Insurance Plan, which describe the use of acute care hospital services and the use of medical services provided by physicians. To protect individual privacy, health care records available to researchers do not contain information describing either the name or address of individual children. Research records contain a modified form of the Personal Health Identification Number, which has been encrypted by Manitoba Health prior to releasing records to the Manitoba Centre for Health Policy and Evaluation.

The report presents three principal views of health care use. First, we have reported the proportion of children encountering the health care system one or more times in the study period. This measure is termed treatment prevalence. Second, we have described the use of physician services as the mean number of visits per child in the 12 month observation period. Third, the use of acute care hospital services are reported as admissions per 1,000 children.

To contribute to an understanding of the degree to which the prevalence of different kinds of morbidity may differ among the categories of children described in this study, we have classified each health care encounter to one of four possible categories of disorder: a) the treatment of an acute disorder, b) the treatment of an acute disorder with a recurrent pattern, c) the treatment of conditions which are expected to be chronic or permanent, and d) the provision of health care services for preventive care.

We also implemented a prototype measure of illness burden in children, which was based on the combination of categories of disorder. This measure was developed to provide an index of severity of illness burden in children. Children who received treatment one or more times in the study period for one or more acute conditions, one or more recurrent conditions and one or more permanent conditions were considered to have poorer health status than children in treatment for acute conditions only, recurrent conditions only or permanent conditions only.

Of the 249,000 children in Manitoba aged 1-15 years of age in FY94/95, 10% (24,298) of children resided in a household receiving income assistance on the basis of dependent children for one or more months (Table 1). All children in the income assistance sample resided in households which were headed by single parents. On the basis of estimates of the proportion of all Manitoba children of this age residing in single parent households, children in single parent households receiving income assistance comprised 35.1% of all Manitoba children in single parent households (Table 3).

The median duration of income assistance in these households was 2.1 years (mean duration: 3.2 years) and the mean duration increased with the age of the child, from 2.5 years of assistance at ages 1-5 to 4.2 years of assistance at ages 11-15 (Table 6). Almost 70% of income assistance children lived in the two lowest income quintile neighbourhoods, in comparison to 36.5% of non-assistance children (Tables 4-5). However, the length of time the household was receiving income assistance did not prove to be a significant factor in predicting the use of health care services by children in income-assistance households.

As would be expected in a paediatric cohort, a very high proportion of Manitoba children received treatment one or more times for an acute medical condition. At ages 1-5, 86.3% of urban children received treatment for an acute condition, compared to 78.2% of urban children aged 6-10 and 74.1% of urban children aged 11-15 (Tables 7-9). Across all three age groups, children in income assistance households were more likely than non-assistance children to receive treatment one or more times in the year for an acute medical condition. For example, among urban children aged 11-15 years of age, 81.8% of children in income assistance households received treatment for an acute condition, compared to 73.4% of urban children in non-assistance households.

The treatment prevalence of recurrent conditions and permanent conditions did not differ appreciably between income assistance children and non-assistance children. However, children aged 1-5 and 6-10 in income assistance households were slightly less likely to receive preventive medical services relative to non-assistance children.

In the majority of children treated (60%), health care use was limited to the treatment of acute conditions only (Tables 10-12). An additional 20% received treatment for recurrent or permanent conditions, as well as for acute conditions. Less than 5% were burdened with treatment for all three morbidity types. For example, a total of 4.5% of urban children aged 1-5 were in treatment for acute, recurrent and permanent conditions in the study period; this proportion declined to 2.1% of income assistance children at ages 11-15.

Children in income assistance households used approximately 15% more physician services than children in non-assistance households at ages less than 11 years of age. Between ages 11 and 15, both urban and rural income assistance children used approximately 30% more physician services than children in non-assistance households (Tables 13-15). These differences appeared to persist even when comparisons were made to children in non-assistance households residing in lower income neighbourhoods and also when comparisons were made to children in non-assistance households that were also headed by single parents (Tables 25-27; Figures 1-3).

In contrast to the use of physician services, where the use of services by income assistance children was only marginally elevated relative to non-assistance children, children in households receiving income assistance experienced a much higher rate of hospital admission (Tables 16-18). Among some income assistance children, hospitalization rates were 60%-80% higher than for children in non-assistance households, resulting in an additional 5-10 admissions per 100 children. Acute conditions accounted for most of this excess risk, a risk which was present across the spectrum of neighbourhood incomes.

As expected, children with the greatest burden of illness used substantially more health care services than children whose encounters with the health care system suggested less complex illness states (Tables 19-24). For example, among urban children aged 1-5 who received treatment for one or more acute conditions, one or more recurrent conditions and one or more permanent conditions in the observation year, the hospitalization rate for income assistance children was 543/1,000 compared to a hospitalization rate among income assistance children in treatment only for acute conditions of 41/1,000. The comparable figures for children in non-assistance households were lower, but still displayed a pattern of rising utilization with greater illness burden (362/1,000 and 25.2/1,000)(Table 22). A similar pattern was seen in the use of physician services.

In assessing the first objective of this pilot study, we have concluded that the routine surveillance of the use of health services by children receiving income assistance is eminently feasible in this setting.

Potentially useful information was also provided by the second objective which focused on a comparison of health care use by income assistance and non-assistance children. It is clear from this study that the use of health services does differ between these two groups of children. These differences are especially visible in the use of acute care hospital services. Income assistance children in urban areas also were the highest users of hospital care among all children characterized by more complex illness burdens. This may represent a group of households struggling with the indirect costs of caring for these children.

At the same time, we urge caution in interpreting these findings. We simply do not know if the measures of health care use available to this study can be used to infer observations about the health status of children. There are two concerns which arise from the use of secondary records of the use of insured health care services to derive observations about children's health status. The first concern is focused on the potential gap between *need for* and *use of* health care. It may be that children residing in income assistance households have, in fact, a greater *need* for health care than is represented in these data, but barriers to the appropriate *use* of insured health care services are substantially greater in income assistance households than in non-assistance households. The time constraints and financial constraints faced by poor, single-parent households must not be overlooked, and were unmeasured in this study.

The second issue which bears upon the utility of this work concerns the appropriate definition of health status. Records of health care use are primarily documents of encounters with the health care system for the treatment of physical disorders. The health of children, however, also encompasses dimensions of mental health, emotional health, cognitive development and the child's behavioural orientation to family and to school. Disorders or deficits in these domains may not present for treatment in the insured health care system, and yet may well have much more profound and durable impacts on the well being of children. The first



descriptive reports from the National Longitudinal Survey of Children and Youth document the magnitude of socioeconomic disparity in children's health when viewed from this broader perspective. Young children in lower socioeconomic households display more aggressive behaviours, enter school with weaker foundation learning skills, and are more likely to have behavioural problems noted by parents.

In evaluating the utility of the information that is available from a descriptive study of this type, we strongly recommend that attention be paid to assessing the degree to which the portrait of the health of children available from the secondary records of health care use is an accurate description of the needs of the poorest children in the province. This assessment may be accomplished through analyses of surveys such as the National Longitudinal Survey of Children and Youth, or through a direct survey of Manitoba children.

There are also important ethical issues concerning the objectives of the routine surveillance of the use of health care services by a vulnerable population. The purposes of such descriptive research are to better understand the needs of this community, to describe the performance of the health care system in responding to these needs, and to influence efforts to improve the capacity of health care and social services to protect, restore or maintain the well-being of children living in disadvantaged circumstances. It would seem crucial to link future analyses of these administrative program records to an explicit process in which the objectives of the research are linked to the development of child and youth policy. This research also suggests additional opportunities for future study and for integrating health and social service delivery to our poorest children.

## 1. INTRODUCTION

This pilot study describes the use of health care services by the poorest children in Manitoba, the approximately 10% of children who lived in single-parent households receiving income assistance for one or more months in the 12 month study period from April 1994 to March 1995.

The objectives of this study were two-fold. First, the study assessed the technical feasibility of linking anonymous records for children in income assistance households with records of the use of insured health care services. If this first objective was determined to be feasible, the study sought to describe the use of health care services by children in income assistance households and to compare aspects of the use of health care services between children in income assistance households and children in non-assistance households.

In 1994-1995 there were 4.67 million children aged 0 to 11 years living in Canada, comprising 16% of the total population (Statistics Canada, Human Resources Development Canada 1997). Canadian children born in the 1990s will grow up in an ethnically and racially diverse country, ranked by the United Nations Human Development Report as the best country in the world with respect to quality of life (Purvis 1997). Unfortunately, a significant proportion of Canadian children will also grow up in circumstances of material deprivation. The National Longitudinal Survey of Youth and Children reports that 25% of Canadian children, less than 12 years of age, were living below the Statistics Canada low income cut-off. At 29% of the childhood population, Manitoba had the second highest proportion of children living below the low income measure (Statistics Canada, Human Resources Development Canada 1997).

There are a number of definitions of household material deprivation in use in Canada. Statistics Canada currently reports two approaches to classifying the proportion of households in Canada with incomes below a low income threshold. These measures are: 1) the Low Income Measure (LIM) and 2) the Low Income Cutoffs (LICO). The LIM is set as a fixed percentage (50%) of

adjusted median family income, where the adjustment reflects consideration of how income needs differ by family size (Statistics Canada 1998). The series of LICO measures are estimated from responses to the Statistics Canada Family Expenditure Survey. Income thresholds are selected such that families with incomes below these thresholds typically spend more than 55% of income on food, shelter and clothing (Statistics Canada 1997). Specific LICO income thresholds are set for different family sizes and for different sizes of urban and rural communities. Although Statistic Canada's Low Income Cutoffs are commonly referred to as poverty thresholds, they have no officially recognized status (that is, they are not used to define eligibility for social benefits) and Statistics Canada does not promote their use as poverty thresholds.

In contrast to these low income thresholds, provincial income assistance programs define eligibility on the basis of estimates of the minimum costs of sustaining a household (National Council of Welfare 1996-97). In 1995 in Manitoba, 22% of all households and 13.5% of all families (defined as 2 or more people related by marriage) fell below the Statistics Canada Low Income Cutoff (Statistics Canada 1997). At the same time, income assistance provided to single-parent households in Manitoba was approximately 50% of the Low Income Cutoff. By these very much lower income thresholds, approximately 10% of Canadian households are in poverty (Statistics Canada, Human Resources Development Canada 1997). Children in these income assistance households are the focus of this pilot study.

Poverty potentially affects child health in a variety of ways, from prenatal malnutrition to home environments conducive to illness and injury, with long-term outcomes for the child and society as a whole (Kaplan, Salonen 1990; Peck 1992; Montgomery, Bartley, Cook, et al. 1996; Shah, Kahan, Krauser 1987). Poverty has been associated with low birth weight and other perinatal complications which contribute to excess infant mortality among children in Canada's lowest income neighbourhoods (Mustard, Roos 1994; Kramer 1987; Wilkins, Adams, Brancker 1989). Increased morbidity and mortality of poor children has been documented in many populations; (Wilkins, Adams, Brancker 1989; West 1988; Vagero, Ostberg 1989) in Canada, deaths from accidental causes and respiratory disease are the major

contributors to excess mortality among children in lower income areas (Wilkins, Adams, Brancker 1989; Thompson, Newman 1995; Hanvey, Avar, Graham, et al. 1994). Canadian children living in low income or income assistance families are more likely to have a chronic condition, be hospitalized, or have a limitation in normal function (Thompson, Newman 1995; Hanvey, Avar, Graham, et al. 1994; Cadman, Boyle, Offord, et al. 1986; Cadman, Rosenbaum, Boyle, et al. 1991). Poverty is also associated with deficits in mental and social development; a 4-year follow-up study of children in Ontario reported that low family income predicted behaviour problems and poor school performance (Offord, Boyle, Racine, et al. 1992). The 1983 Ontario Child Health Survey of 3,300 children, aged 4 to 16 years, and a follow-up survey in 1987 documented no differences in the proportion of children using physician services with respect to family income, receipt of income assistance, or number of parents in the households (Woodward, Boyle, Offord, et al. 1993; Woodward, Boyle, Offord, et al. 1988). However, among high users of physician services, children living in low income or income assistance households were over-represented (Woodward, Boyle, Offord, et al. 1988). Moreover, there are indications that these inequalities in child health are exacerbated by the depth and duration of material deprivation in the household (McGauhey, Starfield, Alexander, et al. 1991; Aber, Bennett 1997).

It is important to note that for the majority of households in conditions of material deprivation which are headed by adults of occupational age (20-65 years), the duration of deprivation spells is, on average, relatively short. This is not the case for households with young children, however. For single-parent households in particular, the duration of spells of material deprivation can be especially long. Over the past decade, for example, the unemployment rate for female single-parents has hovered around 20%, while that for men and women in dual-parent households has remained below 10% (Statistics Canada, Housing, Family and Social Statistics Division 1993). It is in response to the needs of single-parent families that income assistance programs have emphasized support to households with dependent children.

Readers of this study may ultimately be interested in using this information to better understand the health status or health care needs of children in income assistance households. However, it cannot be assumed that measures of the use of health care services exactly represent the health status of a population. Administrative databases such as the Manitoba Health Services Insurance Plan (MHSIP) database are ideal sources for evaluating the health care utilization of whole populations of children (Roos, Shapiro 1995). Proxy measures such as the presence or clustering of chronic conditions, which can be derived from administrative databases and are employed in this pilot study, have effectively predicted the utilization of health services by children (Newacheck 1992; Newacheck, Starfield 1988; Aday, Lee, Spears, et al. 1993; Tessler, Mechanic 1978). Still, there are numerous factors which prevent our assuming that, even under Canada's universal health insurance system, need for health care services translates directly to an equivalent use of health care services. This limitation is discussed further following the analysis of study results.

## 2. METHODS

### 2.1 Research Design

This is a population-based, observational study of the utilization of health services by children resident in Manitoba. Health service utilization of children living in households receiving income assistance was compared to children living in households receiving no assistance during the fiscal year 1994/95.

### 2.2 Sources of Data and Data Confidentiality

Data for this study were obtained from 5 sources: 1) registration files of the Manitoba Health Services Insurance Plan (MHSIP), 2) case eligibility files of Manitoba Family Services (MFS), 3) computerized records of physician reimbursement claims maintained by MHSIP, 4) computerized records of hospital separation abstracts maintained by MHSIP, and 5) public use data files from the Statistics Canada 1991 census describing enumeration areas.

To preserve individual privacy, the MHSIP and MFS records available to researchers do not contain information describing either the name or address of individual children. Research records in both files contain a modified form of the Personal Health Identification Number (PHIN), which has been encrypted by Manitoba Health prior to releasing records to the Manitoba Centre for Health Policy and Evaluation.

**MHSIP Registration File:** The registration file of the health insurance program in the province of Manitoba which is available to researchers contains a record for every individual registered to receive insured health services and records an encrypted version of their Personal Health Identification Number (PHIN), birth-date, gender and residential postal code. This file also contains limited information on family structure. The registry file was used to develop population denominators for children, aged 1-15 years, and to characterize children by family structure and place of residence.

***MFS Eligibility File:*** The case eligibility file of the income assistance program in the province of Manitoba contains a record for each benefit case, reporting the number of members in the households, income assistance eligibility, residential postal code, and duration and amount of benefits. A secondary file, the client file, contains individual-level data such as encrypted PHIN, birth-date and marital status for all members of the benefit recipient household. Information from these two files was used to develop population denominators for children living in income assistance households, as well as to characterize family structure and place of residence.

***Physician Reimbursement Claims:*** All records of physician reimbursement for medical care provided under a fee-for-service arrangement to children living in Manitoba were selected from the MHSIP physician claims file. Reimbursement claims include the patient's encrypted PHIN and contain information on patient diagnosis at the 3-digit level of the ICD-9-CM classification system, physician specialty and site of service delivery.

***Hospital Separation Abstracts:*** All separation abstracts for hospital services provided to children living in Manitoba were selected. Information contained in the abstracted hospital records includes patient characteristics and encrypted PHIN, ICD-9-CM diagnostic codes, and service type (inpatient, day surgery or outpatient).

***Statistics Canada 1991 Census Files:*** Measures of average household income for each enumeration area in Manitoba, obtained from the 1991 Census, was used to create geographic area measures of socioeconomic status. Census resources include a conversion file which links census geography to postal code data available in the MHSIP health administrative files (Wilkins 1993).

### **2.3 Study Population**

A cohort of 263,551 children, less than 16 years old as of June 30, 1994 and living in households with adults, was identified in the MHSIP registry. The MFS case eligibility files

for the fiscal year 1994/95 identified 29,823 children living in 17,422 households receiving income assistance for one or more months during the 12 month study period, fiscal year 1994/95. Of these children, 26,815 children who were born before June 30,1994 and lived in households receiving mothers', fathers' or foster care allowance became the basis study population of children living in income assistance recipient households. The remaining children residing in income assistance households qualifying for adult disability, general assistance or other benefits (n=2745) were included in the study cohort of children living in households not receiving income assistance, as did 741 of the 26,815 income assistance children who could not be linked to an MHSIP identity.

Information describing treaty status Indians living on reserve who received income assistance from non-MFS sources was not available to this study. Consequently, all treaty status aboriginal children living on reserve were classified with households not receiving income assistance. It is recognized that this creates a potentially significant limitation to this work; however, access to household data for recipients of non-MFS income assistance benefits was not available for this pilot study. For the same reason, children in households receiving municipal income assistance benefits were also included among the non-assistance households.

Children less than 1 year old (n=14,145) were excluded from the cohort because of the inapplicability of the study's methodology to this age group and will be subjects of a future analysis. In addition, 1850 children who could not be classified by neighbourhood income quintile were excluded from the study.

The final study population (247,556) was composed of 24,187 children resident in households receiving income assistance for reason of dependent children and 223,369 non-income assistance children. The final study population represents 99.3% of all Manitoba children aged 1-15 years in fiscal year 1994/95.



## 2.4 Summary of Data Linkages

The methods and procedures of the linkage of income assistance beneficiaries records with records of health care use were reviewed and approved by two research oversight bodies, the Faculty Committee on the Use of Human Subjects in Research of the Faculty of Medicine, University of Manitoba, and the Access and Confidentiality Committee of Manitoba Health. Following these approvals, the Family Services file of income assistance beneficiaries was provided to Manitoba Health. This file did not contain individual names or street addresses. Representatives of Manitoba Health altered the unique personal identifiers contained on the Family Service records and provided the file to the Manitoba Centre for Health Policy and Evaluation. All subsequent analyses of these records were conducted within a secure computing environment which preserves the confidentiality of individual information. Record linkage between the MFS eligibility and MHSIP registration files was conducted using the encrypted PHIN which is common to both files.

Household of residence postal codes were matched with Census-derived income quintile postal codes to place cohort children into neighbourhood income quintiles. An income quintile is one of five groups of equal size on the basis of the average household income of neighbourhoods. The MFS registry provided information on parental marital status for income assistance households. Data on the marital status of non-income assistance household heads was derived from the MHSIP registry.

Once the cohort of children was successfully classified by household income assistance status, neighbourhood income quintile and marital status of household head, the resulting file was linked by encrypted PHIN to the physician remuneration claim file and hospital separation abstract file to enumerate the health service utilization for each child of this population.

Overall, record linkage between the MHSIP and MFS file sources was successful. A total of 95.5% of MFS client records in households with dependent children were linked to the MHSIP registry. The proportion of records linked did not vary among age groups or

neighbourhood income quintiles, indicating no bias across records for which record linkage was not accomplished (Appendices I, II).

## **2.5 Study Measures**

### **Measures of Health Care Use**

Three measures of health care use are described: 1) prevalence of children utilizing physician or hospital services, 2) use of physician services and 3) use of hospitalization care.

#### **Prevalence of children utilizing physician or hospital services (treatment prevalence):**

measures the proportion of children with at least one physician contact or hospitalization during FY 1994/95. Physician contact was defined as any contact with a physician in a hospital or in the community, and was measured by the presence of a physician billing claim or an outpatient hospital visit. A hospitalization was defined as an inpatient stay or an outpatient surgical procedure.

***Physician visits per child:*** measures the average number of physician contacts per child. Physician contact is defined above; diagnostic laboratory services were excluded from this definition. Multiple, same person-day billing claims made by a physician for the same diagnosis but different tariff code were counted as one encounter.

***Hospital admission rate:*** measures the number of inpatient hospitalizations or outpatient surgical services per 1000 children.

### **Descriptive Measures of Children and their Households**

Eight characteristics of children or their households were described in this study : 1) age, 2) morbidity type, 3) morbidity burden, 4) household income assistance status, 5) urban or rural residence, 6) neighbourhood income quintile, 7) duration of income assistance benefits and 8) family structure (single or two-parent household).

**Age.** The age of the child as recorded in the MHSIP registry file. As described previously, children less than 1 year old were excluded from the study cohort.

**Morbidity type.** ICD-9-CM diagnosis codes which appeared on the physician claim or in the hospital abstract (most responsible diagnosis only) were categorized by 3 morbidity types developed for this study: acute condition, permanent condition and recurrent condition. The operational definitions of permanent and recurrent condition and their development are summarized in Appendix III. Visits for preventive care were categorized separately from contacts with a morbidity diagnosis.

**Morbidity burden.** Drawing upon literature which shows that children with the greatest number of chronic health disorders consume the most health services, (Newacheck 1992; Newacheck, Starfield 1988; Starfield, Katz, Gabriel, et al. 1984; Starfield, Hankin, Steinwachs, et al. 1985) a classification system was developed to describe the burden of illness (Appendix III). Children treated during the study period were categorized according to the following grouping of morbidity types: 1) no morbidity in treatment, 2) acute conditions only, 3) permanent or recurrent conditions only, 4) acute conditions as well as either permanent or recurrent conditions, and 5) acute conditions as well as both recurrent and permanent conditions. The “no morbidity in treatment” category included children who only had visits for preventive care. Children without any health care contacts were not included in any of the groups.

**Residence in an income assistance household.** A child was defined as living in an income assistance household if the child was the dependent of a recipient of MFS mothers’, fathers’ or foster child allowance for one month or greater during the fiscal year 1994/95. Details of the study population are presented above.

**Residence in an urban or rural area.** Children were defined as living in an urban or rural area on the basis of the postal code of the household and by criteria defined by Statistics Canada (Statistics Canada, Geography Division 1989).

***Neighbourhood income quintile.*** This was a geographic measure of socioeconomic status derived from Census 1991 data. Census household income data, aggregated to the geographic unit of the enumeration area, were used to rank neighbourhoods in population quintiles by average household income (Mustard, Roos 1994; Wilkins 1993; Krieger 1992). The 6-digit postal code of a child's residence was then used to link residence to a Census enumeration area. Neighbourhood income quintiles were ranked from the 20% of the population residing in the lowest income neighbourhoods (Q1) to the 20% of the population residing in the highest income neighbourhoods (Q5).

Information on household income assistance status and neighbourhood income quintile was combined to form a consolidated measure of socioeconomic status which permitted comparison of children in income assistance households to children in lower and higher income households not receiving assistance. Approximately 30% of children in the study cohort, not resident in income assistance households and living in the two lowest income quintile neighbourhoods (I and II), were classified as "lower income, non-assistance" children. Non-assistance children living in quintile neighbourhoods III, IV and V (60% of children) were classified as "higher income, non-assistance" children. This aggregation of income quintiles is similar to that used by the recent Canadian National Longitudinal Survey of Children and Youth (Statistics Canada, Human Resources Development Canada 1997). The cohort of children resident in MFS assistance households was assumed to represent the lowest income group and was not further differentiated for the comparative analyses described by Figures 1-15.

***Duration of income assistance benefits.*** The duration of income assistance benefits received by the household was calculated as the time period between the date of initiation of MFS income assistance benefits (including dates prior to the start of the study period) and the benefit termination date or the end of the study period, whichever was earliest.

*Single-parent household status.* All MFS households receiving income assistance for dependent children were headed by single parents, as single parent status was a qualifying criteria for MFS benefits for this study. For non-income assistance children, marital status was based on evidence that only a single adult shared a family registration number with the child in the MHSIP registry files.

## **2.6 Data Analysis**

The health care utilization of children in income assistance households was compared to that of children in non-assistance households in terms of the three measures of health care use: treatment prevalence, physician utilization and hospitalization. Comparisons were made within three age groups (1-5, 6-10 and 11-15 years of age) and among groups of children stratified according to the household characteristics described above. Data were tabulated as frequency distributions and rates of utilization. As this was a descriptive analysis, no standard errors are presented, and with the exception of regression analyses to identify trends in utilization across income neighbourhoods, no statistical testing was performed.

### 3. RESULTS

#### 3.1 Overview of Manitoba Children and Their Families

A total of 10% of all children less than 16 years old in the province of Manitoba resided in households receiving MFS income assistance for dependent children in FY 1994/95. This proportion was higher for younger children (Table 1). According to the measures available to this study, the proportion of children aged 1 to 15 years of age residing in single parent households was 27.7% (Table 2). Children in income assistance households accounted for 34.8% of all children living in single-parent households (Table 3) and predominantly lived in lower income, urban neighbourhoods (Tables 4,5). Almost 70% of income assistance children lived in the two lowest urban income quintile, in comparison to 36% of non-assistance children.

Table 6 describes the study population of 247,556 children 1-15 years of age. Children living in income assistance households were more likely to be younger than children in non-assistance households. The mean duration of income assistance benefits to the household was 3.2 years (SD=7.6 years) with the duration of benefits increasing with age from 2.5 years at ages 1-5 to 4.2 years at ages 11-15.

#### 3.2 Health Service Utilization by Manitoba Children

##### Treatment prevalence

Overall, 85.9 % of children aged 1-15 years in Manitoba had one or more encounters with a physician or hospital over the 12 month observation period (Tables 7-9). Among income-assistance households, the treatment prevalence was 91%, in comparison to 85 % of non-income assistance children. This difference was primarily due to higher treatment prevalence for an acute condition among children living in income assistance households, in both urban and rural areas. For other types of morbidity, use of health services did not vary substantially by benefit status.

Fewer children living in rural areas received medical care (81.6 %) than did children living in urban neighbourhoods (87.8 %). This difference was especially apparent in the proportion of visits for preventive care in rural children, which was 55% - 60% of that for urban children. Children generally had fewer contacts with the health care system as they got older except, as would be expected, for treatment of permanent conditions.

No gradients in treatment prevalence across neighbourhood income quintiles were observed among income assistance children. Among non-income assistance children, however, overall treatment prevalence declined along with neighbourhood income, with the lowest prevalences reported in the lowest income quintile. This pattern was especially evident in treatment for permanent conditions or preventive care.

Among children with any health care contact during the study period, the majority (60%) received treatment for acute conditions only (Tables 10-12); this proportion was similar across age groups and neighbourhood characteristics. An additional 20% of children received care for permanent or recurrent conditions, as well as for an acute need. This proportion was closer to 25% among the youngest children and lower (15%) in rural children older than 5 years. Less than 5 % of treated children were burdened with all three morbidity types: acute, recurrent and permanent conditions. This represents 3.6% of all income assistance children and 2.6% of non-assistance children, and this difference was most pronounced in the youngest and oldest age groups.

### **Utilization of Health Care Services**

Results presented in this section represent the use of health services over the whole study population of children (n=247,556), including children with no health care contacts.

#### ***Use of Physician Services***

On average, Manitoba children saw a physician 4.2 times (median: 3 times) during the study year. Physician utilization decreased with age and was lower among rural residents across all age groups. Rural children, 1-5 years old, visited a physician on average 4.3 times, compared to 5.6 visits per urban child. Older rural children (11-15 years) visited the physician least

frequently, at 2.8 visits per year; their urban counterparts had an average of 3.5 visits (Tables 13-15).

These age and geographic trends were observed in both income assistance and non-assistance children, but the two groups showed marked differences. At 5.3 visits (median: 4 visits), children living in income assistance households had more frequent physician care than did children in non-assistance households (mean: 4.1; median: 3 visits). This is primarily explained by more frequent treatment encounters for acute conditions (approximately one additional visit per year over non-assistance children), but physician contact rates were also generally greater for recurrent and permanent morbidity among income assistance children. Preventive care, however, was less frequent for these children than those in non-assistance households.

Gradients across neighbourhood income quintiles were observed more often among children in non-assistance households than among income assistance children. None of these gradients, however, was dramatic. Among children in non-assistance households, visits for acute morbidity were marginally higher in wealthier neighbourhoods relative to low income neighbourhoods.

In Figures 1-3, the average number of physician contacts for income-assistance children is compared with the utilization by non-assistance children in low income and high income areas. In the youngest age groups (1-10 years), both income assistance and non-assistance, low income area children received less preventive care than non-assistance, high income area children. Overall, income assistance children had a greater average number of physician visits in comparison to non-assistance children living in low income areas, who in turn had fewer physician contacts than non-assistance children living in high income areas.. As noted above, this difference was primarily driven by greater treatment for acute conditions among income assistance children.



### *Hospital Admissions*

The mean hospital admission rate for the study population was 74.2 admissions per 1000 children (Tables 16-18). Urban and rural children, 1-5 years and 11-15 years old, were hospitalized more frequently than children aged 6-10 years. The hospital admission rate was one and a half times greater in rural than in urban children. These age and geographic trends in hospitalization were observed in both income assistance and non-assistance children.

Children in income assistance households were hospitalized at higher rates in nearly every age, residence, income and morbidity category, compared to children in non-assistance households. For example, urban children 1-5 years old from income assistance households were hospitalized for acute conditions at a rate of 51.7 per 1000 children; for non-assistance children, the comparable rate was 31.9. The parallel rates for rural children were 133.5 (income assistance) and 71.8 (non-assistance). In the youngest and oldest age groups, income assistance children were hospitalized nearly twice as often as non-assistance children.

An inverse relationship between hospitalization rates and neighbourhood income was frequently apparent in non-assistance household children, but was infrequent among income assistance children. These neighbourhood income gradients were steepest for non-assistance rural children.

Exclusion of admissions to rural nursing stations (located in First Nation settings) decreased the hospital admission rate for rural children, but not to rates lower than for urban children, nor did it change the patterns of hospitalization across income quintiles in rural children (data not shown).

Figures 4-6 compare hospitalization rates by our combined measure of socioeconomic status (benefits status and neighbourhood income levels). Children living in income assistance households generally had greater hospitalization rates than those for non-assistance children living in low income areas. Among rural 6-10 year old children, however, those in non-

assistance low income area households were hospitalized more frequently (87.7 per 1000 children) than income assistance children (69.4). Children from non-assistance households in high income areas had the lowest hospitalization rates in nearly all areas of study.

### **Health Service Utilization by Manitoba Children in Relation to Morbidity Burden**

This section describes the health service utilization patterns of children who had any contact with the health care system. The population denominators are children categorized according to the classification of morbidity burden: 1) no conditions [optometrist and preventive care visits only], 2) acute conditions only, 3) permanent or recurrent conditions only, 4) acute plus either permanent or recurrent conditions, and 5) acute, permanent and recurrent conditions.

#### ***Physician Utilization***

As expected, children with a greater morbidity burden, represented by the presence of multiple morbidity types, utilized physician services to a greater extent than children with only acute or permanent/recurrent conditions (Tables 19-21). Physician utilization among children with multiple morbidities was approximately 14 visits per child during the study year, compared to 4 visits per child for acute conditions on average and 3 visits per child for permanent/recurrent conditions.

Income assistance children visited the physician more often than non-assistance children if they had a greater morbidity burden or if they were treated for acute conditions only. This difference according to benefits status widened with increasing morbidity burden and was more apparent in urban children. Although physician visit rates were generally higher in children living in low income neighbourhoods, especially in children with a greater morbidity burden, very few gradients in utilization across neighbourhood income were observed.

Of all children, the highest users of physician services were children with the greatest morbidity burden living in urban, income assistance households (Figures 7-9). Among children treated for permanent or recurrent conditions only, however, the physician contact rate was the lowest in income assistance children. In addition, rural children less than 11

years old and with the greatest morbidity burden saw a physician more frequently if they lived in non-assistance, lower income than in income assistance households. Otherwise, patterns of physician utilization among rural children were similar to those of urban children. Among children whose contact with the health care system was limited to optometrist visits or visits for preventive care, there were no significant differences by socioeconomic status.

### ***Hospital Admissions***

Urban and rural children with a greater morbidity burden, as represented by the presence of multiple morbidity types, were hospitalized much more frequently than children with a lower morbidity burden (Tables 22-24). Hospitalization rates were generally higher for rural children, however. For example, urban children 1-5 years old with acute, permanent and recurrent conditions were hospitalized on average 393 times per 1000 children; the comparable rate for rural children was 730 admissions per 1000 children.

In many morbidity burden categories, hospital admission rates increased with diminishing neighbourhood income. This negative gradient in hospitalization was more pronounced among rural children.

The effect of morbidity burden did not substantially change the relative difference in hospitalization rates between benefit status groups reported above. In the majority of morbidity burden categories, income assistance children were admitted to hospital more frequently than non-assistance, low income area children, who in turn were hospitalized more frequently than non-assistance, high income area children (Figures 10-12). Some striking exceptions to this trend were observed, however: the highest hospitalization rates were seen in rural, lower income area, non-assistance children, with the greatest morbidity burden.

### **The Impact of Family Structure on Children's Use of Health Care Services**

In single-parent families, 90.9 % of income assistance children and 82.4 % of non-income assistance children had at least one health care encounter during the study year (data not

shown). These treatment prevalences are similar to the figure for all Manitoba children (85.9 %) reported earlier.

Tables 25-30 report the effect of family structure (single- or two-parent household) on health care utilization, in relation to other characteristics of the children. Single-parent households are further classified by benefits status; two-parent households are assumed to be not receiving income assistance.

In both urban and rural areas, children living in single-parent households saw the physician as frequently or slightly more frequently than children in two-parent households (Tables 25-27). However, children living in income assistance single-parent households had more physician visits on average than did children in two-parent households. This difference was primarily due to higher physician use for acute conditions by children living in income assistance single-parent households. On the other hand, visits for preventive care were slightly less common among younger children living in income assistance single-parent households, compared with children in two-parent households. Visits for preventive care decreased with neighbourhood income in rural children 1-5 years old living in single-parent households, regardless of benefits status (data not shown).

Hospital admissions were notably more frequent in income assistance children living in single-parent households (both urban and rural), compared with children in single-parent non-assistance or two-parent households (Tables 25-27). However, among rural children 6-10 years old, hospitalization for some morbidity types was higher in non-assistance children living in single-parent households.

As with all children, the presence of multiple morbidity increased the level of physician and hospital utilization by single-parented children (Tables 28-30). Within most of the morbidity burden categories, physician utilization and especially hospital admissions were higher in children living in single-parent than in two-parent households. Again, income assistance household children accounted for the increased utilization. The difference in physician

utilization and hospitalization between income assistance single-parented children and two-parented children became more pronounced as morbidity burden increased. Consistent with earlier findings, however, the most frequent hospital users were non-assistance single-parented children with the greatest morbidity burden living in rural lower income areas. The hospitalization rate in these children was as high as one hospital admission per child during the study year.

### **The Impact of Duration of Income Assistance on Health Care Utilization of Children**

The duration of income assistance received by the household, calculated as the difference between the effective date of MFS coverage and the end of study period or benefit termination date, was not associated with the prevalence of children receiving health care services (data not shown). The duration of income assistance benefits also was not associated with greater use of physician services or more frequent hospitalizations.

#### 4. DISCUSSION

In this pilot study, we have presented an exploratory description of the use of health care services by the poorest children in Manitoba, the approximately 10% of children in this province who lived in single-parent households receiving income assistance for one or more months in the 12 month study period from April 1994 to March 1995. The pilot study had two objectives. The first was to determine if the linkage of anonymous records of income assistance households with records of the use of insured health care services was technically feasible. The second objective was to describe the use of health care services by children in income assistance households and to compare aspects of the use of health care services between children in income assistance households and children in non-assistance households. In presenting the findings of this pilot study, we invite an assessment of the utility of this information to informing social policy.

Regarding the first objective, the results described in this report and a companion report ("A description of the use of insured health care services by income assistance recipients in the province of Manitoba: recipients of income assistance for mental health disability") have established that the merging of anonymous records of income assistance benefits and health care services is technically feasible in this setting. At the same time, there are important ethical issues concerning the methods and objectives of research of this type which describes vulnerable groups in a population. We return to these issues in the recommendations which follow this discussion.

What are the important findings of this descriptive study? A total of 10% of the 249,000 children in Manitoba aged 1-15 years of age resided in a household receiving provincial income assistance on the basis of dependent children for one or more months in FY94/95. All children in the income assistance sample resided in households which were headed by single parents. This study has estimated that children in single parent households receiving income assistance represent approximately 35% of all Manitoba children in single parent

households. Almost 70% of income assistance children lived in the two lowest income quintile neighbourhoods, in comparison to 36% of non-assistance children.

As would be expected in a paediatric cohort, a very high proportion of Manitoba children received treatment one or more times for an acute medical condition. At ages 1-5, 86.3% of urban children received treatment for an acute condition, compared to 78.2% of urban children aged 6-10 and 74.1% of urban children aged 11-15. Across all three age groups, children in income assistance households were more likely than non-assistance children to receive treatment one or more times in the year for an acute medical condition. For example, among urban children aged 11-15 years of age, 81.8% of children in income assistance households received treatment for an acute condition, compared to 73.4% of urban children in non-assistance households. The treatment prevalence of recurrent conditions and permanent conditions did not differ appreciably between income assistance children and non-assistance children. However, children aged 1-5 and 6-10 in income assistance households were slightly less likely to receive preventive medical services relative to non-assistance children.

In the majority of children treated (60%), health care use was limited to the treatment of acute conditions only. An additional 20% received treatment for recurrent or permanent conditions, as well as for acute conditions. Less than 5% were burdened with treatment for all three morbidity types. For example, a total of 4.5% of urban income assistance children aged 1-5 were in treatment for acute, recurrent and permanent conditions in the study period; this proportion declined to 2.1% of income assistance children at ages 11-15. In general, the rates of treatment prevalence within each morbidity category did not differ between children in income assistance and non-assistance households.

Children in income assistance households used approximately 15% more physician services than children in non-assistance households at ages less than 11. Between ages 11 and 15, income assistance children used approximately 30% more physician services than children in non-assistance households. These differences appeared to persist even when comparisons

were made to children in non-assistance households residing in lower income neighbourhoods and also when comparisons were made to children in non-assistance households that were also headed by single parents.

In contrast to the use of physician services, where the use of services by income assistance children was only moderately elevated relative to non-assistance children, children in households receiving income assistance experienced a much higher rate of hospital admission. Among some age groups, hospitalization rates were 60%-80% higher for income assistance children than for children in non-assistance households, resulting in an additional 5-10 admissions per 100 children. Acute conditions accounted for most of this excess risk, a risk which was present across the spectrum of neighbourhood incomes.

As expected, children with the greatest burden of illness used substantially more health care services than children whose encounters with the health care system suggested less complex illness states. For example, among urban children aged 1-5 who received treatment for one or more acute conditions, one or more recurrent conditions and one or more permanent conditions in the observation year, the hospitalization rate for income assistance children was 543/1,000 compared to a hospitalization rate among income assistance children in treatment only for acute conditions of 47/1,000. The comparable figures for children in non-assistance households were lower, but still displayed a pattern of rising utilization with greater illness burden (362/1,000 and 25.2/1,000). A similar pattern was seen in the use of physician services.

There is one regular pattern in the description of treatment prevalence which presents a paradox and which focuses attention on the relatively poor state of understanding of children's need for health care services. In the body of this report, we have described a general tendency for treatment prevalence among both urban and rural children in income assistance households to be higher than that of children in non-assistance households. This pattern is consistent with the explanation that children in income assistance households have poorer health status than children in non-assistance households. By the same argument, we



would expect children in non-assistance households living in low income neighbourhoods to have a higher treatment prevalence than children in non-assistance households in higher income neighbourhoods. However, the pattern of findings described in Tables 10-12 for these children is contrary to this expectation. Non-assistance children residing in poorer neighbourhoods have lower treatment prevalence than that of children in higher income neighbourhoods. For example, relative to the treatment prevalence of children in non-assistance households living in the wealthiest 20% of urban neighbourhoods, approximately 6% fewer children aged 1-5 in non-assistance households in the poorest 20% of urban neighbourhoods were in treatment, 7.9% fewer children aged 6-10 and 8.5% fewer children aged 11-15. Some possible explanations for this finding are considered below, under “Some Important Limitations of the Study.”

One final summary observation is of note. We did not identify any evidence that children residing in single parent urban households which did not receive income assistance used a substantially different amount of health care services than did children in dual parent households. While there was some evidence that rural children in single parent non-assistance households used more hospital care than rural children in dual parent households, single parenthood, on its own, did not generally alter the health care utilization of children. These findings concur with the lack of effect of single parenthood on the prevalence of chronic illness or use of physician services reported in Ontario children (Cadman, Rosenbaum, Boyle, et al. 1991; Woodward, Boyle, Offord, et al. 1993; Woodward, Boyle, Offord, et al. 1988). These findings support the view that it is the poverty level of single parent households which is the factor most responsible for impacts on child health and health care use (Montgomery, Kiely, Pappas 1996).

#### **4.1 Some Important Limitations of the Study**

##### **Measuring Health Status and the Need for Health Care**

It is important that readers use caution in drawing inferences about the health status of children from the information we have reported on the use of health services. We simply do

not know if the measures of health care use available to this study can be used to infer observations about the health status of children. There are two concerns which arise from the use of secondary records of the use of insured health care services to derive observations about children's health status. The first concern is focused on the potential gap between *need for* and *use of* health care. It may be that children residing in income assistance households have, in fact, a greater *need* for health care than is represented in these data, but barriers to the appropriate *use* of insured health care services are substantially greater in income assistance households than in non-assistance households. The time constraints and financial constraints faced by poor, single-parent households must not be overlooked, but were unmeasured in this study.

The paradox identified earlier in this discussion, where non-assistance children in low income neighbourhoods had lower use of physician services than non-assistance children in higher income neighbourhoods may be partly explained by the effects of non-financial barriers to care. Working parents of children in lower income households may have less flexibility in work arrangements to negotiate the time necessary to accompany children to a primary care provider. These households will also be less able to afford the hiring of substitute care-givers when a child is ill, and this diminished capacity to care for ill children as a result of conflict with work obligations may partially explain the higher rate of hospitalization for acute conditions among children residing in lower income neighbourhoods.

The second issue which bears upon the utility of this work concerns the appropriate definition of health status. Records of health care use are primarily documents of encounters with the health care system for the treatment of *physical* disorders. The health of children, however, also encompasses dimensions of mental health, emotional health, cognitive development and the child's behavioural orientation to family and to school. The first descriptive reports from the National Longitudinal Survey of Children and Youth document the magnitude of socioeconomic disparity in children's health when viewed from this broader perspective. Young children in lower socioeconomic households display more aggressive behaviours,

enter school with weaker foundation learning skills, and are more likely to have behavioural problems noted by parents. Disorders or deficits in these domains may not present for treatment in the insured health care system, and yet may well have much more profound and durable impacts on the well being of children.

### **Exclusion of Children Aged 0-12 Months**

We have excluded infants from the sample of Manitoba children described in this study. This should not be understood to suggest that the health status and health care needs of these youngest children are not influenced by the social and economic circumstances of the household. In fact, in the case of infants, we would argue the exact opposite. The state of maternal health during pregnancy and the quality of the nurturing environment in the first 12 months of life are crucial factors in establishing the trajectory of a child's health status. Infants were excluded from the study sample primarily because a description of maternal and infant health care use would require a different analytic approach than was employed here. We return to this issue in the recommendations.

### **Potential Misclassification of Household Income Assistance Status and of Parenting Status of Households**

It is important that readers recognize that this study does not identify all children in Manitoba residing in families which received some form of income assistance. First, the study sample is based on households receiving provincial income assistance benefits. This sampling frame excludes households receiving income assistance from municipal sources and First Nations households residing on reserves receiving income assistance from federal sources. We have not attempted to estimate the numbers of children present in these two household groups. Because we are unable to identify households with children receiving income assistance from non-provincial sources, we note that these children have been grouped in the comparison category of children in non-assistance households. In future research work, it will be important to address these sources of misclassification.

A smaller source of misclassification of household income assistance status arises within the group of provincial income assistance cases. As described previously in the methods section of this report, children in households receiving income assistance for reasons other than dependent children were not included in the study sample of children in income assistance households. In a previous progress report, we have documented that approximately 3,100 children resided in households which received income assistance for reasons of adult disability (N=1,500), general assistance benefits (N=1,600) or other benefits (N=50) (Mustard, Derksen, Kozyrskyj April 1997). These children, representing approximately 10% of all children in households receiving income assistance, have been classified in non-assistance households for the purpose of this pilot study. In future research, we recommend that these children be included in the income assistance household category.

In preliminary descriptive analysis of income assistance households, we also examined the degree to which measures of household parenting structure (single vs. dual parent) and treaty Indian status were concordant between the information contained in the Family Services case record and information contained in the MHSIP registry record.

As we expected, the MHSIP registry file undercounted the numbers of persons in treaty status households as reported by Family Services records: the MHSIP file mis-classifies as non-native approximately 1 of every 3 persons defined as holding treaty status in the Family Services records. For reasons outlined in Progress Report #1, (Mustard, Derksen, Kozyrskyj March 1997) the Family Services designation is expected to be much more accurate than the designation recorded in the MHSIP file. Because this pilot study has not reported the use of health services by treaty status children, we do not present more detailed information in this report. We return to this issue briefly in the closing recommendations.

It is also important to note that there is some degree of error in the classification of single parent household status in this sample. The prevalence of children in single parent households obtained from this sample, 28.4%, is higher than other current estimates available from Canadian sources. For example, in a supplement to the Ontario Health Survey

conducted in the period 1990-91, the prevalence of single parent households was estimated to be 18.7% (Lipman, Offord, Boyle 1997). Although the unit of analysis reported in the Ontario Health Survey was the household, rather than children, the mean number of children in single parent households was less than the mean number of children in dual parent households. The 1994 National Longitudinal Survey of Children and Youth has reported the prevalence of children in lone parent families to be 12% at ages 0-23 months, rising to approximately 16% at ages 2-11 years (Statistics Canada, Human Resources Development Canada 1997). These survey data are substantially lower than estimates obtained from the 1991 Canadian census. In Manitoba in 1991, 20% of all families with children under the age of 18 were lone parent families (Hanvey, Avard, Graham, et al. 1994).

In this study, the parenting status of children in households which did not receive income assistance was derived from information obtained from the MHSIP registry and is based on the presence of a single adult sharing a household registration number with the children in the household. For children in households receiving income assistance for dependent children, single parent status was a qualifying criteria for income assistance. In these households, single parent status was derived from Family Services case records. We have estimated that the MHSIP registry over-estimates the prevalence of single parent households by approximately 10% relative to the more precise information collected by Family Services. Using this information to adjust the obtained prevalence estimate would reduce the proportion of children in single parent households from 28.4% to 25.6%.

## **4.2 Implications of Study Findings**

This pilot study had two exploratory objectives: to assess the technical feasibility of a research methodology based upon secondary administrative records and to describe the use of health care services among the 10% of Manitoba children residing in income assistance households.

There are two kinds of implications which arise from this pilot study. One set of issues focuses on observations on the reliability and validity of the secondary data sources used in this study. These observations can inform the conduct of future research and include the important question of the ethics of this type of research. Secondly, questions raised by the patterns of health care use described in this study may have policy implications for the organization and delivery of social and health care services to the children of Manitoba. Many of these questions deserve more detailed research attention.

### **The Reliability and Validity of Secondary Data Sources**

In evaluating the utility of the information available from this descriptive study of secondary administrative records, we strongly recommend that attention be paid to assessing the degree to which the portrait of the health of children available from the secondary records of health care use is an accurate description of the needs of the poorest children in the province. This assessment may be accomplished through comparative analyses of surveys such as the National Longitudinal Survey of Children and Youth, or through a direct survey of Manitoba children.

The pilot study did not describe the use of health care services in relation to the treaty status of children. Subject to the agreement of First Nations organizations such as the Assembly of Manitoba Chiefs, we believe that descriptions of the use of services by native children would be useful for the development of comprehensive and co-ordinated health and social policy in the area of child development. However, there are two obstacles to achieving this outcome. First, the MHSIP registry file is not an accurate source of information on household treaty status. The MHSIP registry file currently fails to identify correctly approximately 30,000 of the 90,000 treaty status individuals in the province of Manitoba. The second obstacle arises from the absence of information in provincial Family Services records concerning those households with children receiving income assistance benefits from federal sources. Further work is necessary to resolve these obstacles.

### **The Ethics of Research in Vulnerable Populations**

There are important ethical issues concerning the objectives of the routine surveillance of the use of health care services by a vulnerable population. The purposes of such descriptive research are to better understand the needs of this community, to describe the performance of the health care system in responding to these needs, and to influence efforts to improve the capacity of health care and social services to protect, restore or maintain the well-being of children living in disadvantaged circumstances.

The Manitoba Centre for Health Policy and Evaluation and Manitoba Family Services should consider undertaking a consultation with representatives of the vulnerable communities described in this study to explain the methods and objectives of this type of research, to review the findings of the study, and to explore mechanisms to ensure that future research is conducted in an ethically acceptable manner.

In the future, it will be important to ensure that the definition of research objectives and the results of research studies based on administrative program records are linked to the processes by which child and youth policy is developed.

### **The Organization and Delivery of Social Services and Health Care Services to the Children of Manitoba**

There are significant integrated service delivery issues between Manitoba Family Services and Manitoba Health surrounding pregnancy, labour and delivery, and infant health services. While the health of pregnant women and infants was not described in this study, the fetal and infant period is fundamental to the subsequent health of children. There are a substantial number of program initiatives in Manitoba which are directed to low income pregnant women. For example, income assistance benefits provided by Manitoba Family Services include a pregnancy supplement. Separately, Manitoba Health provides funding for specialized adolescent pregnancy clinics in two acute care hospital programs which have strong relations to social service agencies. There may be benefit in future work focused on

describing the organization and delivery of health and social services to low income, pregnant women with the objective of more completely understanding the coverage of these services and the benefits to infant health.

In this study, we have replicated findings from a number of other settings which show that a small proportion of children have a very high use of health care services (Starfield, Katz, Gabriel, et al. 1984; Starfield, Hankin, Steinwachs, et al. 1985). Among children with a burden of multiple morbidities, utilization was greatest among those children in resource-poor households, who had 40%-50% more hospital admissions and used 15%-30% more physician services. These findings are similar to the higher physician service use among low income children with multiple morbidities described by Newacheck (Newacheck 1992; Newacheck, Starfield 1988) and the concentration of higher users of physician services among children living in low income families in the Ontario Child Health Study (Woodward, Boyle, Offord, et al. 1988). There may be significant opportunities to both improve the quality of life in these children and reduce the use of health care services through innovative approaches to integrated service delivery.

Children in households receiving income assistance see physicians more frequently for the treatment of acute conditions and less frequently for preventive care. This pattern raises questions about the organization and delivery of primary care and the integration of service delivery to income assistance children. The US experience with managed care organizations has documented very large changes in poor children's use of emergency department services following enrolment in managed care programs. In this service delivery model, there are strong economic incentives to primary care providers to comprehensively manage the primary health care needs of children. There may be merit in exploring the opportunities to introduce similar innovations in the Manitoba setting. It would also be useful to conduct an evaluation of the effects of existing innovative service delivery models in Manitoba, to determine the degree to which they may be succeeding in the delivery of health care services to children.



Children in income assistance households and children in low income neighbourhoods in general are much more likely to be hospitalized for acute medical conditions than other children in Manitoba. There are longstanding unresolved questions concerning the degree to which this higher use of hospital care reflects missed opportunities in the primary care system to provide timely and appropriate care for these children. We recommend a specific investigation of the role of primary care service delivery and the role of continuity of primary care in accounting for the higher hospitalization rates of low income children.

In Manitoba, there are many community-based initiatives which seek to provide improved services to low income families with children. Some of these programs focus on workforce skill training, some focus on integrating social service delivery in the public education system and some focus on the delivery of primary care health services. In the large majority of these community-based initiatives, improving child health may not be an objective. However, there are substantial reasons to expect that improvements to child health will be a consequence of these services. To adequately inform public policy in child health, focused efforts should be made to measure contributions to child health from a range of services to low income families.

## REFERENCES

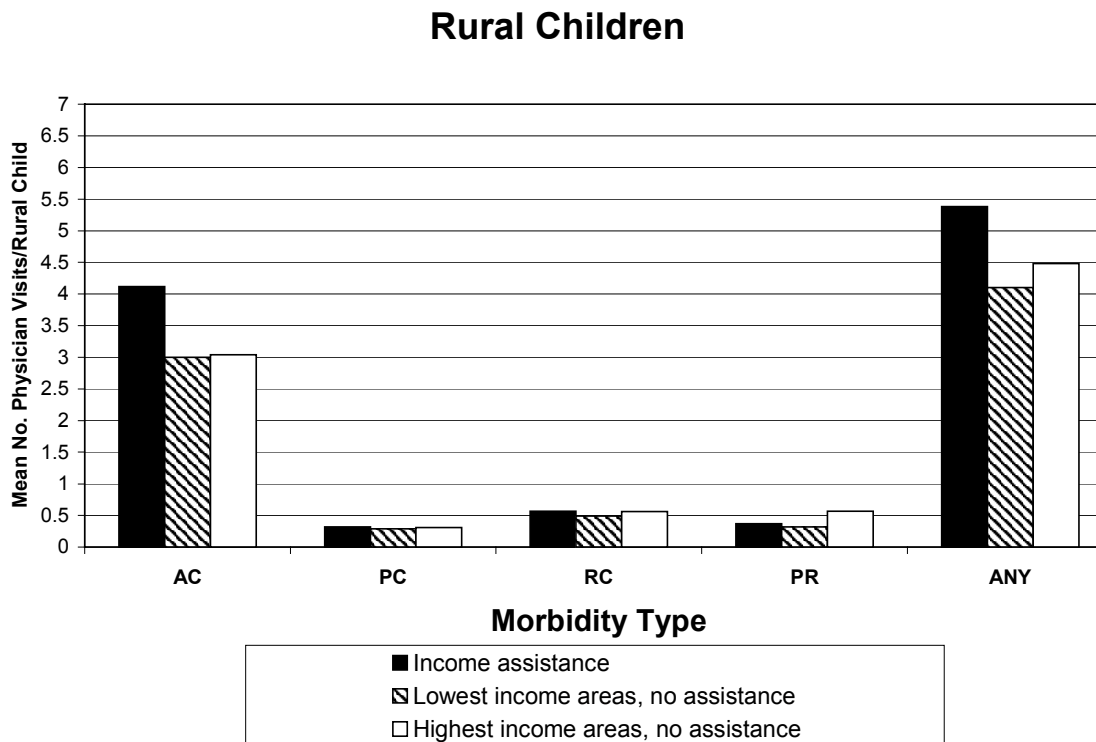
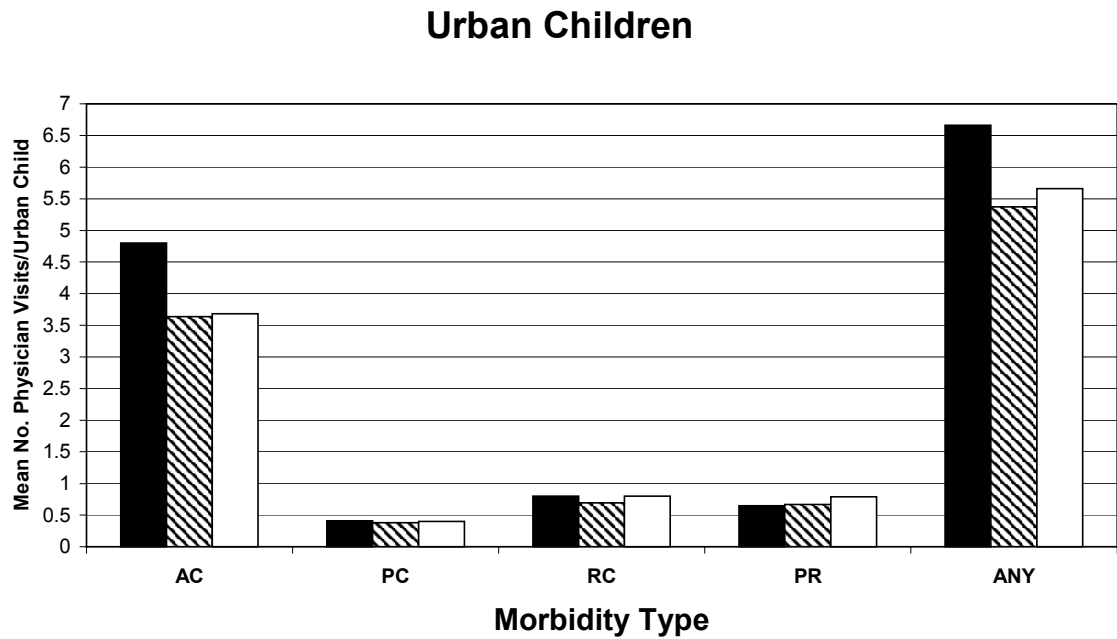
- Aber JL, Bennett NG. The effects of poverty on child health and development. *Annu Rev Public Health* 1997;18:463-83.
- Aday LA, Lee ES, Spears B, Chung CW, Youssef A, Bloom B et al. Health insurance and utilization of medical care for children with special health care needs. *Med Care* 1993;31:1013-26.
- Cadman D, Boyle MH, Offord DR, Szatmari P, Rae-Grant NI, Crawford J et al. Chronic illness and functional limitation in Ontario children: findings of the Ontario Child Health Study. *Can Med Assoc J* 1986;135:761-7.
- Cadman D, Rosenbaum P, Boyle, M Offord DR. Children with chronic illness: Family and parent demographic characteristics and psycho-social adjustment. *Pediatrics* 1991;87:884-9.
- Gortmaker SL, Walker DK, Weitzman, Sobol AM . Chronic conditions, socioeconomic risks, and behavioural problems in children and adolescents. *Pediatrics* 1990;85:267-76.
- Hanvey L, Avard DA, Graham I et al. The Health of Canada's Children: A CICH Profile, 2<sup>nd</sup> ed, 1994. Ottawa: Canadian Institute of Child Health.
- Kaplan GA, Salonen JT. Socioeconomic conditions in childhood and ischaemic heart disease during middle age. *Br Med J* 1990;301:1121-3.
- Kramer MS. Determinants of low birth weight: methodologic assessment and meta-analysis. *Bull World Health Organ* 1987;65:663-737.
- Krieger N. Overcoming the absence of socioeconomic data in medical records: Validation and application of a census-based methodology. *Am J Public Health* 1992;82:703-10.
- Lipman EL, Offord DR, Boyle MH. Single mothers in Ontario: Sociodemographic, physical and mental health characteristics. *Can Med Assoc J* 1997;156:639-45.
- McGauhey, Starfield B, Alexander C, Esminger ME. Social environment and vulnerability of low birth weight children: A income-epidemiological perspective. *Pediatrics* 1991;88:943-53.
- Montgomery LE, Kiely JL, Pappas G. The effects of poverty, race and family structure on US children's health: Data from the NHIS, 1978 through 1980 and 1989 through 1991. *Am J Public Health* 1996; 86:1401-5.

- Montgomery SM, Bartley MJ, Cook DG, Wadsworth ME. Health and social precursors of unemployment in young men in Great Britain. *J Epidemiol Community Health* 1996;50:415-22.
- Mustard CA, Derksen, S, Kozyrskyj A. Progress Report #1: Considering the health care needs of income assistance recipients in the province of Manitoba. Winnipeg: Manitoba Centre for Health Policy and Evaluation; March 1997.
- Mustard CA, Derksen, S, Kozyrskyj A. Progress Report #2: Considering the health care needs of income assistance recipients in the province of Manitoba. Winnipeg: Manitoba Centre for Health Policy and Evaluation; April 1997.
- Mustard CA, Roos NP. The relationship of prenatal care and pregnancy complications to birthweight in Winnipeg, Canada. *Am J Public Health* 1994;84:1450-7.
- National Council of Welfare. Welfare Incomes 1995: A Report by the National Council of Welfare. Ottawa: Minister of Supply and Services Canada; Winter 1996-97.
- Newacheck PW, Starfield B. Morbidity and use of ambulatory care services among poor and nonpoor children. *Am J Public Health* 1988;78:927-33.
- Newacheck PW, Stoddard JJ, McManus M. Ethnocultural variations in the prevalence and impact of childhood chronic conditions. *Pediatrics* 1993;91 Suppl:1031-9.
- Newacheck PW, Taylor WR. Childhood chronic illness: Prevalence, severity and impact. *Am J Public Health* 1992;82:364-71.
- Newacheck PW. Characteristics of children with high and low usage of physician services. *Med Care* 1992;30:30-42.
- NLSC Project Team, "What Works" for Children Information Development Program. National Longitudinal Survey of Children: Survey instruments for 1994-95 data collection; cycle 1, Feb 1995. Ottawa: Human Resources Development, Statistics Canada.
- Offord DR, Boyle MH, Racine YA, Fleming JE, Cadman DT, Blum HM et al. Outcome, prognosis, and risk in a longitudinal follow-up study. *J Am Acad Child Adolesc Psychiatry* 1992;31:916-23.
- Peck AMN. Childhood environment, intergenerational mobility, and adult health-evidence from Swedish data. *J Epidemiol Community Health* 1992;46:71-4.
- Perrin EC, Newacheck P, Pless B, Drotar D, Gortmaker SL, Leventhal J et al. Issues involved in the definition and classification of chronic health conditions. *Pediatrics* 1993;91:787-93.

- Purvis A. Counting our blessings. *Time* 1997;149:14-31.
- Roos NP, Shapiro E. A productive experiment with administrative data. *Med Care* 1995;33 Suppl:DS7-DS12.
- Schaubel D, Johansen H, Mao Y, Dutta M, Manfreda J. Risk of preschool asthma: Incidence, hospitalization, recurrence, and readmission probability. *J Asthma* 1996;33:97-103.
- Shah CP, Kahan M, Krauser J. The health of children of low-income families. *Can Med Assoc J* 1987;137:485-90.
- Starfield B, Hankin J, Steinwachs D, Horn S, Benson P, Katz H et al. Utilization and morbidity: Random or tandem? *Pediatrics* 1985; 75:241-7.
- Starfield B, Katz H, Gabriel A, Livingston G, Benson P, Hankin J et al. Morbidity in childhood: A longitudinal view. *N Engl J Med* 1984;310:824-9.
- Statistics Canada, Geography Division. Geography: Detailed User Guide, Postal Code Conversion File. Ottawa: Statistics Canada; July 1989.
- Statistics Canada, Housing, Family and Social Statistics Division, Target Groups Project. A Portrait of Families in Canada: Target Groups Project, 1993. Ottawa: Statistics Canada.
- Statistics Canada, Human Resources Development Canada. Growing up in Canada: National Longitudinal Survey of Children and Youth, 1997. Ottawa: Statistics Canada. Catalogue no. 89-550-MPE.
- Statistics Canada. Income distributions by size in Canada, 1996. Ottawa: Statistics Canada; December 1997. Catalogue 13-207-XPB.
- Statistics Canada. Low Income Measures, 1996. Ottawa: Statistics Canada; March 1998. Catalogue 13-582-XPB.
- Stein REK, Bauman LJ, Westbrook LE, Coupey SM, Ireys HT et al. Framework for identifying children who have chronic conditions: the case for a new definition. *J Pediatr* 1993;122:342-7.
- Stein REK, Jessop DJ. What diagnosis does not tell: The case for a noncategorical approach to chronic illness in childhood. *Soc Sci Med* 1989;29:769-78.
- Tessler R, Mechanic D. Factors affecting children's use of physician services in a prepaid group practice. *Med Care* 1978;16:33-46.

- Thompson AH, Newman SC. Mortality in a child welfare population: Implications for policy. *Child Welfare* 1995;74:843-57.
- Vagero D, Ostberg V. Mortality among children and young persons in Sweden in relation to childhood socioeconomic group. *J Epidemiol Community Health* 1989;43:280-4.
- West P. Inequalities? Income class differentials in health in British youth. *Soc Sci Med* 1988;27:291-6.
- Wilkins R, Adams O, Brancker A. Changes in mortality by income in urban Canada from 1971 to 1986. *Health Rep* 1989;1:137-74.
- Wilkins R. Use of postal codes and addresses in the analysis of health data. *Health Rep* 1993;5:157-77.
- Woodward CA, Boyle MH, Offord DR, Racine YA. Correlates of children's use of physician and dentist services: Ontario Child Health Study Follow-up. *Can J Public Health* 1993;84:103-6.
- Woodward CA, Boyle MH, Offord DR, Cadman DT, Links PS, Munroe-Blum H et al. Ontario Child Health Study: Patterns of ambulatory medical care utilization and their correlates. *Pediatrics* 1988;82:425-34.

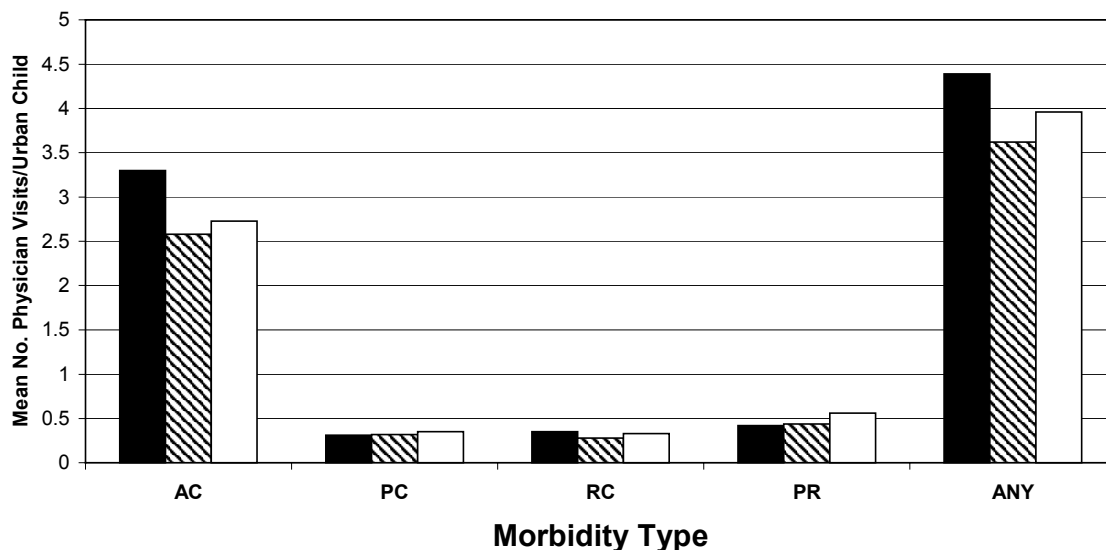
**Figure 1: Physician Service Utilization by Children Aged 1-5 Years By Morbidity Type and Socioeconomic Status**



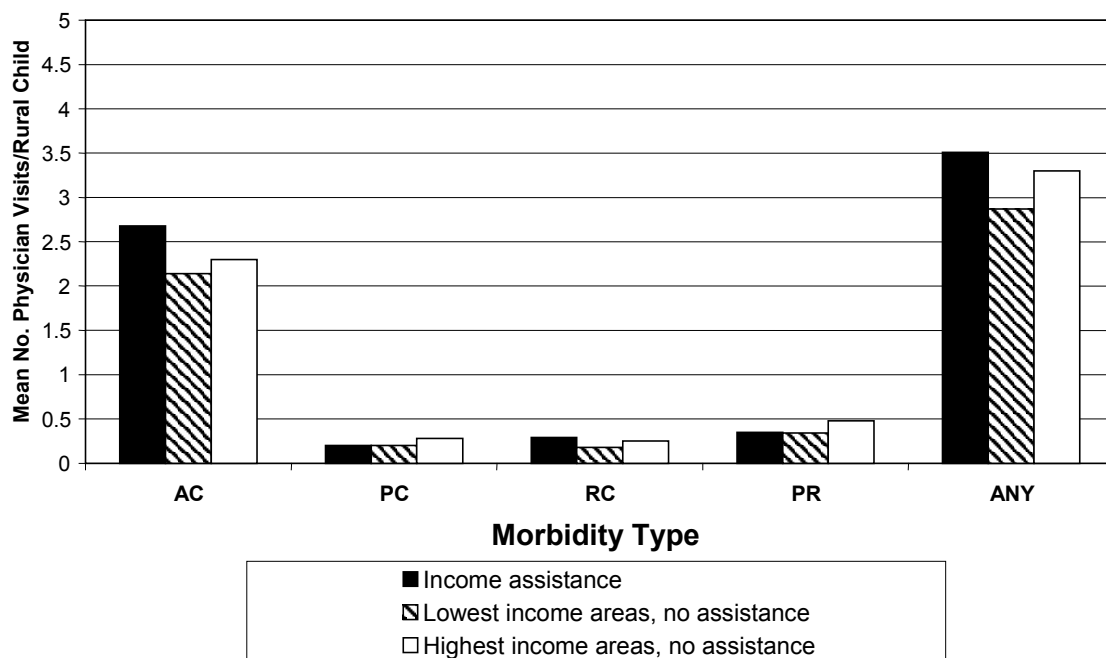
AC – Acute Condition    PR – Preventive Care    PC – Permanent Condition  
 RC – Recurrent Condition    ANY – Any Condition

**Figure 2: Physician Service Utilization by Children Aged 6-10 Years By Morbidity Type and Socioeconomic Status**

**Urban Children**



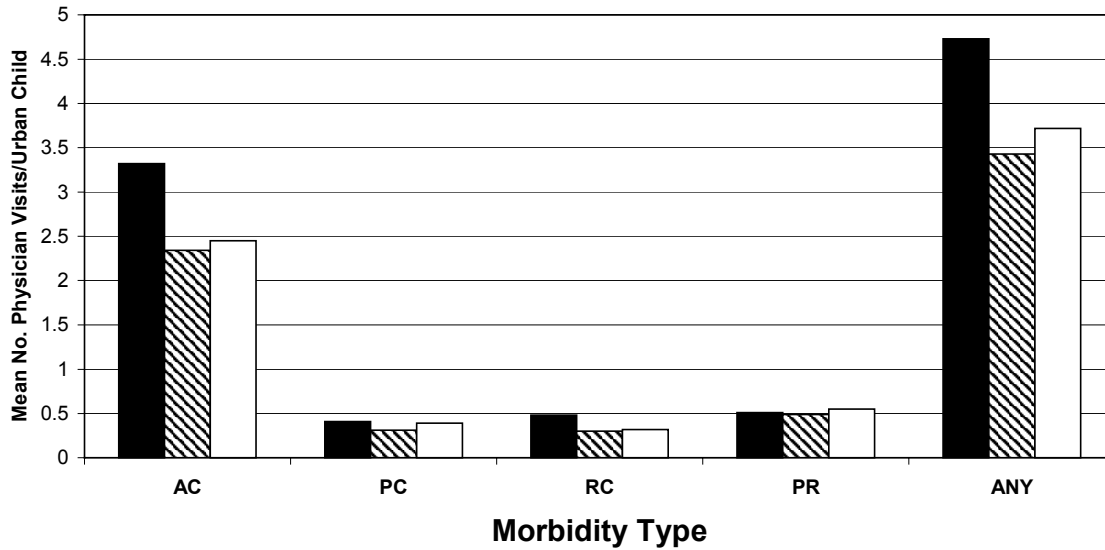
**Rural Children**



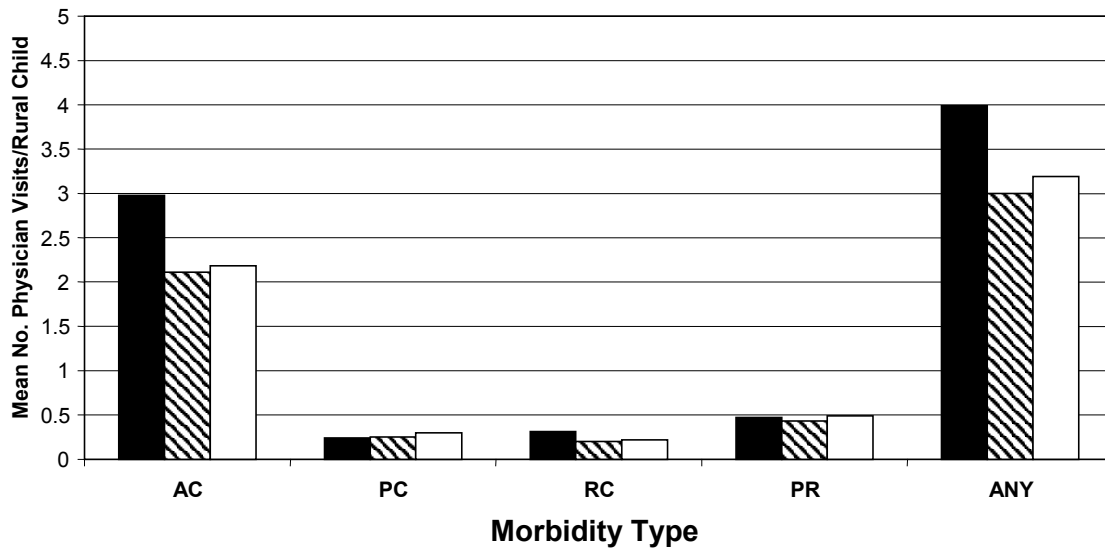
AC – Acute Condition    PR – Preventive Care    PC – Permanent Condition  
 RC – Recurrent Condition    ANY – Any Condition

**Figure 3: Physician Service Utilization by Children Aged 11-15 Years By Morbidity Type and Socioeconomic Status**

**Urban Children**



**Rural Children**



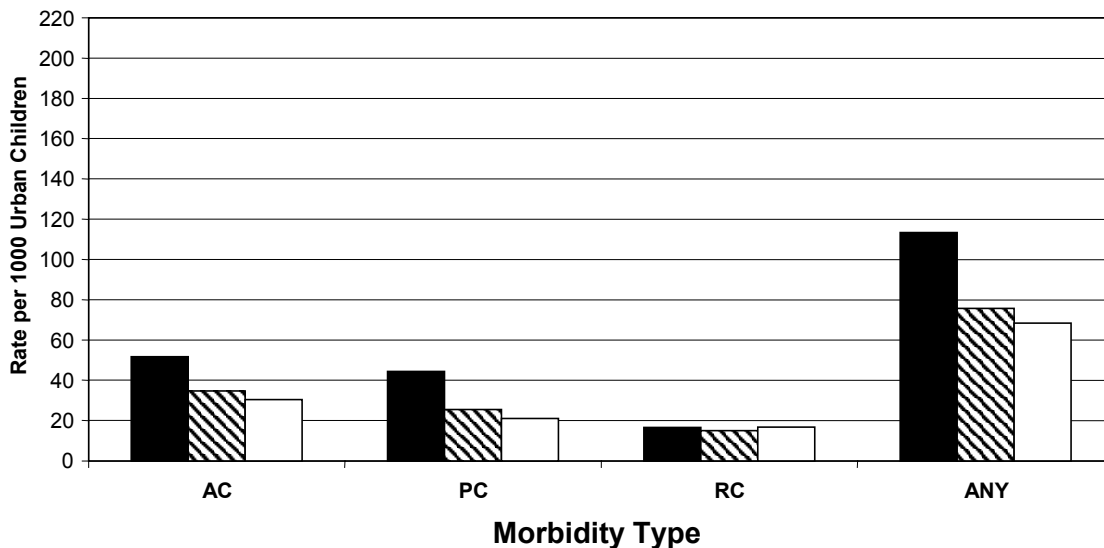
Income assistance  
 Lowest income areas, no assistance  
 Highest income areas, no assistance

AC – Acute Condition    PR – Preventive Care    PC – Permanent Condition  
 RC – Recurrent Condition    ANY – Any Condition

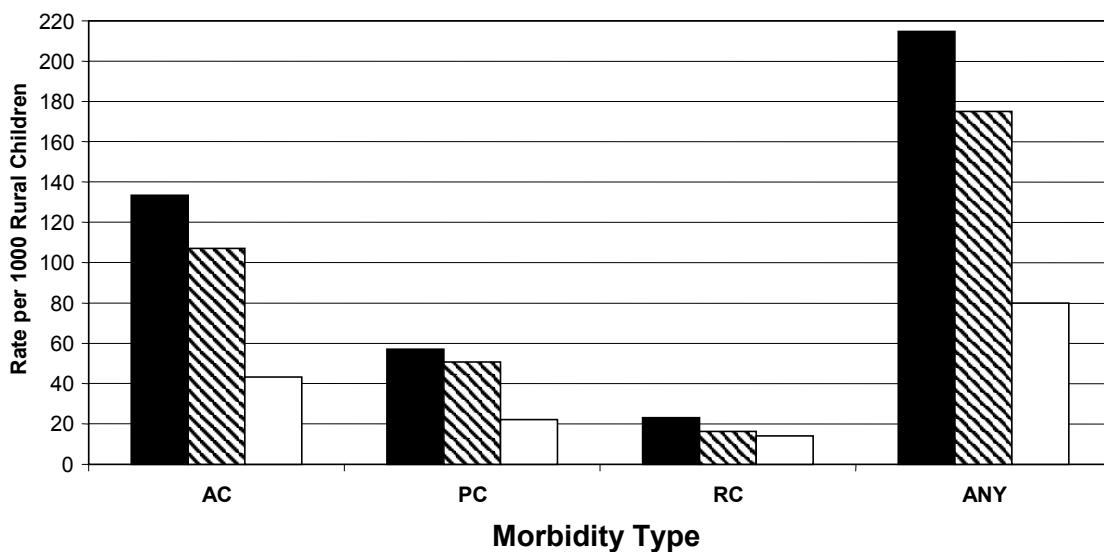


**Figure 4: Hospitalization of Children Aged 1-5 Years By Morbidity Type and Socioeconomic Status**

**Urban Children**



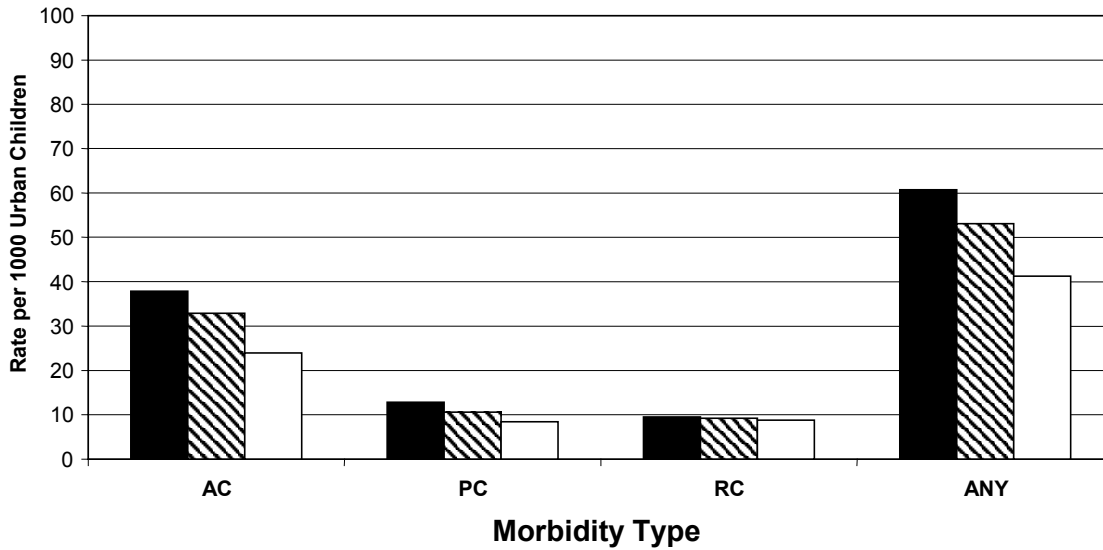
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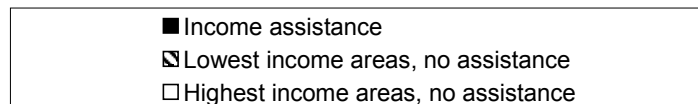
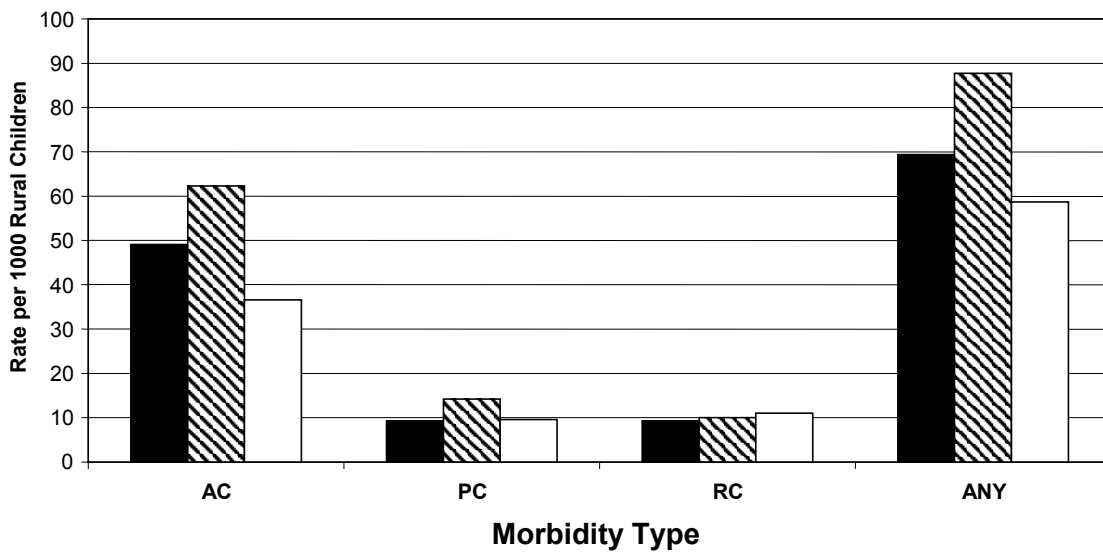
Income assistance  
 Lowest income areas, no assistance  
 Highest income areas, no assistance

**AC** – Acute Condition    **PC** – Permanent Condition  
**RC** – Recurrent Condition    **ANY** – Any Condition

**Figure 5: Hospitalization of Children  
Aged 6-10 Years  
By Morbidity Type and Socioeconomic Status  
Urban Children**



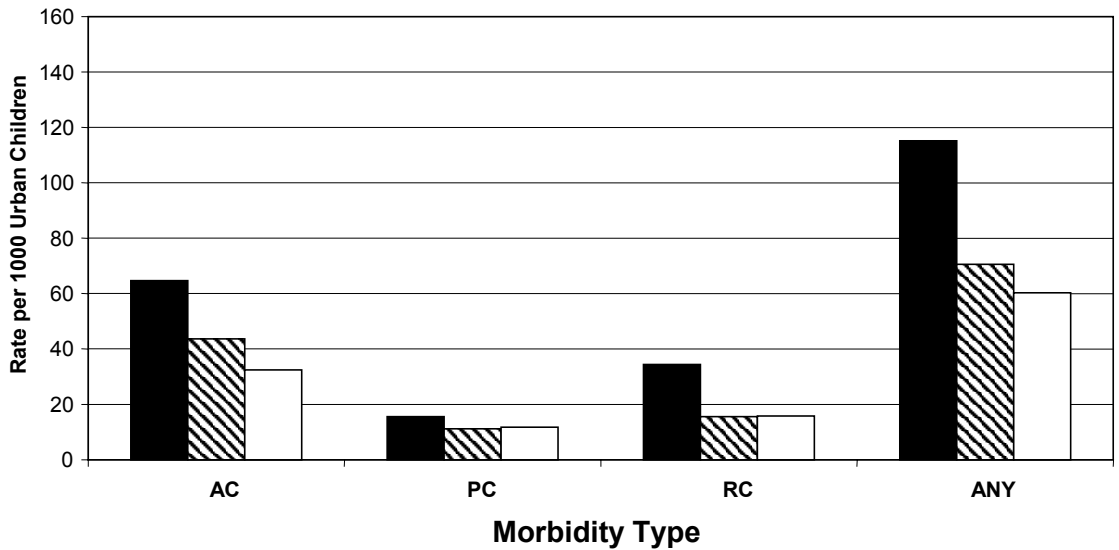
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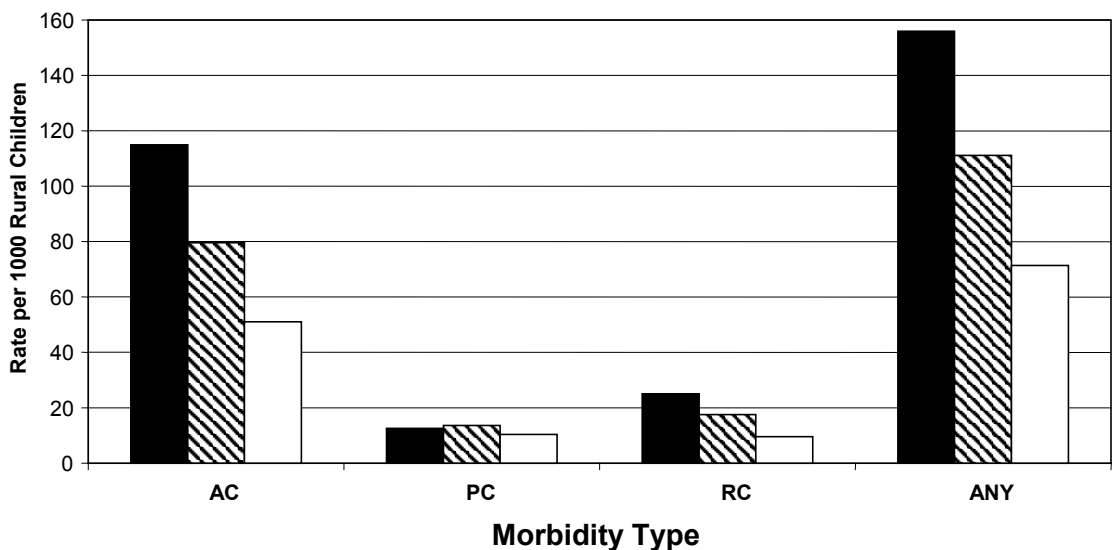
AC – Acute Condition    PC – Permanent Condition  
RC – Recurrent Condition    ANY – Any Condition

**Figure 6: Hospitalization of Children Aged 11-15 Years By Morbidity Type and Socioeconomic Status**

**Urban Children**



**Rural Children**

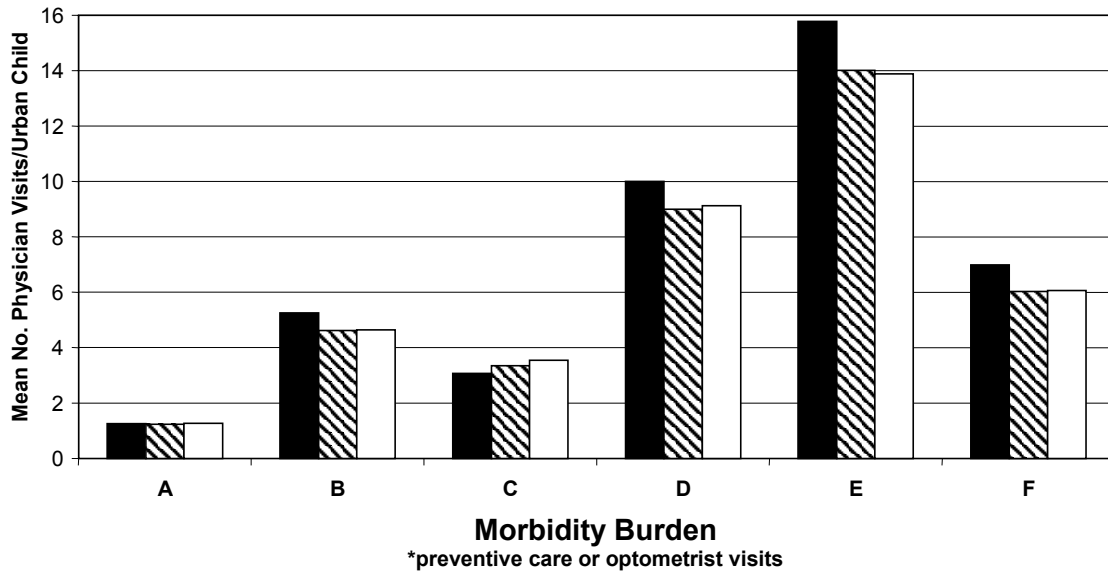


■ Income assistance  
 ▨ Lowest income areas, no assistance  
 □ Highest income areas, no assistance

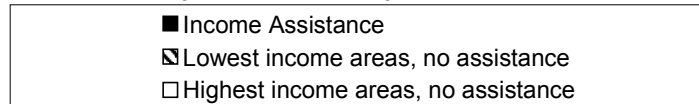
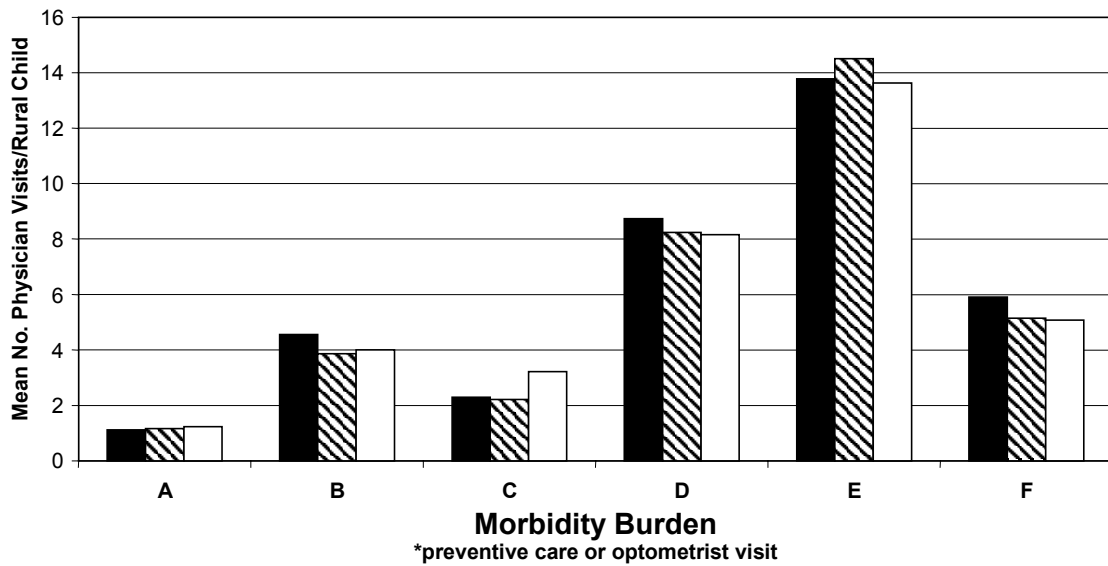
AC – Acute Condition    PC – Permanent Condition  
 RC – Recurrent Condition    ANY – Any Condition

**Figure 7: Physician Utilization by Children Aged 1-5 Years By Morbidity Burden and Socioeconomic Status**

**Urban Children**



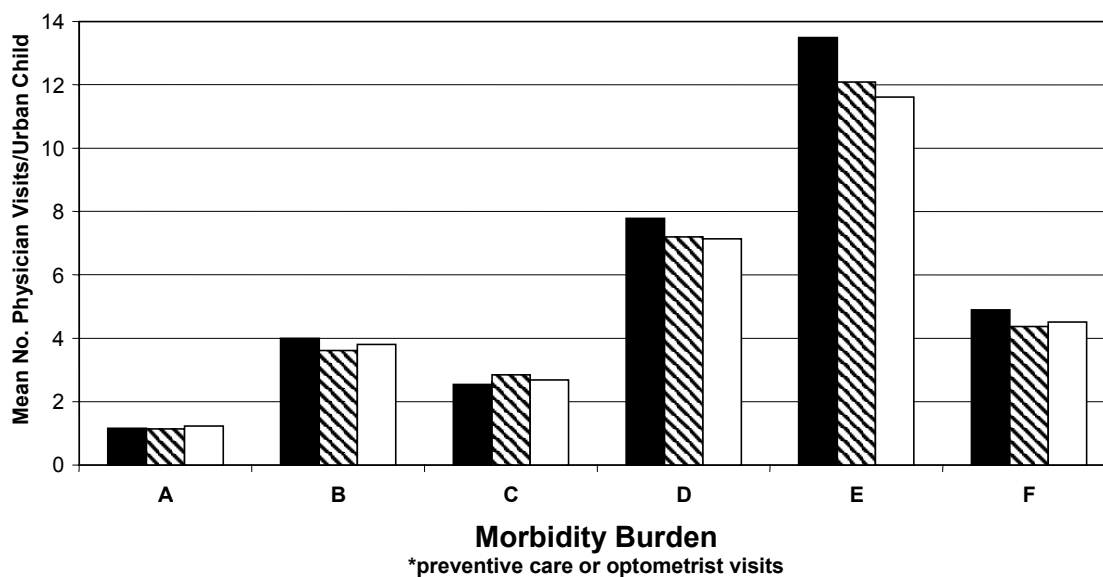
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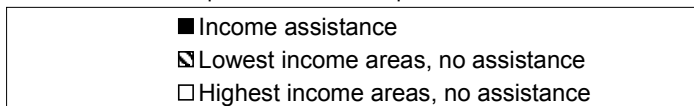
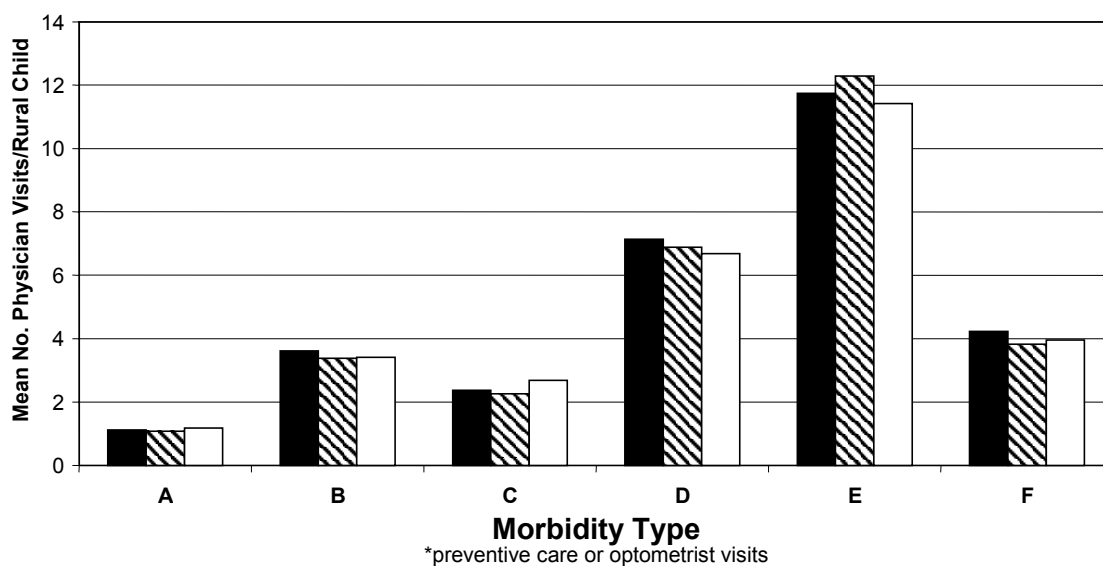
A – No Conditions\* B – One Acute Condition C – One Chronic Condition  
D – Acute Condition and 1 Chronic Condition E – Acute Condition and 2 Chronic Conditions F – Any Condition

**Figure 8: Physician Utilization by Children Aged 6-10 Years By Morbidity Burden and Socioeconomic Status**

**Urban Children**



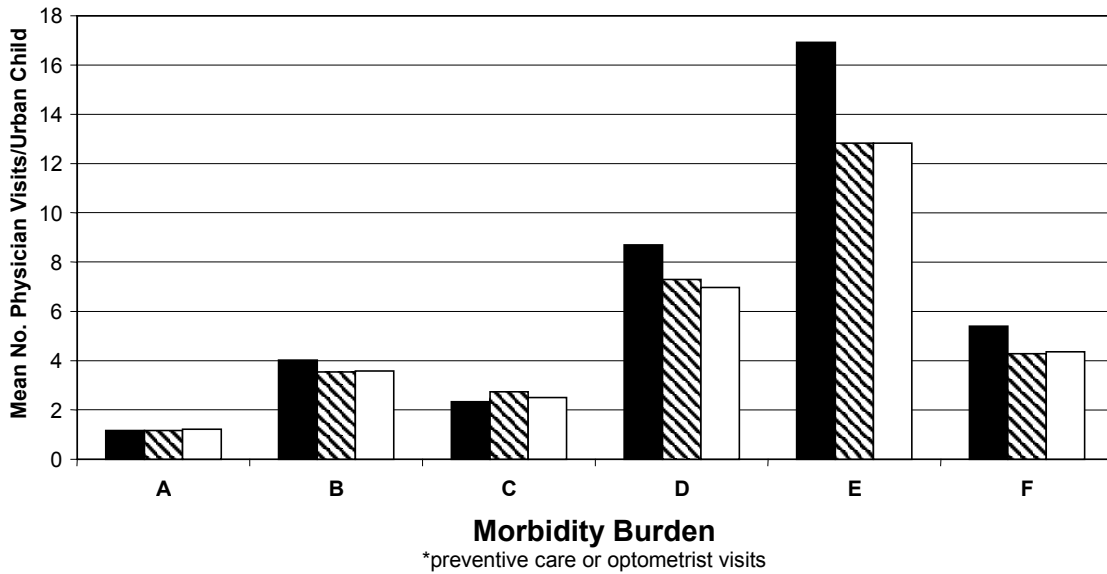
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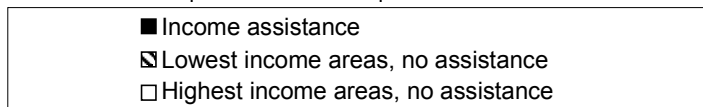
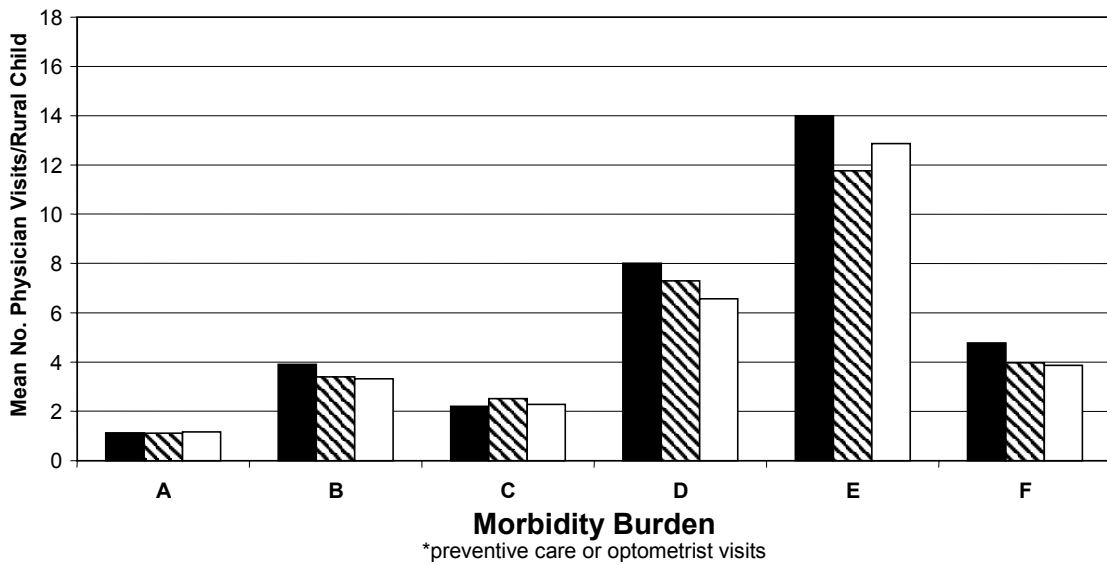
A – No Conditions\* B – One Acute Condition C – One Chronic Condition  
 D – Acute Condition and 1 Chronic Condition E – Acute Condition and 2 Chronic Conditions F – Any Condition

**Figure 9: Physician Utilization by Children Aged 11-15 Years By Morbidity Burden and Socioeconomic Status**

**Urban Children**



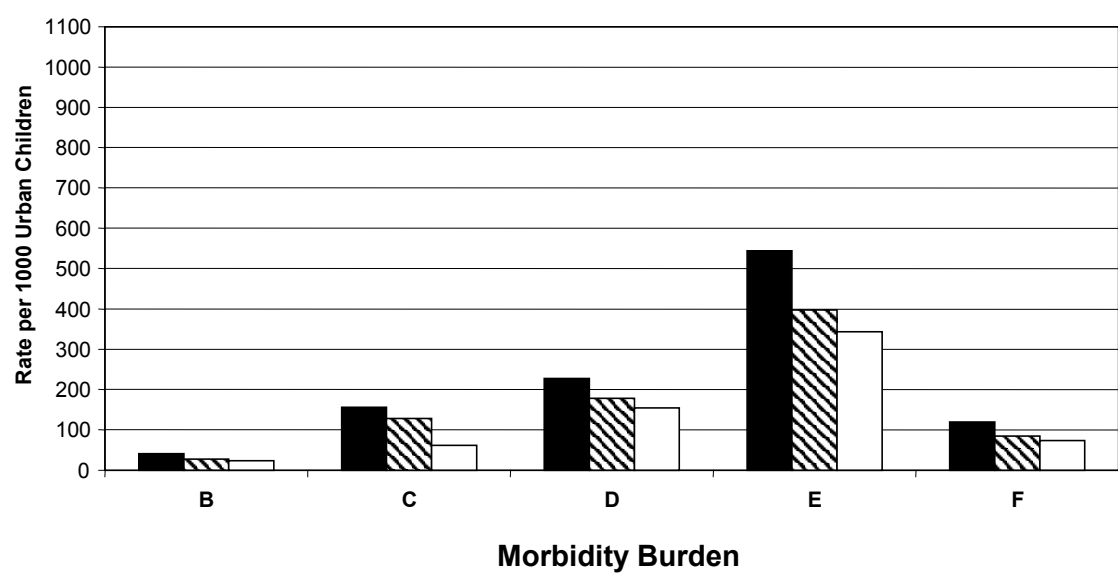
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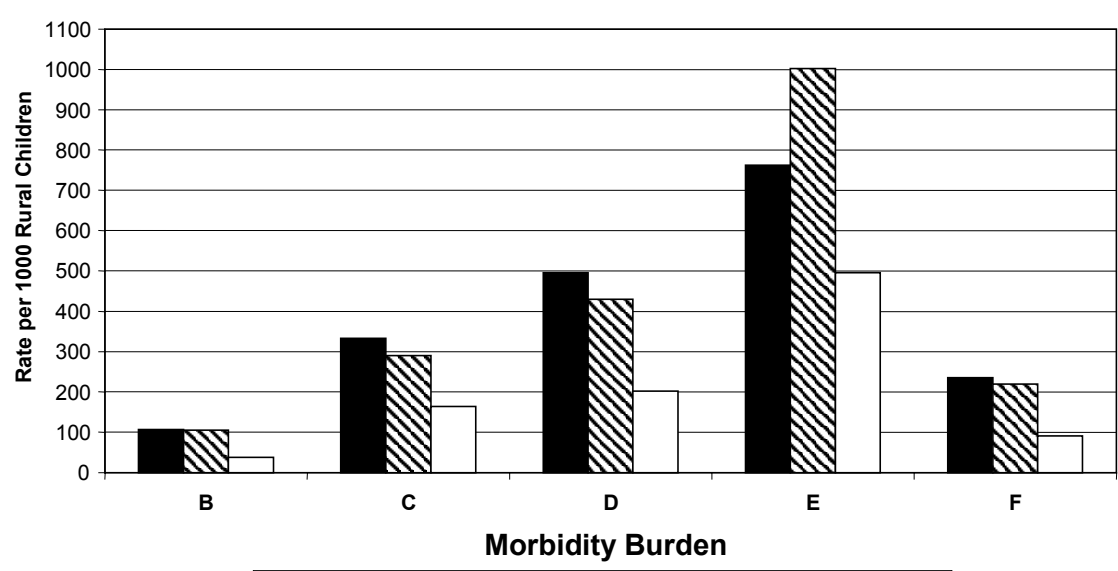
**A – No Conditions\*   B – One Acute Condition   C – One Chronic Condition  
 D – Acute Condition and 1 Chronic Condition   E – Acute Condition and 2 Chronic Conditions   F – Any Condition**

**Figure 10: Hospitalization of Children Aged 1-5 Years By Morbidity Burden and Socioeconomic Status**

**Urban Children**

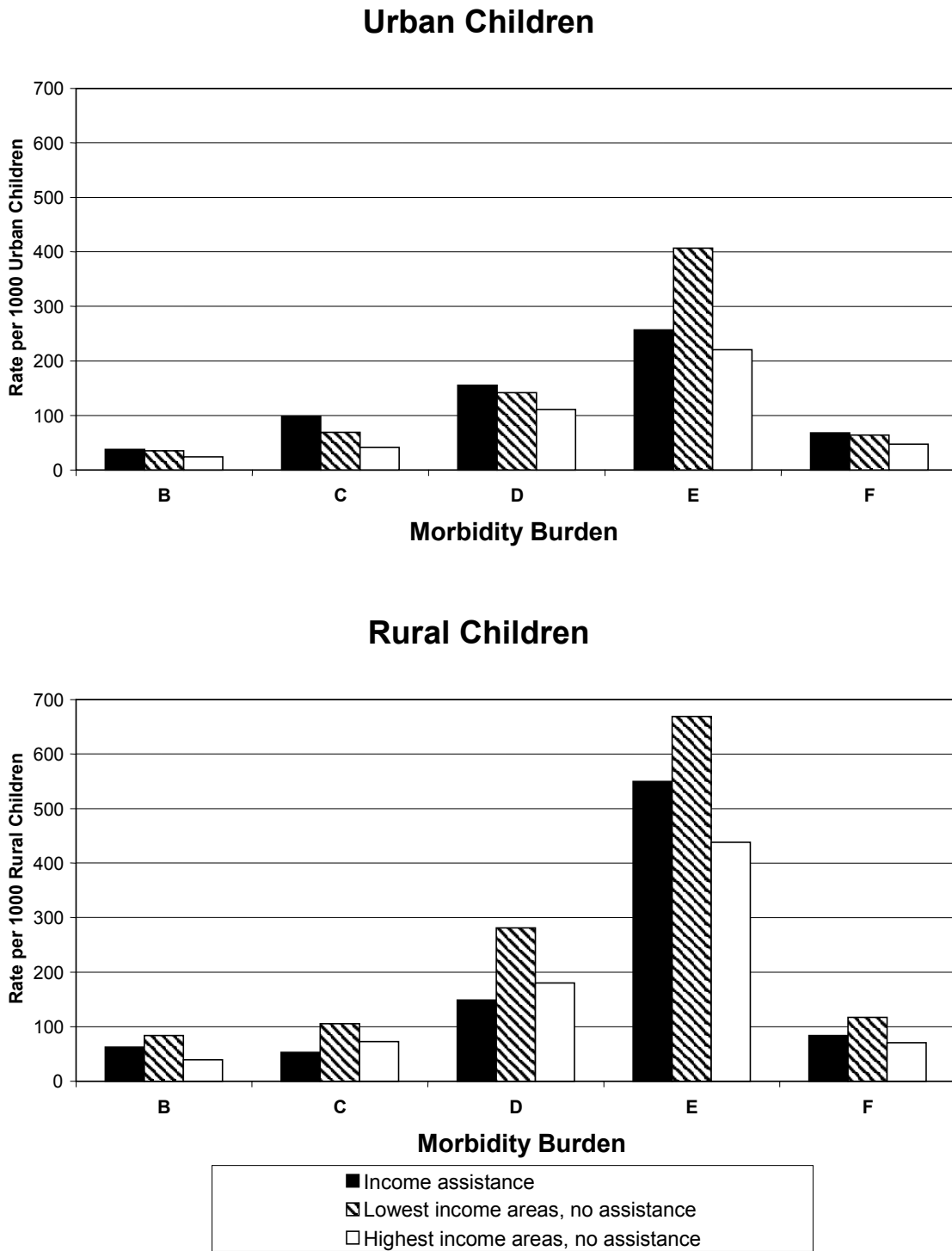


**Rural Children**



■ Income assistance  
▨ Lowest income areas, no assistance  
□ Highest income areas, no assistance

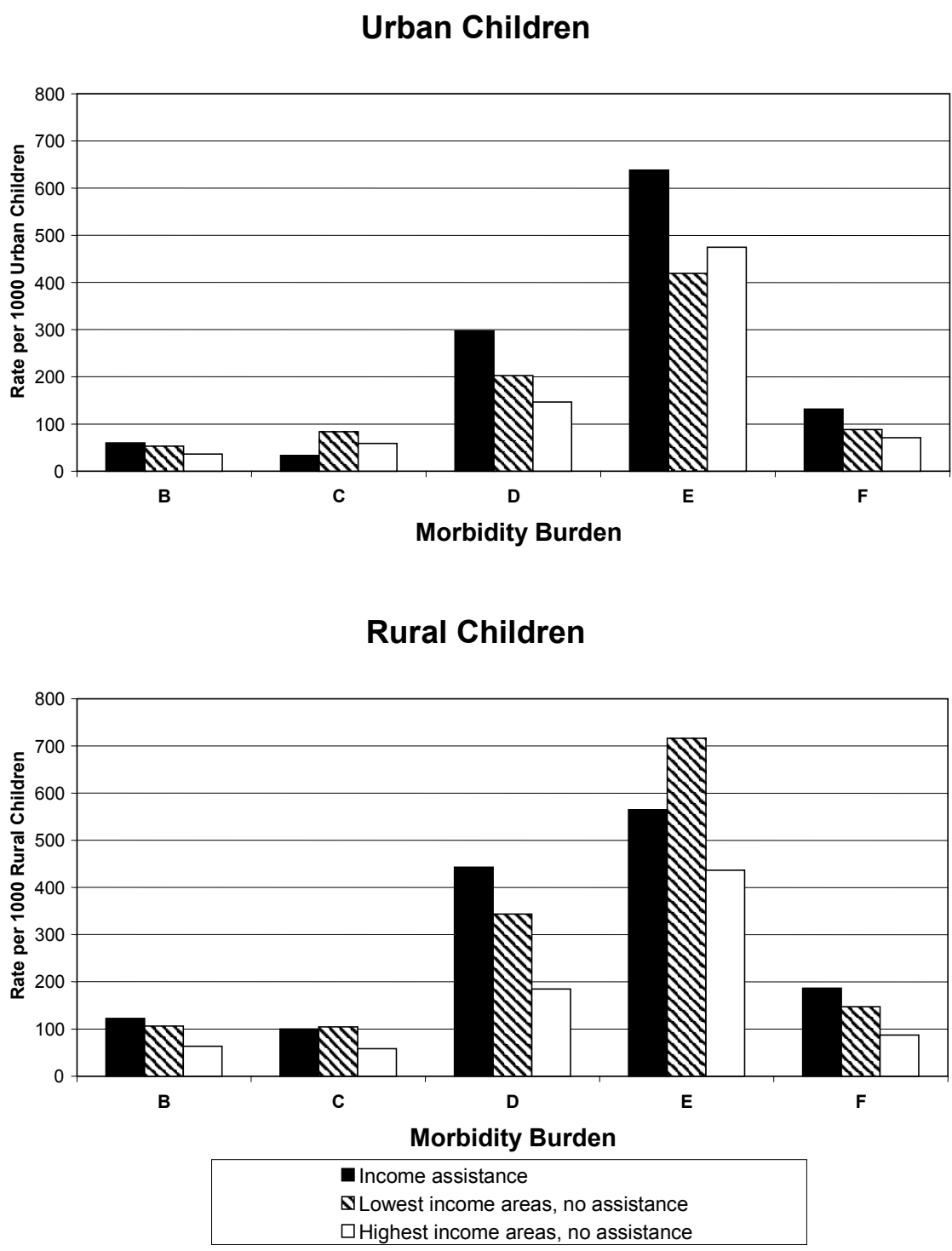
**Figure 11: Hospitalization of Children Aged 6-10 Years By Morbidity Burden and Socioeconomic Status**



**B – One Acute Condition   C – One Chronic Condition   D – Acute Condition and 1 Chronic Condition  
E – Acute Condition and 2 Chronic Conditions   F – Any Condition**



**Figure 12: Hospitalization of Children Aged 11-15 Years By Morbidity Burden and Socioeconomic Status**



**Table 1: Population of Children in Manitoba  
By Income Assistance Status and Age of Child**

Manitoba, FY94/95				
Age of Child (years)		Income Assistance Households (1)	Non-Assistance Households	Total
< 1	N (%)	1,776 (12.5)	12,369 (87.5)	14,145 (100.0)
1-5	N (%)	11,150 (13.0)	74,448 (87.0)	85,598 (100.0)
6-10	N (%)	7,532 (9.0)	75,888 (91.0)	83,420 (100.0)
11-15	N (%)	5,616 (7.0)	74,772 (93.0)	80,388 (100.0)
Total	N (%)	26,074 (10.0)	237,477 (90.0)	263,551 (100.0)

(1) Income Assistance Households are restricted to mothers' allowance, fathers' allowance and foster child benefits. Children in households receiving income assistance due to adult disability (N=1,380), general assistance benefits (N=1,340) or other income assistance eligibility (N=45) are classified in non-assistance households.

Children in Income Assistance households which could not be linked to an MHSIP identity have been excluded from the income assistance category. These children are, by default, included in the non-assistance category. In this category there are a total of 741 children, including 145 children aged 0-12 months, 285 children aged 1-5 years, 192 children aged 6-10 years and 119 children aged 11-15 years.

**Table 2: Population of Children in Manitoba  
By Parenting Status of Household and Age of Child**

Manitoba, FY94/95							
Age of Child (years)		Single Parent Household		Dual Parent Household		Total	
<1	N (%)	5,752	(40.7)	8,393	(59.3)	14,145	(100.0)
1-5	N (%)	29,201	(34.1)	56,307	(65.9)	85,598	(100.0)
6-10	N (%)	21,249	(25.5)	62,171	(74.5)	83,420	(100.0)
11-15	N (%)	18,731	(23.3)	61,657	(76.7)	80,388	(100.0)
Total	N (%)	74,933	(28.4)	188,618	(71.6)	263,551	(100.0)

**Table 3: Population of Children in Single Parent Households in Manitoba  
By Income Assistance Status and Age of Child**

Manitoba, FY94/95							
Age of Child (years)		Income Assistance Households (1)		Non-Assistance Households		Total	
< 1	N (%)	1,776	(30.9)	3,976	(69.1)	5,752	(100.0)
1-5	N (%)	11,150	(38.2)	18,051	(61.8)	29,201	(100.0)
6-10	N (%)	7,532	(35.4)	13,717	(64.6)	21,249	(100.0)
11-15	N (%)	5,616	(30.0)	13,115	(70.0)	18,731	(100.0)
Total	N (%)	26,074	(34.8)	48,859	(65.2)	74,933	(100.0)

(1) Income Assistance Households are restricted to mothers' allowance, fathers' allowance and foster child benefits. Children in households receiving income assistance due to adult disability (N=1,380), general assistance benefits (N=1,340) or other income assistance eligibility (N=45) are classified in non-assistance households.

Children in Income Assistance households which could not be linked to an MHSIP identity have been excluded from the income assistance category. These children are, by default, included in the non-assistance category. In this category there are a total of 741 children, including 145 children aged 0-12 months, 285 children aged 1-5 years, 192 children aged 6-10 years and 119 children aged 11-15 years.

**Table 4: Population of Children in Manitoba Residing in Urban Areas  
By Age, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95

Age Group	Income Assistance Status	Urban Neighbourhood Income Quintile										TOTAL	
		Q1 (Lowest)		Q2		Q3		Q4		Q5 (Highest)			
N	%	N	%	N	%	N	%	N	%	N	%		
0	Income Assistance	697	(30.1)	344	(15.4)	244	(12.7)	116	(5.9)	52	(3.3)	1,453	(14.5)
	Non-Assistance	1,617	(69.9)	1,883	(84.6)	1,683	(87.3)	1,842	(94.1)	1,540	(96.7)	8,565	(85.5)
	Total	2,314	(100.0)	2,227	(100.0)	1,927	(100.0)	1,958	(100.0)	1,592	(100.0)	10,018	(100.0)
1-5	Income Assistance	4,396	(34.9)	2,128	(17.5)	1,553	(13.2)	862	(7.1)	345	(3.1)	9,284	(15.5)
	Non-Assistance	8,205	(65.1)	10,030	(82.5)	10,230	(86.8)	11,346	(92.9)	10,738	(96.9)	50,549	(84.5)
	Total	12,601	(100.0)	12,158	(100.0)	11,783	(100.0)	12,208	(100.0)	11,083	(100.0)	59,833	(100.0)
6-10	Income Assistance	2,825	(27.5)	1,497	(13.9)	1,123	(10.1)	652	(5.2)	214	(1.7)	6,311	(11.1)
	Non-Assistance	7,449	(72.5)	9,260	(86.1)	9,975	(89.9)	11,771	(94.8)	12,055	(98.3)	50,510	(89.9)
	Total	10,274	(100.0)	10,757	(100.0)	11,098	(100.0)	12,423	(100.0)	12,269	(100.0)	56,821	(100.0)
11-15	Income Assistance	2,105	(23.4)	1,134	(11.3)	851	(8.2)	442	(3.7)	180	(1.4)	4,712	(8.7)
	Non-Assistance	6,876	(76.6)	8,923	(88.7)	9,575	(91.8)	11,648	(96.3)	12,442	(98.6)	49,464	(91.3)
	Total	8,981	(100.0)	10,057	(100.0)	10,426	(100.0)	12,090	(100.0)	12,622	(100.0)	54,176	(100.0)
Total	Income Assistance	10,023	(29.3)	5,103	(14.5)	3,771	(10.7)	2,072	(5.3)	791	(2.1)	21,760	(12.0)
	Non-Assistance	24,147	(70.7)	30,096	(85.5)	31,463	(89.3)	36,607	(94.7)	36,775	(97.9)	159,088	(88.0)
	Total	34,170	(100.0)	35,199	(100.0)	35,234	(100.0)	38,679	(100.0)	37,566	(100.0)	180,848	(100.0)

A total of 1,939 children could not be classified by neighbourhood income quintile. In addition, 741 children in income assistance households who could not be linked to an MHSIP identity have been excluded from the income assistance group.

**Table 5: Population of Children in Manitoba Residing in Rural Areas  
By Age, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95

Age Group	Income Assistance Status	Rural Neighbourhood Income Quintile											
		Q1 (Lowest)	Q2	Q3	Q4	Q5 (Highest)	TOTAL						
		N	%	N	%	N	%	N	%	N	%		
0	Income Assistance	113	(9.5)	77	(10.5)	49	(6.6)	40	(5.7)	42	(6.3)	321	(7.9)
	Non-Assistance	1,074	(90.5)	653	(89.5)	697	(93.4)	665	(94.3)	628	(93.7)	3,717	(92.1)
	Total	1,187	(100.0)	730	(100.0)	746	(100.0)	705	(100.0)	670	(100.0)	4,038	(100.0)
1-5	Income Assistance	676	(9.9)	492	(10.3)	301	(6.7)	178	(3.8)	173	(3.9)	1,820	(7.2)
	Non-Assistance	6,142	(90.1)	4,296	(89.7)	4,186	(93.3)	4,456	(96.2)	4,261	(96.1)	23,341	(92.8)
	Total	6,818	(100.0)	4,788	(100.0)	4,487	(100.0)	4,634	(100.0)	4,434	(100.0)	25,161	(100.0)
6-10	Income Assistance	387	(6.4)	310	(6.7)	194	(4.0)	167	(3.2)	124	(2.4)	1,182	(4.6)
	Non-Assistance	5,683	(93.6)	4,314	(93.3)	4,706	(96.0)	5,051	(96.8)	5,006	(97.6)	24,760	(95.4)
	Total	6,070	(100.0)	4,624	(100.0)	4,900	(100.0)	5,218	(100.0)	5,130	(100.0)	25,942	(100.0)
11-15	Income Assistance	315	(5.6)	220	(4.8)	136	(2.7)	119	(2.2)	88	(1.7)	878	(3.4)
	Non-Assistance	5,273	(94.4)	4,392	(95.2)	4,879	(97.3)	5,232	(97.8)	4,969	(98.3)	24,745	(96.6)
	Total	5,588	(100.0)	4,612	(100.0)	5,015	(100.0)	5,351	(100.0)	5,057	(100.0)	25,623	(100.0)
Total	Income Assistance	1,491	(7.6)	1,099	(7.4)	680	(4.5)	504	(3.2)	427	(2.8)	4,201	(5.2)
	Non-Assistance	18,172	(92.4)	13,655	(92.6)	14,468	(95.5)	15,404	(96.8)	14,864	(97.2)	76,563	(94.8)
	Total	19,663	(100.0)	14,754	(100.0)	15,148	(100.0)	15,908	(100.0)	15,291	(100.0)	80,764	(100.0)

A total of 1,939 children could not be classified by neighbourhood income quintile. In addition, 741 children in income assistance households who could not be linked to an MHSIP identity have been excluded from the income assistance group. The distribution of children living in income assistance households exhibited a negative gradient with increasing neighbourhood income. (Data for income quintiles Q2, Q3, Q4 not shown)

**Table 6: Description of Study Population Children:  
Age, Gender and Duration of Household Income Assistance**

Manitoba FY94/95			
Characteristic (n=247,556)	Income Assistance Household (n=24,190)	Non-Assistance Household (n=223,366)	All Children
Age, mean years, (SD)	6.7, (4.2)	8.0, (4.3)	7.9, (4.3)
% 1-5 years old	45.9 %	33.1 %	34.3 %
% 6-10 years old	31.0 %	33.7 %	33.4 %
% 11-15 years old	23.1 %	33.2 %	32.2 %
Gender			
% female	49.4 %	48.7 %	48.7 %
% male	50.6 %	51.3 %	51.3 %
Duration of Income Assistance Benefits,* years			
Overall mean years (SD)	3.2, (7.6)	NA	NA
25 <sup>th</sup> tile	0.9	NA	NA
Median	2.1	NA	NA
75 <sup>th</sup> tile	4.4	NA	NA
Mean years by age group (SD)			
1-5 years	2.5, (2.5)	NA	NA
6-10 years	3.5, (3.5)	NA	NA
11-15 years	4.2, (4.2)	NA	NA
Median years by age group			
1-5 years	1.8	NA	NA
6-10 years	2.3	NA	NA
11-15 years	2.7	NA	NA

\* duration = (effective date for most recent benefit coverage for household applicant  
- closure date or March 31, 1995 if case is active during study period)

**Table 7: Treatment Prevalence of Urban or Rural Children in Manitoba, Aged 1-5 Years, By Disorder Category, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95

Morbidity Type	Income Assistance Status	Urban Neighbourhood Income Quintile				Rural Neighbourhood Income Quintile			
		Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000	TOTAL /1000	Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000	TOTAL /1000
Acute Conditions	Income Assistance	931.3	887.0	919.2	919.2	890.5	919.1	876.4	876.4
	Non-Assistance	824.5	856.4	852.9	852.9	712.5	837.6	778.8	778.8
	Total for All Quintiles	861.8	857.3	863.2	863.2	730.1	840.8	785.8	785.8
Permanent Conditions	Income Assistance	183.1	147.8	182.2	182.2	173.1	196.5	175.8	175.8
	Non-Assistance	161.7	183.3	172.7	172.7	166.2	153.3	150.9	150.9
	Total for All Quintiles	169.2	182.2	174.2	174.2	166.9	154.9	152.7	152.7
Recurrent Conditions	Income Assistance	189.0	173.9	191.4	191.4	136.1	138.7	147.8	147.8
	Non-Assistance	162.6	178.1	172.9	172.9	113.5	142.7	125.8	125.8
	Total for All Quintiles	171.8	177.9	175.8	175.8	115.7	142.5	127.4	127.4
Preventive Care	Income Assistance	463.6	420.3	450.2	450.2	218.9	341.0	246.7	246.7
	Non-Assistance	447.9	552.6	501.7	501.7	178.4	486.3	290.3	290.3
	Total for All Quintiles	453.4	548.5	493.7	493.7	182.5	480.6	287.2	287.2
Any Condition	Income Assistance	958.4	915.9	953.1	953.1	915.7	959.5	909.9	909.9
	Non-Assistance	873.2	935.6	918.4	918.4	776.1	919.7	844.4	844.4
	Total for All Quintiles	902.9	934.9	923.8	923.8	790.0	921.3	849.1	849.1
No Treatment	Income Assistance	41.6	84.1	46.9	46.9	84.3	40.5	90.1	90.1
	Non-Assistance	126.8	64.4	81.6	81.6	223.9	80.3	155.6	155.6
	Total for All Quintiles	97.1	65.1	76.2	76.2	210.0	78.7	150.9	150.9

Denominators for these proportions represent the total number of children resident in a neighbourhood income quintile as shown in Tables 4 and 5.

**Table 8: Treatment Prevalence of Urban or Rural Children in Manitoba, Aged 6-10 Years, By Disorder Category, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95

Morbidity Type	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile			TOTAL /1000
		Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000	Q1 (Lowest) /1000	Q5 (Lowest) /1000	TOTAL /1000	
Acute Conditions	Income Assistance	858.1	869.2	841.4	808.8	729.0	767.3	
	Non-Assistance	738.0	785.7	774.9	633.3	758.3	708.0	
	Total for All Quintiles	771.0	787.2	782.3	644.5	755.2	710.7	
Permanent Conditions	Income Assistance	149.7	158.9	160.4	90.4	129.0	112.5	
	Non-Assistance	138.9	193.9	169.3	99.8	161.6	129.0	
	Total for All Quintiles	141.9	193.3	168.3	99.2	160.8	128.2	
Recurrent Conditions	Income Assistance	87.1	93.5	93.3	82.7	96.8	79.5	
	Non-Assistance	72.4	85.4	84.0	51.4	74.7	62.1	
	Total for All Quintiles	76.4	85.5	85.1	53.4	75.2	62.9	
Preventive Care	Income Assistance	203.2	191.6	201.7	93.0	193.5	106.6	
	Non-Assistance	187.9	314.6	255.2	79.5	246.5	138.4	
	Total for All Quintiles	192.1	312.4	249.2	80.4	245.2	137.0	
Any Condition	Income Assistance	905.1	915.9	894.8	873.4	725.8	829.9	
	Non-Assistance	805.7	884.1	861.0	717.4	860.8	799.5	
	Total for All Quintiles	833.1	884.7	864.7	727.3	857.5	800.9	
No Treatment	Income Assistance	94.9	84.1	105.2	126.6	274.2	170.1	
	Non-Assistance	194.3	115.9	139.0	282.6	139.2	200.5	
	Total for All Quintiles	166.9	115.3	135.3	272.7	142.5	199.1	

Denominators for these proportions represent the total number of children resident in a neighbourhood income quintile as shown in Tables 4 and 5.



**Table 9: Treatment Prevalence of Urban or Rural Children in Manitoba, Aged 11-15 Years, By Disorder Category, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95

Morbidity Type	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000	Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000
Acute Conditions	Income Assistance	814.4	838.9	818.4	784.8	750.0	778.2
	Non-Assistance	685.2	747.5	733.7	631.3	725.3	691.4
	Total for All Quintiles	715.5	748.9	741.0	639.9	725.7	694.3
Permanent Conditions	Income Assistance	177.5	205.6	186.7	117.1	159.1	133.1
	Non-Assistance	152.5	216.3	197.1	116.8	191.4	153.6
	Total for All Quintiles	158.3	216.1	196.2	116.9	190.8	152.9
Recurrent Conditions	Income Assistance	84.5	94.4	93.8	72.8	90.9	79.6
	Non-Assistance	61.4	63.7	63.8	47.0	60.8	49.3
	Total for All Quintiles	66.8	64.2	66.4	48.5	61.3	50.3
Preventive Care	Income Assistance	217.8	255.6	230.8	155.1	170.5	154.7
	Non-Assistance	190.6	272.2	234.3	109.6	218.0	138.3
	Total for All Quintiles	197.0	272.0	234.0	112.2	217.1	138.9
Any Condition	Income Assistance	865.7	900.0	875.1	835.4	795.5	836.2
	Non-Assistance	776.4	861.7	837.4	728.6	847.3	797.0
	Total for All Quintiles	797.3	862.2	840.6	734.6	846.4	798.3
No Treatment	Income Assistance	134.3	100.0	124.9	164.6	204.5	163.8
	Non-Assistance	223.6	138.3	162.6	271.4	152.7	203.0
	Total for All Quintiles	202.7	137.8	159.4	265.4	153.6	201.7

Denominators for these proportions represent the total number of children resident in a neighbourhood income quintile as shown in Tables 4 and 5.

**Table 10: Treatment Prevalence per 1000 Urban or Rural Children Aged 1-5 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

Morbidity Burden Classification	Income Assistance Status	Manitoba FY94/95					
		Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
No conditions (preventive care/optometrist visits)	Income Assistance	18.1 (79)	20.3 (7)	23.1 (214)	17.8 (12)	23.1 (x)	19.2 (35)
	No Assistance	32.8 (269)	56.6 (608)	45.9 (2320)	28.2 (173)	61.3 (261)	40.9 (955)
	All Children	27.6 (348)	55.5 (615)	42.4 (2534)	27.1 (185)	59.8 (265)	39.3 (990)
Only Acute conditions	Income Assistance	621.0 (2730)	611.6 (211)	606.0 (5626)	616.9 (417)	653.2 (113)	601.6 (1095)
	No Assistance	558.6 (4583)	563.6 (6052)	571.5 (28889)	501.3 (3079)	596.8 (2543)	558.5 (13036)
	All Children	580.4 (7313)	565.1 (6263)	576.9 (34515)	512.8 (3496)	599.0 (2656)	561.6 (14131)
Only Permanent or Recurrent conditions	Income Assistance	9.1 (40)	8.7 (x)	10.3 (96)	7.4 (5)	17.3 (x)	13.2 (24)
	No Assistance	14.3 (117)	20.5 (220)	17.9 (903)	33.7 (207)	18.8 (80)	23.0 (538)
	All Children	12.5 (157)	20.1 (223)	16.7 (999)	31.1 (212)	18.7 (83)	22.3 (562)
Acute, and Permanent or Recurrent conditions	Income Assistance	257.5 (1132)	237.7 (82)	264.2 (2453)	245.6 (166)	213.9 (37)	241.2 (x)
	No Assistance	225.2 (1848)	248.8 (2672)	238.5 (12056)	178.9 (1099)	208.2 (887)	189.7 (4427)
	All Children	236.5 (2980)	248.5 (2754)	242.5 (14509)	185.5 (1265)	208.4 (924)	193.4 (4866)
Acute, Permanent and Recurrent conditions	Income Assistance	52.8 (232)	37.7 (13)	49.5 (460)	28.1 (19)	52.0 (9)	34.6 (63)
	No Assistance	42.4 (348)	46.0 (494)	44.6 (2255)	33.5 (206)	34.5 (147)	32.0 (747)
	All Children	46.0 (580)	45.7 (507)	45.4 (2715)	33.0 (225)	35.2 (156)	32.2 (810)
Any Condition	Income Assistance	958.4 (4213)	915.9 (316)	953.1 (8849)	915.7 (619)	959.5 (166)	909.9 (1656)
	No Assistance	873.2 (7165)	935.6 (10046)	918.4 (46423)	775.6 (4764)	919.5 (3918)	844.1 (19703)
	All children	902.9 (11378)	934.9 (10362)	923.8 (55272)	789.5 (5383)	921.1 (4084)	848.9 (21359)

Figures reported in brackets are population counts.

(x) cell values less than 5 not reported to preserve confidentiality

**Table 11: Treatment Prevalence per 1000 Urban or Rural Children Aged 6-10 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

		Manitoba FY94/95					
Morbidity Burden Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
No conditions (preventive care/optometrist visits)	Income Assistance	31.5 (89)	37.4 (8)	34.9 (220)	46.5 (18)	80.6 (10)	44.0 (52)
	No Assistance	44.0 (328)	65.3 (787)	57.8 (2918)	62.6 (356)	69.5 (348)	64.7 (1602)
	All Children	40.6 (417)	64.8 (795)	55.2 (3138)	61.6 (374)	69.8 (358)	63.8 (1654)
Only Acute conditions	Income Assistance	657.0 (1856)	644.9 (138)	629.1 (3970)	666.7 (258)	443.5 (55)	610.8 (722)
	No Assistance	570.1 (4247)	564.8 (6809)	572.3 (28909)	516.1 (2933)	573.3 (2870)	558.1 (13819)
	All Children	594.0 (6103)	566.2 (6947)	578.6 (32879)	525.7 (3191)	570.2 (2925)	560.5 (14541)
Only Permanent or Recurrent conditions	Income Assistance	14.9 (42)	9.3 (x)	17.7 (112)	15.5 (6)	16.1 (x)	16.1 (19)
	No Assistance	21.2 (158)	31.1 (375)	26.6 (1344)	20.8 (118)	31.2 (156)	25.8 (638)
	All Children	19.5 (200)	30.7 (377)	25.6 (1456)	20.4 (124)	30.8 (158)	25.3 (657)
Acute, and Permanent or Recurrent conditions	Income Assistance	181.6 (513)	205.6 (44)	190.3 (1201)	131.8 (51)	161.3 (20)	142.1 (168)
	No Assistance	150.6 (1122)	197.6 (2382)	181.8 (9182)	105.1 (597)	168.4 (843)	136.3 (3374)
	All Children	159.1 (1635)	197.7 (2426)	182.7 (10383)	106.8 (648)	168.2 (863)	136.5 (3542)
Acute, Permanent and Recurrent conditions	Income Assistance	20.2 (57)	18.7 (x)	22.8 (144)	12.9 (5)	24.2 (x)	16.9 (20)
	No Assistance	19.7 (147)	25.3 (305)	22.5 (1134)	12.7 (72)	18.4 (92)	14.5 (360)
	All Children	19.9 (204)	25.2 (309)	22.5 (1278)	12.7 (77)	18.5 (95)	14.6 (380)
Any Condition	Income Assistance	905.1 (2557)	915.9 (196)	894.8 (5647)	873.4 (338)	725.8 (90)	829.9 (981)
	No Assistance	805.7 (6002)	884.1 (10658)	861.0 (43487)	717.2 (4076)	860.8 (4309)	799.4 (19793)
	All children	833.1 (8559)	884.7 (10854)	864.7 (49134)	727.2 (4414)	857.5 (4399)	800.8 (20774)

Figures reported in brackets are population counts.

(x) cell values less than 5 not reported to preserve confidentiality

**Table 12: Treatment Prevalence per 1000 Urban or Rural Children Aged 11-15 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

		Manitoba FY94/95					
Morbidity Burden Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
No conditions (preventive care/optometrist visits)	Income Assistance	34.2 (72)	27.8 (5)	36.5 (172)	31.6 (10)	45.5 (x)	44.4 (39)
	No Assistance	61.7 (424)	71.1 (885)	67.5 (3337)	74.7 (394)	79.7 (396)	76.1 (1882)
	All Children	55.2 (496)	70.5 (890)	64.8 (3509)	72.3 (404)	79.1 (400)	75.0 (1921)
One Acute condition	Income Assistance	600.4 (1265)	616.7 (111)	592.7 (2794)	632.9 (200)	545.5 (48)	605.2 (532)
	No Assistance	516.0 (3547)	529.7 (6590)	528.9 (26158)	502.1 (2647)	532.9 (2648)	531.6 (13155)
	All Children	535.8 (4812)	530.9 (6701)	534.4 (28952)	509.5 (2847)	533.1 (2696)	534.2 (13687)
One Permanent or Recurrent condition	Income Assistance	15.7 (33)	33.3 (6)	19.1 (90)	15.8 (5)	- (-)	11.4 (10)
	No Assistance	28.5 (196)	40.7 (507)	34.8 (1719)	21.4 (113)	40.2 (200)	28.0 (693)
	All Children	25.5 (229)	40.6 (513)	33.4 (1809)	21.1 (118)	39.5 (200)	27.4 (703)
Acute, Permanent or Recurrent condition	Income Assistance	184.6 (389)	177.8 (32)	192.2 (906)	136.1 (43)	159.1 (14)	149.0 (131)
	No Assistance	155.1 (1066)	200.7 (2497)	186.4 (9218)	118.2 (623)	176.9 (879)	147.4 (3647)
	All Children	162.0 (1455)	200.4 (2529)	186.9 (10124)	119.2 (666)	176.6 (893)	147.4 (3778)
Acute, Permanent and Recurrent condition	Income Assistance	30.8 (65)	44.4 (8)	34.6 (163)	19.0 (6)	45.5 (x)	26.2 (23)
	No Assistance	15.1 (104)	19.3 (240)	19.9 (984)	12.1 (64)	17.5 (87)	13.7 (340)
	All Children	18.8 (169)	19.6 (248)	21.2 (1147)	12.5 (70)	18.0 (91)	14.2 (363)
Any Condition	Income Assistance	865.7 (1824)	900.0 (162)	875.1 (4125)	835.4 (264)	795.5 (70)	836.2 (735)
	No Assistance	776.4 (5337)	861.5 (10719)	837.3 (41416)	728.6 (3841)	847.3 (4210)	796.8 (19717)
	All children	797.3 (7161)	862.1 (10881)	840.6 (45541)	734.6 (4105)	846.4 (4280)	798.2 (20452)

Figures reported in brackets are population counts.

(x) cell values less than 5 not reported to preserve confidentiality

**Table 13: Mean Number of Physician Visits per Urban or Rural Child Aged 1-5 Years, by Morbidity Classification, Income Assistance Status, and Neighbourhood Income Quintile**

Manitoba, FY94/95							
Morbidity Type	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
Acute Condition	Income Assistance	5.04	4.20	4.80	4.46	4.10	4.12
	No Assistance	3.73	3.56	3.66	3.04	3.09	3.03
	Total	4.19	3.58	3.84	3.19	3.13	3.10
Permanent Condition	Income Assistance	*0.43	0.34	0.41	0.33	0.28	0.32
	No Assistance	0.35	0.41	0.39	0.29	0.33	0.30
	Total	0.38	0.40	0.39	0.30	0.33	0.31
Recurrent Condition	Income Assistance	0.77	0.73	0.80	0.53	0.60	0.57
	No Assistance	0.66	*0.80	0.76	0.47	0.62	0.53
	Total	0.70	*0.80	0.76	0.47	0.62	0.53
Preventive Care	Income Assistance	0.60	0.53	0.58	0.27	*0.39	0.29
	No Assistance	0.58	*0.69	0.64	0.21	*0.60	0.35
	Total	0.59	*0.69	0.63	0.22	*0.59	0.35
Total	Income Assistance	6.84	5.79	6.59	5.60	5.38	5.30
	No Assistance	5.33	5.46	5.45	4.02	4.63	4.21
	Total	5.86	5.47	5.62	4.18	4.66	4.29

Denominators for these rates represent the total number of children resident in a neighbourhood income quintile as shown in Tables 4 and 5.

\* gradient (significant regression coefficient) with increasing neighbourhood income quintile (data not shown for quintiles 2,3,4)

**Table 14: Mean Number of Physician Visits per Urban or Rural Child Aged 6-10 Years, by Morbidity Classification, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba, FY94/95							
Morbidity Type	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
Acute Condition	Income Assistance	3.46	3.79	3.30	2.59	2.36	2.68
	No Assistance	2.57	2.70	2.68	2.06	*2.36	2.23
	Total	2.82	2.72	2.75	2.10	2.36	2.25
Permanent Condition	Income Assistance	0.29	0.30	0.31	0.18	0.21	0.20
	No Assistance	0.31	*0.37	0.34	0.19	*0.31	0.25
	Total	0.30	*0.36	0.34	0.18	*0.30	0.24
Recurrent Condition	Income Assistance	0.30	0.29	0.35	0.26	0.44	0.29
	No Assistance	0.25	0.31	0.31	0.18	*0.26	0.22
	Total	0.26	0.31	0.32	0.18	*0.26	0.23
Preventive Care	Income Assistance	0.23	0.20	0.22	0.10	*0.22	0.12
	No Assistance	0.21	*0.35	0.28	0.09	*0.27	0.15
	Total	0.22	*0.34	0.28	0.09	*0.27	0.15
Total	Income Assistance	4.29	4.58	4.19	3.13	3.23	3.28
	No Assistance	3.34	*3.72	3.61	2.52	*3.20	2.86
	Total	3.61	3.74	3.68	2.56	*3.20	2.88

Denominators for these rates represent the total number of children resident in a neighbourhood income quintile as shown in Tables 4 and 5.

\* gradient (significant regression coefficient) with increasing neighbourhood income quintile (data not shown for quintiles 2,3,4)

**Table 15: Mean Number of Physician Visits per Urban or Rural Child Aged 11-15 Years, by Morbidity Classification, Income Assistance Status and Neighbourhood Income Quintile**

		Manitoba, FY94/95					
Morbidity Type	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
Acute Condition	Income Assistance	3.35	3.23	3.32	3.06	2.94	2.98
	No Assistance	2.28	2.43	2.42	2.06	2.13	2.15
	Total	2.53	2.44	2.50	2.12	2.15	2.18
Permanent Condition	Income Assistance	0.34	1.32	0.41	0.27	0.25	0.24
	No Assistance	0.31	*0.40	0.37	0.23	*0.36	0.28
	Total	0.32	*0.41	0.37	0.23	*0.36	0.28
Recurrent Condition	Income Assistance	0.39	0.92	0.48	0.27	0.52	0.31
	No Assistance	0.32	0.31	0.31	0.19	0.26	0.21
	Total	0.34	0.32	0.33	0.19	0.26	0.21
Preventive Care	Income Assistance	0.28	0.38	0.30	0.19	0.23	0.20
	No Assistance	0.25	*0.32	0.29	0.15	0.26	0.17
	Total	0.25	*0.32	0.29	0.15	0.26	0.17
Total	Income Assistance	4.37	5.84	4.52	3.79	3.94	3.72
	No Assistance	3.16	*3.47	3.38	2.62	*3.01	2.82
	Total	3.44	3.50	3.48	2.69	*3.02	2.85

Denominators for these rates represent the total number of children resident in a neighbourhood income quintile as shown in Tables 4 and 5.

\* gradient (significant regression coefficient) with increasing neighbourhood income quintile (data not shown for quintiles 2,3,4)

**Table 16: Hospital Admissions per 1,000 Urban and Rural Children Aged 1-5 Years, by Morbidity Classification, Income Assistance Status and Neighbourhood Income Quintile**

		Manitoba FY94/95					
Morbidity Type	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000	Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000
Acute Condition	Income Assistance	45.0	78.3	51.7	177.5	*57.8	133.5
	No Assistance	35.1	26.4	31.9	126.7	*32.4	71.8
	Total	38.6	28.1	35.0	131.7	*33.4	76.3
Permanent Condition	Income Assistance	45.0	*31.9	44.5	69.5	*34.7	57.1
	No Assistance	25.2	*18.2	22.7	61.4	*17.8	35.0
	Total	32.1	*18.6	26.0	62.2	*18.5	36.6
Recurrent Condition	Income Assistance	14.8	8.7	16.6	25.1	17.3	23.1
	No Assistance	12.2	13.4	16.2	17.9	15.3	15.1
	Total	13.1	13.3	16.2	18.6	15.3	15.7
Total	Income Assistance	105.1	118.8	113.4	272.2	*109.8	214.8
	No Assistance	73.0	58.0	71.0	206.9	*65.7	122.5
	Total	84.2	*59.9	77.6	213.4	*67.4	129.2

Denominators for these rates represent the total population of children resident each neighbourhood income quintile as shown in Tables 4 and 5.

\* gradient (significant regression coefficient) with increasing neighbourhood income quintile (data not shown for quintiles 2,3,4)



**Table 17: Hospital Admissions per 1,000 Urban and Rural Children Aged 6-10 Years, by Morbidity Classification, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba, FY94/95							
Morbidity Type	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000	Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000
Acute Condition	Income Assistance	33.6	42.1	37.9	80.1	32.3	49.1
	No Assistance	34.9	*20.8	26.9	70.7	*23.4	47.0
	Total	34.6	*21.2	28.1	71.3	*23.6	47.1
Permanent Condition	Income Assistance	13.1	14.0	12.8	7.8	8.1	9.3
	No Assistance	10.5	*8.4	9.1	13.9	*8.6	11.4
	Total	11.2	*8.5	9.6	13.5	*8.6	11.3
Recurrent Condition	Income Assistance	11	4.7	9.5	15.5	8.1	9.3
	No Assistance	7.5	8.3	8.9	10.0	7.2	10.6
	Total	8.5	8.2	9.0	10.4	7.2	10.6
Total	Income Assistance	58.1	60.7	60.7	103.4	48.4	69.4
	No Assistance	53.4	*37.6	45.2	96.1	*39.4	70.4
	Total	54.7	*38.0	46.9	96.5	*39.6	70.4

Denominators for these rates represent the total population of children resident in each neighbourhood income quintile as shown in Tables 4 and 5.

\* gradient (significant regression coefficient) with increasing neighbourhood income quintile (data not shown for quintiles 2,3,4)

**Table 18: Hospital Admissions per 1,000 Urban and Rural Children Aged 11-15 Years, by Morbidity Classification, Income Assistance Status and Neighbourhood Income Quintile**

		Manitoba, FY94/95					
Morbidity Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000	Q1 (Lowest) /1000	Q5 (Highest) /1000	TOTAL /1000
Acute Condition	Income Assistance	60.3	83.3	64.7	107.6	79.5	114.9
	No Assistance	45.4	*27.7	36.0	90.1	*38.2	62.2
	Total	48.9	*28.5	38.5	91.1	*39.0	64.0
Permanent Condition	Income Assistance	12.3	16.7	15.5	22.2	0.0	12.5
	No Assistance	8.0	12.9	11.6	12.5	10.7	11.6
	Total	9.0	13.0	11.9	13.1	10.5	11.6
Recurrent Condition	Income Assistance	33.2	66.7	34.4	50.6	0.0	25.0
	No Assistance	20.2	15.4	15.7	21.4	11.1	12.6
	Total	23.3	16.2	17.3	23.1	10.9	13.1
Total	Income Assistance	106.3	166.7	115.2	183.5	79.5	155.9
	No Assistance	73.9	*56.3	63.5	125.0	*60.0	86.9
	Total	81.5	*57.8	68.0	128.3	*60.3	89.3

Denominators for these rates represent the total population of children resident in each neighbourhood income quintile as shown in Tables 4 and 5.

\* gradient (significant regression coefficient) with increasing neighbourhood income quintile (data not shown for quintiles 2,3,4)

**Table 19: Mean Number of Physician Visits Per Urban or Rural Child Aged 1-5 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

		Manitoba FY94/95					
Morbidity Burden Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
No conditions (preventive care/optometrist visits)	Income Assistance	1.32	1.29	1.25	1.17	1.00	1.11
	No Assistance	1.25	1.25	1.26	1.14	1.24*	1.22
	All Children	1.26	1.25	1.25	1.15	1.23*	1.21
Only Acute conditions	Income Assistance	5.38	4.93	5.25	4.88	4.61	4.56
	No Assistance	4.79	4.64	4.63	3.96	4.12	3.94
	All Children	5.01	4.65	4.73	4.07	4.14	3.99
Only Recurrent or Permanent conditions	Income Assistance	2.83	1.67	3.07	1.40	2.67	2.29
	No Assistance	3.15	3.59	3.48	2.21	3.78*	2.66
	All Children	3.07	3.56	3.44	2.19	3.73*	2.64
Acute & Recurrent or Permanent conditions	Income Assistance	10.29	9.04	10.00	8.92	8.24	8.73
	No Assistance	9.09	8.94	9.08	8.28	8.05	8.19
	All Children	9.55	8.94	9.24	8.36	8.06	8.24
Acute, Recurrent and Permanent condition	Income Assistance	16.24	17.46	15.78	15.26	11.33	13.78
	No Assistance	14.07	13.05	13.94	15.43	13.84	14.03
	All Children	14.93	13.16	14.25	15.41	13.70	14.01
Any condition	Income Assistance	7.20	6.40	6.99	6.18	5.66	5.91
	No Assistance	6.19	5.97	6.05	5.27	5.17	5.11
	All children	6.56	5.98	6.20	5.38	5.19	5.17

Denominators for these rates represent the population in each strata defined by income assistance status, neighbourhood income quintile and morbidity burden as shown in Tables 10-12.

\* gradient (significant regression coefficient) in utilization across neighbourhood income quintiles (data not shown for quintiles 2,3,4)

**Table 20: Mean Number of Physician Visits Per Urban or Rural Child Aged 6-10 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

		Manitoba FY94/95					
Morbidity Burden Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
No conditions (preventive care/optometrist visits)	Income Assistance	1.11	1.38	1.15	1.11	1.30	1.12
	No Assistance	1.13	1.22*	1.20	1.09	1.22*	1.14
	All Children	1.13	1.22*	1.19	1.09	1.23*	1.14
Only Acute conditions	Income Assistance	4.11	4.26	4.00	3.43	4.04	3.62
	No Assistance	3.68	3.83	3.74	3.40	3.49	3.40
	All Children	3.81	3.83	3.77	3.40	3.50	3.41
Only Recurrent or Permanent conditions	Income Assistance	2.50	3.00	2.54	2.50	2.50	2.37
	No Assistance	2.87*	2.64	2.72	2.21	2.56	2.55
	All Children	2.79*	2.64	2.71	2.23	2.56	2.54
Acute & Recurrent or Permanent conditions	Income Assistance	7.86	8.50	7.78	6.55	8.25*	7.14
	No Assistance	7.25	6.95	7.16	6.83	6.61	6.75
	All Children	7.44	6.98	7.23	6.81	6.64	6.77
Acute, Recurrent and Permanent conditions	Income Assistance	12.98	12.00	13.50	11.00	7.67	11.75
	No Assistance	12.26	10.81	11.76	12.69	10.48	11.73
	All Children	12.46	10.83	11.95	12.58	10.39	11.73
Any condition	Income Assistance	4.93	5.24	4.90	3.87	4.76	4.23
	No Assistance	4.40	4.49	4.47	3.83	4.03*	3.91
	All Children	4.55	4.50	4.52	3.83	4.05*	3.93

Denominators for these rates represent the population in each strata defined by income assistance status, neighbourhood income quintile and morbidity burden as shown in Tables 10-12.

\* gradient (significant regression coefficient) in utilization across neighbourhood income quintile (data not shown for quintiles 2,3,4)

**Table 21: Mean Number of Physician Visits Per Urban or Rural Child Aged 11-15 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95							
Morbidity Burden Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
No conditions	Income Assistance	1.17	1.20	1.16	1.40	1.00	1.13
	No Assistance	1.15	1.22	1.20	1.11	1.24	1.15
	All Children	1.16	1.22	1.20	1.11	1.24	1.15
Only Acute conditions	Income Assistance	4.05	4.15	4.02	3.90	4.25	3.90
	No Assistance	3.54	3.58	3.57	3.46	3.23	3.35
	All Children	3.67	3.59	3.61	3.49	3.25	3.37
Only Recurrent or Permanent conditions	Income Assistance	2.21	1.50	2.33	2.60	-	2.20
	No Assistance	2.99	2.18	2.56	2.42	2.31	2.36
	All Children	2.88	2.17	2.55	2.42	2.31	2.35
Acute & Recurrent or Permanent conditions	Income Assistance	8.71	8.91	8.69	9.33	7.57	8.01
	No Assistance	7.69	6.89	7.07	7.44	6.55	6.83
	All Children	7.96*	6.91	7.22	7.56	6.56	6.87
Acute, Recurrent and Permanent conditions	Income Assistance	14.14	41.50	16.92	14.00	13.25	14.00
	No Assistance	13.52	13.10	12.82	12.45	12.14	12.45
	All Children	13.76	14.01	13.40	12.59	12.19	12.55
Any condition	Income Assistance	5.26	6.75	5.40	4.89	5.24	4.78
	No Assistance	4.35	4.30	4.34	3.98	3.88	3.91
	All children	4.58	4.34	4.43	4.04	3.90	3.94

Denominators for these rates represent the population in each strata defined by income assistance status, neighbourhood income quintile and morbidity burden as shown in Tables 10-12.

\* gradient (significant regression coefficient) in utilization across neighbourhood income quintiles (data not shown for quintiles 2,3,4)

**Table 22: Hospital Admissions per 1000 Urban and Rural Children Aged 1-5 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95							
Morbidity Burden Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
Only Acute conditions	Income Assistance	34.4	47.4	40.9	129.5*	26.5	106.8
	No Assistance	31.2	23.0	25.2	128.9*	26.7	65.9
	All Children	32.4	23.8	27.8	129.0*	26.7	69.1
Only Recurrent or Permanent conditions	Income Assistance	250.0	333.3	156.3	600.0	333.3	333.3
	No Assistance	162.4*	54.5	83.1	299.5	187.5	234.2
	All Children	184.7*	58.3	90.1	306.6	192.8	238.4
Acute & Recurrent or Permanent conditions	Income Assistance	215.5	243.9	227.5	614.5	324.3	496.6
	No Assistance	172.1	131.7	163.1	503.2*	164.6	300.7
	All Children	188.6*	135.1	174.0	517.8*	171.0	318.3
Acute, Recurrent and Permanent conditions	Income Assistance	491.4	769.2	543.5	1315.8*	333.3	761.9
	No Assistance	339.1	242.9	362.3	1257.3	346.9	726.9
	All Children	400.0	256.4	393.0	1262.2	346.2	729.6
Any Condition	Income Assistance	109.7	129.7	119.0	297.3*	114.5	236.1
	No Assistance	83.6*	62.0	77.3	266.8*	71.5	145.1
	All Children	93.3*	64.1	84.0	270.3*	73.2	152.2

Denominators for these rates represent the number of children in each strata defined by income assistance status, neighbourhood income quintile and morbidity burden as shown in Tables 10-12.

\* gradient (significant regression coefficient) in hospitalization across neighbourhood income quintiles (data not shown for quintiles 2,3,4)

**Table 23: Hospital Admissions per 1000 Urban and Rural Children Aged 6-10 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95							
Morbidity Burden Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
Only Acute conditions	Income Assistance	31.8	65.2	37.3	89.1	72.7	62.3
	No Assistance	37.0*	21.0	27.6	98.5*	23.7	56.6
	All Children	35.4*	21.9	28.8	97.8*	24.6	56.9
Only Recurrent or Permanent conditions	Income Assistance	166.7	500.0	98.2	166.7	-	52.6
	No Assistance	69.6*	34.7	49.1	110.2	38.5	83.1
	All Children	90.0*	37.1	52.9	112.9*	38.0	82.2
Acute & Recurrent or Permanent conditions	Income Assistance	159.8	68.2	155.7	235.3*	50.0	148.8
	No Assistance	144.4*	98.2	120.2	306.5*	126.9	213.7
	All Children	149.2*	97.7	124.3	300.9*	125.1	210.6
Acute, Recurrent and Permanent conditions	Income Assistance	280.7	-	256.9	800.0	333.3	550.0
	No Assistance	455.8*	206.6	276.9	847.2	173.9	519.4
	All Children	406.9*	203.9	274.6	844.2	178.9	521.1
Any Condition	Income Assistance	64.1	66.3	67.8	118.3	66.7	83.6
	No Assistance	66.3*	42.5	52.5	134.0*	45.7	88.1
	All children	65.7*	42.9	54.3	132.8*	46.1	87.9

Denominators for these rates represent the number of children in each strata defined by income assistance status, neighbourhood income quintile and morbidity burden as shown in Tables 10-12.

\* gradient (significant regression coefficient) in hospitalization across neighbourhood income quintiles (data not shown for quintiles 2,3,4)

**Table 24: Hospital Admissions per 1000 Urban and Rural Children Aged 11-15 Years, by Morbidity Burden, Income Assistance Status and Neighbourhood Income Quintile**

Manitoba FY94/95							
Morbidity Burden Classification	Income Assistance Status	Urban Neighbourhood Income Quintile			Rural Neighbourhood Income Quintile		
		Q1 (Lowest)	Q5 (Highest)	TOTAL	Q1 (Lowest)	Q5 (Highest)	TOTAL
Only Acute conditions	Income Assistance	54.5	72.1	59.8	95.0	125.0	122.2
	No Assistance	55.3	29.3*	41.4	122.0*	43.4	79.2
	All Children	55.1	30.0*	43.1	120.1*	44.9	80.9
Only Recurrent or Permanent conditions	Income Assistance	30.3	-	33.3	200.0	-	100.0
	No Assistance	51.0	69.0	65.7	88.5	50.0	73.6
	All Children	48.0	68.2	64.1	93.2	50.0	74.0
Acute & Recurrent or Permanent conditions	Income Assistance	313.6	187.5	296.9	697.7	-	442.7
	No Assistance	247.7	154.2	162.1	431.8*	163.8	239.4
	All Children	265.3	154.6	174.1	448.9*	161.3	246.4
Acute, Recurrent and Permanent conditions	Income Assistance	492.3	2000	638.0	1333.3	250.0	565.2
	No Assistance	365.4	362.5	459.3	890.6*	333.3	541.2
	All Children	414.2	415.3	484.7	928.6*	329.7	542.7
Any Condition	Income Assistance	122.8	185.2	131.6	219.7	100.0	186.4
	No Assistance	95.2*	65.3	75.8	171.6*	70.8	109.0
	All Children	102.2*	67.1	80.9	174.7*	71.3	111.8

Denominators for these rates represent the number of children in each strata defined by income assistance status, neighbourhood income quintile and morbidity burden as shown in Tables 10-12.

\* gradient (significant regression coefficient) in hospitalization across neighbourhood income quintiles (data not shown for quintiles 2,3,4)



**Table 25: Health Care Utilization in Urban and Rural Children Aged 1-5 Years, by Morbidity Type, Income Assistance and Family Structure (Single vs Two-Parent Households)**

		Manitoba FY94/95							
Morbidity Type	Income Assistance Status	Physician Visits/Child				Hospitalizations/1000 Children			
		Urban		Rural		Urban		Rural	
		SP (1)	TP (2)	SP	TP	SP	TP	SP	TP
Acute condition	Income Assistance	4.80	-	4.11	-	51.7	-	133.5	-
	No Assistance	3.58	3.69	3.21	2.96	33.9	31.3	113.5	58.1
	Total	4.11	3.69	3.43	2.96	41.6	31.3	118.5	58.1
Permanent condition	Income Assistance	0.41	-	0.32	-	44.5	-	57.1	-
	No Assistance	0.39	0.39	0.29	0.31	27.5	21.1	48.6	30.5
	Total	0.40	0.39	0.30	0.31	34.8	21.1	50.7	30.5
Recurrent condition	Income Assistance	0.80	-	0.57	-	16.6	-	23.1	-
	No Assistance	0.72	0.77	0.49	0.54	13.9	16.9	17.7	14.2
	Total	0.76	0.77	0.51	0.54	15.1	16.9	19.0	14.2
Preventive care	Income Assistance	0.58	-	0.29	-	-	-	-	-
	No Assistance	0.61	0.64	0.31	0.37	-	-	-	-
	Total	0.60	0.64	0.31	0.37	-	-	-	-
Total	Income Assistance	6.59	-	5.30	-	113.4	-	214.8	-
	No Assistance	5.31	5.49	4.30	4.18	75.3	69.6	180.8	103.4
	Total	5.86	5.49	4.54	4.18	91.8	69.6	189.0	103.4

(1) SP = Single-Parent and (2) TP = Two-Parent. Denominators for these rates represent the total number of child resident in urban or rural areas as shown in Tables 4 and 5.

**Table 26: Health Care Utilization in Urban and Rural Children Aged 6-10 Years, by Morbidity Type, Income Assistance and Family Structure (Single vs Two-Parent Households)**

		Manitoba FY94/95							
Morbidity Type	Income Assistance Status	Physician Visits/Child				Hospitalization/1000 Children			
		Urban		Rural		Urban		Rural	
		SP (1)	TP (2)	SP	TP	SP	TP	SP	TP
Acute condition	Income Assistance	3.30	-	2.68	-	37.9	-	49.1	-
	No Assistance	2.54	2.71	2.32	2.22	29.5	26.2	59.8	44.5
	Total	2.84	2.71	2.40	2.22	32.8	26.2	57.3	44.5
Permanent condition	Income Assistance	0.31	-	0.20	-	12.8	-	9.3	-
	No Assistance	0.32	0.35	0.21	0.25	9.7	9.0	16.2	10.5
	Total	0.32	0.35	0.21	0.25	10.9	9.0	14.6	10.5
Recurrent condition	Income Assistance	0.35	-	0.29	-	9.5	-	9.3	-
	No Assistance	0.32	0.31	0.20	0.23	8.7	9.0	10.2	10.7
	Total	0.33	0.31	0.22	0.23	9.0	9.0	10.0	10.7
Preventive care	Income Assistance	0.22	-	0.12	-	-	-	-	-
	No Assistance	0.24	0.29	0.11	0.16	-	-	-	-
	Total	0.23	0.29	0.12	0.16	-	-	-	-
Total	Income Assistance	4.19	-	3.28	-	60.7	-	69.4	-
	No Assistance	3.41	3.66	2.85	2.86	48.3	44.5	87.6	67.1
	Total	3.72	3.66	2.95	2.86	53.2	44.5	83.5	67.1

(1) SP = Single-Parent and (2) TP = Two-Parent. Denominators for these rates represent the total number of child resident in urban or rural areas as shown in Tables 4 and 5.

**Table 27: Health Care Utilization in Urban and Rural Children Aged 11-15 Years, by Morbidity Type, Income Assistance and Family Structure (Single vs Two-Parent Households)**

		Manitoba FY94/95							
Morbidity Classification	Income Assistance Status	Physician Visits/Child				Hospitalization/1000 Children			
		Urban		Rural		Urban		Rural	
		SP (1)	TP (2)	SP	TP	SP	TP	SP	TP
Acute condition	Income Assistance	3.32	-	2.98	-	64.7	-	114.9	-
	No Assistance	2.46	2.41	2.30	2.13	40.7	34.9	87.9	58.1
	Total	2.74	2.41	2.44	2.13	48.6	34.9	83.3	58.1
Permanent condition	Income Assistance	0.41	-	0.24	-	15.5	-	12.5	-
	No Assistance	0.35	0.37	0.27	0.28	11.6	11.6	13.5	11.2
	Total	0.37	0.37	0.27	0.28	12.9	11.6	13.3	11.2
Recurrent condition	Income Assistance	0.48	-	0.31	-	34.4	-	25.0	-
	No Assistance	0.44	0.29	0.22	0.21	25.3	13.4	18.4	11.7
	Total	0.45	0.29	0.24	0.21	28.3	13.4	19.8	11.7
Preventive care	Income Assistance	0.30	-	0.20	-	-	-	-	-
	No Assistance	0.29	0.29	0.20	0.17	-	-	-	-
	Total	0.29	0.29	0.20	0.17	-	-	-	-
Total	Income Assistance	4.52	-	3.72	-	115.2	-	155.9	-
	No Assistance	3.53	3.35	2.99	2.79	77.8	60.1	120.1	81.5
	Total	3.86	3.35	3.14	2.79	90.2	60.1	127.4	81.5

(1) SP = Single-Parent and (2) TP = Two-Parent. Denominators for these rates represent the total number of child resident in urban or rural areas as shown in Tables 4 and 5.

**Table 28: Health Care Utilization in Urban and Rural Children Aged 1-5 Years, by Morbidity Burden, Income Assistance and Family Structure (Single vs Two-Parent Households)**

		Manitoba FY 94/95							
Morbidity Burden Category	Income Assistance Status	Physician Visits/Child				Hospitalization/1000 Children			
		Urban		Rural		Urban		Rural	
		SP (1)	TP (2)	SP	TP	SP	TP	SP	TP
No Conditions (preventive care/optometrist visits)	Income Assistance	1.25	-	1.11	-	-	-	-	-
	No Assistance	1.25	1.26	1.17	1.23	-	-	-	-
	Total	1.25	1.26	1.17	1.23				
Only Acute conditions	Income Assistance	5.25	-	4.56	-	40.9	-	106.8	-
	No Assistance	4.59	4.64	4.05	3.91	28.1	24.4	104.4	53.9
	Total	4.89	4.64	4.18	3.91	33.9	24.4	105.0	53.9
Only Recurrent or Permanent conditions	Income Assistance	3.07	-	2.29	-	156.3	-	333.3	-
	No Assistance	3.28	3.54	2.37	2.75	91.8	80.6	328.1	204.9
	Total	3.21	3.54	2.36	2.75	113.0	80.6	328.9	204.9
Acute & Recurrent or Permanent conditions	Income Assistance	10.00	-	8.73	-	227.5	-	496.6	-
	No Assistance	9.22	9.04	8.36	8.13	182.4	157.0	417.5	362.7
	Total	9.58	9.04	8.46	8.13	203.1	157.0	440.3	362.7
Acute, Recurrent and Permanent conditions	Income Assistance	15.78	-	13.78	-	543.5	-	761.9	-
	No Assistance	13.60	14.03	14.46	13.87	369.7	360.2	1099.0	589.0
	Total	14.66	14.03	14.29	13.87	453.4	360.2	1018.9	589.0
Any Condition	Income Assistance	6.99	-	5.91	-	119.0	-	236.1	-
	No Assistance	6.06	6.04	5.32	5.04	84.8	75.0	220.8	121.3
	Total	6.48	6.04	5.47	5.04	100.2	75.0	224.8	121.3

(1) SP = Single-Parent and (2) TP = Two-Parent. Denominators for these rates represent the number of children in each strata defined by income assistance status, residence in an urban or rural area and morbidity burden as shown in Tables 10-12.

**Table 29: Health Care Utilization in Urban and Rural Children Aged 6-10 Years, by Morbidity Burden, Income Assistance and Family Structure (Single vs Two-Parent Households)**

		Manitoba FY94/95							
Morbidity Burden Category	Income Assistance Status	Physician Visits/Child				Hospitalization/1000 Children			
		Urban		Rural		Urban		Rural	
		SP (1)	TP (2)	SP	TP	SP	TP	SP	TP
No Conditions (preventive care/optometrist visits)	Income Assistance	1.15	-	1.12	-	-	-	-	-
	No Assistance	1.16	1.20	1.11	1.14	-	-	-	-
	Total	1.16	1.20	1.11	1.14	-	-	-	-
Only Acute conditions	Income Assistance	4.00	-	3.62	-	37.3	-	62.3	-
	No Assistance	3.60	3.77	3.46	3.39	34.4	26.1	77.4	52.5
	Total	3.77	3.77	3.50	3.39	35.7	26.1	73.8	52.5
Only Recurrent or Permanent conditions	Income Assistance	2.54	-	2.37	-	98.2	-	52.6	-
	No Assistance	2.88	2.69	2.60	2.54	63.0	46.1	153.8	71.3
	Total	2.77	2.69	2.56	2.54	74.3	46.1	136.4	71.3
Acute & Recurrent or Permanent condition	Income Assistance	7.78	-	7.14	-	155.7	-	148.8	-
	No Assistance	7.16	7.16	6.89	6.72	126.4	118.9	260.6	205.6
	Total	7.42	7.16	6.95	6.72	138.7	118.9	232.3	205.6
Acute, Recurrent and Permanent conditions	Income Assistance	13.50	-	11.75	-	256.9	-	550.0	-
	No Assistance	12.28	11.65	11.56	11.75	295.0	273.0	687.5	493.6
	Total	12.79	11.65	11.62	11.75	279.1	273.0	647.1	493.6
Any Condition No Assistance	Income Assistance	4.90	-	4.23	-	67.8	-	83.6	-
	No Assistance	4.41	4.49	3.96	3.90	59.3	51.0	113.6	83.4
	Total	4.61	4.49	4.03	3.90	62.9	51.0	106.4	83.4

(1) SP = Single-Parent and (2) TP = Two-Parent. Denominators for these rates represent the number of children in each strata defined by income assistance status, residence in an urban or rural area and morbidity burden as shown in Tables 10-12.

**Table 30: Health Care Utilization in Urban and Rural Children Aged 11-15 Years, by Morbidity Burden, Income Assistance and Family Structure (Single vs Two-Parent Households)**

		Manitoba FY94/95							
Morbidity Burden Category	Income Assistance Status	Physician Visits/Child				Hospitalization/1000 Children			
		Urban		Rural		Urban		Rural	
		SP (1)	TP (2)	SP	TP	SP	TP	SP	TP
No Conditions (preventive care/optometrist visit)	Income Assistance	1.16	-	1.13	-	-	-	-	-
	No Assistance	1.18	1.21	1.17	1.14	-	-	-	-
	Total	1.18	1.21	1.17	1.14	-	-	-	-
Only Acute conditions	Income Assistance	4.02	-	3.90	-	59.8	-	122.2	-
	No Assistance	3.67	3.55	3.53	3.32	46.5	40.2	111.5	74.0
	Total	3.80	3.55	3.62	3.32	51.3	40.2	113.9	74.0
Only Recurrent or Permanent conditions	Income Assistance	2.33	-	2.20	-	33.3	-	100.0	-
	No Assistance	3.11	2.44	2.27	2.36	100.6	58.1	84.5	72.3
	Total	2.93	2.44	2.26	2.36	85.4	58.1	86.4	72.3
Acute & Recurrent or Permanent conditions	Income Assistance	8.69	-	8.01	-	296.9	-	442.7	-
	No Assistance	7.66	6.94	8.13	6.63	220.6	149.0	365.0	220.6
	Total	8.02	6.94	8.10	6.63	247.3	149.0	381.8	220.6
Acute, Recurrent and Permanent conditions	Income Assistance	16.92	-	14.00	-	638.0	-	565.2	-
	No Assistance	14.37	12.39	13.66	12.29	518.7	442.9	853.7	498.3
	Total	15.47	12.39	13.78	12.29	570.3	442.9	750.0	498.3
Any Condition	Income Assistance	5.40	-	4.78	-	131.6	-	186.4	-
	Non-Assistance	4.66	4.26	4.29	3.85	97.2	71.0	158.8	101.4
	Total	4.92	4.26	4.40	3.85	109.2	71.0	164.9	101.4

(1) SP = Single-Parent and (2) TP = Two-Parent. Denominators for these rates represent the number of children in each strata defined by income assistance status, residence in an urban or rural area and morbidity burden as shown in Tables 10-12.

**APPENDIX I: LINKAGE OF INCOME ASSISTANCE CLIENTS  
IN HOUSEHOLDS WITH CHILDREN TO THE MHSIP REGISTRY BY AGE**

Linkage Status	Age Group (years)											Total			
	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54		55-59	60-64	65-69
Households with children	10,662	9,360	6,858	4,679	3,923	3,739	3,646	2,657	1,470	721	267	104	31	6	48,123
Percentage Linked	95.3	95.6	96.2	96.1	95.2	94.6	95.3	96.3	96.1	95.8	96.6	97.1	93.6	83.3	95.6

**APPENDIX II: LINKAGE OF CHILDREN  
IN HOUSEHOLDS RECEIVING INCOME ASSISTANCE TO THE MHSIP REGISTRY  
BY URBAN/RURAL STATUS AND NEIGHBOURHOOD INCOME QUINTILE**

Linkage Status	Neighbourhood Income Quintile										TOTAL	
	Q1 (Lowest) N	%	Q2 N	%	Q3 N	%	Q4 N	%	Q5 (Highest) N	%	N	%
Urban Households												
Linked	10,741	(96.5)	5,445	(96.4)	4,194	(96.6)	2,238	(95.9)	692	(96.8)	23,310	(96.4)
Not Linked	395	(3.5)	203	(3.6)	148	(3.4)	96	(4.1)	23	(3.2)	866	(3.6)
Total	11,136	(100.0)	5,649	(100.0)	4,342	(100.0)	2,334	(100.0)	715	(100.0)	24,176	(100.0)
Rural Households												
Linked	366	(98.4)	920	(96.3)	580	(94.3)	387	(95.3)	394	(95.4)	2,647	(95.9)
Not Linked	6	(1.6)	35	(3.7)	35	(5.7)	19	(4.7)	19	(4.6)	114	(4.1)
Total	372	(100.0)	955	(100.0)	615	(100.0)	406	(100.0)	413	(100.0)	2,761	(100.0)

A total of 984 children in income assistance households who could not be linked to an MHSIP identity or who were born after June 30, 1994 have been excluded from the income assistance group. In addition, 113 children could not be classified by neighbourhood income quintile

### **APPENDIX III: DEVELOPMENT OF AN OPERATIONAL DEFINITION FOR CHILDHOOD CHRONIC MORBIDITY**

This appendix describes the development of an operational definition for chronic childhood morbidity which was utilized in comparisons of the health care utilization of children living in income and non-income assistance households (Newacheck, Starfield 1988; Starfield, Katz, Gabriel, et al. 1984; Starfield, Hankin, Steinwachs, et al. 1985).

#### **Conceptual Framework For Defining Chronic Morbidity in Childhood**

Traditionally, chronic conditions in children have been members of disease-specific lists (Stein, Bauman, Westbrook, et al. 1993; Perrin, Newacheck, Pless, et al. 1993). Criticism of this “categorical” approach is that it does not adequately describe the experience of the child with a chronic condition for the child, family and health care system, and it may exclude less prominent disorders (Stein, Bauman, Westbrook, et al. 1993; Perrin, Newacheck, Pless, et al. 1993). As well, commonalities have been found among individual chronic diseases in terms of the child’s functional status and impact on the family (Stein, Jessop 1989). Subsequently, a “non-categorical” definition of chronic illness in children has been pursued, where children with diverse conditions are grouped together (Newacheck, Starfield 1988). This classification system focuses on elements shared by chronic conditions, such as impact on the child’s functional status or ongoing need for medical services (Stein, Bauman, Westbrook, et al. 1993; Perrin, Newacheck, Pless, et al. 1993).

The use of health care administrative databases to identify children with chronic conditions limits the researcher to the use of diagnosis lists in operationalizing the definition of chronic illness. Even so, the concept of the “non-categorical” approach can be incorporated. We conceptualized chronic conditions in terms of their consequences on the utilization of medical services. This perspective enabled the assessment of the burden of chronic disease on the health care system, and addressed the impact of chronic disease on the child, in terms



of the inconvenience and discomfort of continuous therapeutic management and contact with the health care system (Perrin, Newacheck, Pless, et al. 1993).

Similar to classifications system used in the study of childhood morbidity, (Newacheck, Starfield 1988; Starfield, Katz, Gabriel, et al. 1984; Starfield, Hankin, Steinwachs, et al. 1985) two constructs of chronic disease were employed: chronic disease as a permanent condition and chronic disease as a recurrent condition. Permanent conditions were viewed as conditions, either congenital or acquired, which would likely persist throughout childhood and/or require continuous therapeutic management such as dependence on medications, special diet, medical technology or devices and personal assistance (Stein, Bauman, Westbrook, et al. 1993). The concept of recurrence was utilized as a means of identifying conditions which were episodic, and thus impact on the child's ordinary activities by continual, though not necessarily regular, contact with the health care system over a 1 year period (Perrin, Newacheck, Pless, et al. 1993).

## **Research Methods**

The operational definition of the two chronic disease constructs was derived from literature definitions and the 1994/95 health care utilization patterns of Manitoba children, as documented in the MHSIP administrative databases. Based on prevalence studies of chronic diseases in childhood, a list of ICD-9 diagnoses, representing conditions likely to be permanent or recurrent was initially composed. The diagnosis lists were reviewed by two practising pediatricians for their face validity. A cohort of children, less than 14 years old, with health care contacts during 1994/95 was identified from the MHSIP database.

Diagnoses reported on a physician claim or in the hospital abstract record for the cohort children were classified according to the diagnosis lists, as recurrent or permanent conditions. Diagnosis lists for permanent conditions were finalized after the identification of misclassified diagnoses which were contributing to high prevalences of children with candidate permanent conditions. A definition of recurrence was applied to the health care utilization patterns of children with candidate recurrent diagnoses in order to classify children with

recurrent conditions. The operational definition of recurrence was finalized following the results of regression and sensitivity analyses.

Data presented in the results section are for more prevalent conditions (>1%) in Manitoba children, or less prevalent (<1%) conditions which required continuous drug therapy or use of a device. In the final revision of the diagnoses lists, the remainder of the less prevalent conditions were included to enable classification of all children.

## **Results**

### **Diagnoses Likely to be Permanent**

Permanent conditions were conceptualized as conditions, either congenital or acquired, which would likely persist throughout childhood and/or require continuous therapeutic management such as dependence on medications, special diet, medical technology or devices and personal assistance.

#### *Developing Rules for Inclusion of Diagnoses*

The list of ICD-9 diagnosis codes representing conditions tentatively categorized as permanent in children, included conditions such as arthritis, asthma, cancer, cardiac disorders, diabetes, epilepsy, colitis, thyroid disease and other congenitally acquired diseases (Cadman, Boyle, Offord, et al. 1986; Newacheck, Starfield 1988; Newacheck, Taylor 1992; Gortmaker, Walker 1990; Newacheck, Stoddard, McManus 1993; NLSC Project Team 1995). During the 1994/95 fiscal year, 226,966 children in Manitoba less than 15 years old had seen a physician. The prevalence of the majority of candidate diagnoses per 1000 children treated by a physician in 1994/95, based on the presence of at least 1 diagnosis, was well under 10 (1%) in children of ages. At a prevalence of 2.5%, it was suspected that the prevalence of AIDS was falsely elevated, due to the lack of specificity at the 3-digit ICD-9 diagnosis code level because the '079' diagnosis code also referred to rhinovirus and other viruses. Diagnosis codes from hospital utilization data, reported at the 5-digit level, were needed to differentiate between the various viruses at the 4-digit level. Prevalences greater

than 1% were also documented for arthropathies, asthma, ophthalmic and otic disorders and congenital anomalies.

To further identify 3-digit ICD-9 diagnoses codes in the proposed permanent condition category which were not permanent conditions, the frequency of ICD-9 codes within diagnosis groups for children who presented only once to the physician were reviewed. Disproportionately higher frequencies of specific ICD-9 diagnosis codes were observed in the arthropathy, cardiac, ophthalmic, otic and other diagnostic categories as listed in Table A1. Some of the 3-digit ICD-9 diagnostic codes included conditions such as haemorrhoids, ear pain and haemorrhagic events which were more representative of acute events, while others such as essential hypertension, arrhythmias and glomerulonephritis were more characteristic of permanent conditions. Conditions in which this differentiation was not apparent, such as arthralgia, myalgia and benign skin growths, were re-categorized as recurrent conditions if the frequency of repeat visits was > 25%. In addition, the high frequency of single visits for myopia indicated that the ophthalmic category contained visits to the optometrist.

It was postulated that conditions such as congenital malformations, spina bifida, cerebral palsy and cystic fibrosis would be identifiable in the administrative databases soon after birth, but as the child aged and continued to utilize health care these conditions would not be the primary diagnosis. The prevalence of cystic fibrosis and especially congenital anomalies was more common in children less than 1-4 years of age, suggesting that retrospective review of health care utilization from 1994/5 to time of birth was necessary to identify all children with congenital malformations.

As the diagnosis of asthma may require more than one physician visit, a sensitivity analysis was performed to see how the prevalence of asthma changed by varying the number of required health care contacts in the definition. The prevalence of candidate diagnoses per 1000 Manitoba children in 1994/95 was dramatically decreased when the operational definition was based on 2 diagnoses of the condition (< 1 year:0.5, 1-4 years:12.1, 5-9 years:14.3, 10-14 years: 10.2). These findings are consistent with reports of a decreased

incidence in pre-school asthma subsequent to changes in case definition which require 2 or more physician claim diagnoses (Schaubel, Johansen, Mao, et al. 1996). The prevalence based on two diagnoses of asthma (37 per 1000 children treated) was similar to parental reports of asthma in their children (30-40 per 1000 children), as documented in the literature (Newacheck, Starfield 1988; Newacheck, Taylor 1992; Gortmaker, Walker, Weitzman, et al. 1990). Moreover, because our perspective was to define chronic disease in terms of the impact on the child of repeated health care visits, a decision was made to consider asthma as a permanent condition if there were 2 or more health care visits for the diagnosis.

Once the operational definition of a permanent condition was finalized, hospital and physician visit data were combined to determine the prevalence of permanent conditions, as shown in Table A2. Twenty-three percent of children receiving ambulatory or hospital treatment were treated for a permanent condition. Translated onto the whole population of children living in families in Manitoba (n=261,612), 19.8% of children were treated for a permanent condition. This figure is similar to the prevalence of chronic disease reported in the literature (Cadman, Boyle, Offord, et al. 1986; Newacheck, Starfield 1988; Newacheck, Taylor 1992).

#### *Operational Definition of a Child with a Permanent Condition*

A single physician or hospital contact (primary diagnosis only) for any 3-digit ICD-9 diagnosis code which appears in the permanent condition category, listed in Table A6, denotes a child with a permanent condition with the following exceptions:

- 1) children with AIDS are identified if the 5-digit ICD-9 diagnosis code of '0795' is documented in any of the 16 diagnosis codes in the hospital record
- 2) asthma is categorized as a permanent condition if there were at least 2 health care contacts for the 3-digit ICD-9 diagnosis of '493'
- 3) children with congenital malformations are identified from a review of listed 3-digit diagnoses from time of birth to 2 years of age

### **Diagnoses Which Recur Over a Period of Time**

Recurrent conditions were conceptualized as conditions which resulted in continual, though not necessarily regular, contact with the health care system over a 1 year period, and thus would potentially impact on a child's everyday activities.

#### *Developing Rules for Inclusion of Diagnoses*

A tentative list of conditions likely to recur in children was developed from the empiric literature and included conditions such as allergies, otitis media, gastrointestinal diseases and urinary tract infections (Montgomery, Bartley, Cook, et al. 1996; Cadman, Boyle, Offord, et al. 1986; Newacheck, Taylor 1992; Gortmaker, Walker, Weitzman, et al. 1990; Newacheck, Stoddard, McManus 1993; NLSC Project Team 1995). In order to develop an operational definition, it was necessary to determine whether these conditions recurred in the Manitoba population of children and over what time period.

Thirty-six percent of children with physician contacts for candidate recurrent conditions had more than 1 visit for the condition, but the proportion varied among individual diagnosis (range:15-63%). These findings suggested that the single presence of a diagnosis was probably insufficient to identify children with recurrent illness and that a measurement of recurrence was required. Recurrence of health care visits for the candidate ICD-9 diagnoses during the year of study was selected as the qualifying time period. A frequent literature definition of a chronic condition is one which is expected to be present for a minimum of 3 months, but recent recommendations are to increase the 3 month time period to 1 year in order to improve the sensitivity of the definition (Stein, Bauman, Westbrook, et al. 1993).

Although data on health care contacts provide no information on the duration of a condition, our concept of recurrence recognized that repeated contact with the health care system for a condition over a 1 year period would impact a child's ordinary activities.

To operationalize this construct, the study year was divided into quarter time periods and the occurrence of health service utilization, regardless of intensity, over the 4 quarters was

determined. Recurrence of the candidate diagnoses in children was defined as shown in Table A3. Visits during a single quarter only were not considered recurrent. Occurrence of health utilization over a minimum of 2 consecutive quarter time periods was selected on the basis of Newacheck's definition of conditions likely to recur as those present for more than 3 months (Newacheck, Starfield 1988). Initially physician and hospital visits (inpatient and outpatient) were separately analyzed. Hospital LOS  $\leq 7$  days were considered similar to a physician visit and occurrence in year quarters counted. Hospital LOS  $> 7$  days were defined as a recurring visit.

Using these definitions, 14% of children treated for recurrent diagnoses had recurring physician visits and 5% of children had recurring hospital visits. On average, children with non-recurrent conditions visited the physician 1.3 times, while those with recurrent conditions visited the physician 4 times annually. The mean number of hospital visits per year in children with non-recurrent and recurrent conditions was 1.0 and 2.1, respectively. These findings are consistent with Perrin et al's recommendations to include greater than expected utilization of health care services as a criterion for childhood chronic illness (Perrin, Newacheck, Pless, et al. 1993). To further test our operational definition, the recurrence status of the child was related to the total number of visits in each diagnosis category by means of bivariate regression analyses. Depending on the disease category, a child defined as having a recurrent condition made an average of 1.4 to 10 more visits to the physician. However, children with recurrent conditions did not always have a significantly greater number of hospital visits, indicating the need for a measure of intensity of utilization in order to capture children with multiple visits in a single quarter, who may experience as many visits in a single quarter as children with visits over multiple quarters.

A sensitivity analysis of the operational definition was conducted as shown in Table A4. In the sensitivity analysis, recurrence was redefined by including a measure of utilization intensity, by extending the hospital LOS and by lengthening the minimum period for recurrence to 3 or more quarter time periods. The results of the sensitivity analyses indicated that if intensity of utilization was included in the operational definition, the prevalence of

recurrent disease increased. Increasing the hospital LOS in the definition did not change the prevalence. Limiting the definition of recurrence to the presence of health care contacts over 3 or more quarter periods removed a substantial proportion of children defined as having a recurrent disease.

Based on the results of the sensitivity analyses, the operational definition of a recurrent condition was revised to include a measure of intensity of health service utilization. Applying this definition to 229,262 Manitoba children receiving ambulatory or hospital treatment in 1994/95, the prevalence of recurrent conditions was 13.2%, as shown in Table A5. Translated onto the whole population of children living in families in Manitoba (n=261,612), 11.6% of children had a recurrent condition. This figure could not be compared to the prevalence of conditions likely to recur reported by others because similar conditions were not evaluated or the prevalence of similar diagnoses was not based on actual patterns of recurrence (Stein, Bauman, Westbrook, et al. 1993; Newacheck, Taylor 1993). For example, our prevalence of recurrent otitis media (6.5%) was similar to that reported for repeated ear infections, but the prevalence of recurrent respiratory allergies was one tenth of that reported for respiratory allergies (Newacheck, Starfield 1988; Newacheck, Taylor 1992).

#### *Operational Definition of a Child with a Recurrent Condition*

A single ambulatory or hospital contact (primary diagnosis only) for any 3-digit ICD-9 diagnosis code which appears in the recurrent condition category\*, listed in Table A6, denotes a child with a recurrent condition if any of the following conditions are met:

- 1) presence of ambulatory visits, or hospital visits with LOS  $\leq$  7 days, over 2 or more consecutive quarter time periods in 1 year
- 2) presence of ambulatory visits, or hospital visits with LOS  $\leq$  7 days, over 3 non-consecutive quarter time periods in 1 year
- 3) presence of ambulatory, or hospital visits with LOS  $\leq$  7 days, in single quarter time periods only if the intensity of utilization is greater than 3 visits in the quarter time period
- 4) any occurrence of a hospital visit for  $>$  7 days.

\* and acute condition category to completely enumerate all children with recurrent conditions

**Table A1: Frequently Occurring Single Physician Visits  
For ICD-9 Diagnosis in Diagnosis Groups  
Tentatively Categorized as Permanent Conditions**

Diagnosis Group [no. of single visits]	ICD-9 CM Code	% Single Visits in Diagnosis Group	% (no) Repeat Visits for ICD Diagnosis	Final condition category
Arthropathy [9363]	'719'(arthralgia)	20.8	45.3 % (3656)	Recurrent
	'724'(back pain)	9.7	38.5 % (1509)	Recurrent
	'729'(myalgia)	18.8	29.2 % (2595)	Recurrent
Blood disorder [2479]	'285'(congen. anaemia)	38.7	NA	Permanent
	'289'(polycythemia)	47.5	NA	Permanent
Cardiac disorders [1155]	'401'(hypertension)	10.2	NA	Permanent
	'427'(arrhythmia)	10.6	NA	Permanent
	'436'(CVA, stroke)	5.6	NA	Permanent
	'455'(haemorrhoids)	4.4	NA	Acute
	'459'(haemorrhage)	5.6	21.7 % (83)	Acute
Dental disorders [2536]	'520'(abn. teeth)	62.4	NA	Permanent
Neoplasm [1750]	'216'(benign skin)	41.5	43.0 % (1275)	Recurrent
Ophthalmic disorders [47389]	'367'(myopia)	92.6	NA	Permanent
Otic disorders [5141]	'388'(ear pain, tinnitus)	67.5	NA	Acute
Renal disorders [107]	'583'(glomeruloneph.)	49.5	NA	Permanent



**Table A2: Physician & Hospital Contacts for Permanent Conditions\*  
/1000 Children in Treatment (n=229,262)**

Condition	< 1 years old	1-4 years old	5-9 years old	10-14 years old	All
AIDS	0.0	0.0	0.0	0.0	0.0
Arthropathies	0.7	4.9	6.6	18.3	30.5
Asthma	0.6	12.2	14.2	10.2	37.2
Cardiac disorders	0.9	1.8	1.6	1.9	6.2
Cystic fibrosis	0.3	0.2	0.2	0.2	0.7
Colitis/GI disorders	0.6	0.8	0.3	0.3	2.0
Congenital anomalies	8.8	13.6	6.8	5.1	34.3
Cerebral palsy	0.1	1.0	1.1	0.8	3.0
Dental disorders	2.0	10.8	3.2	1.4	17.4
Diabetes Mellitus	0.1	0.3	0.6	1.0	2.0
Epilepsy	0.2	0.7	0.8	0.8	2.5
Haematologic disorders	0.9	5.8	4.7	3.1	14.5
Metabolic disorders	0.4	0.8	0.4	0.4	2.0
Neoplasms	0.6	1.4	2.0	2.6	6.6
Ophthalmic disorders	3.2	11.2	20.6	20.9	55.9
Otic disorders	0.2	2.4	4.4	2.3	9.3
Renal failure	0.1	0.2	0.3	0.3	0.9
Spina Bifida	0.1	0.1	0.2	0.2	0.6
Thyroid diseases	0.1	0.2	0.2	0.6	1.1
Any Condition	15.1	59.6	65.3	64.8	204.8

\* visits to the optometrist excluded

**Table A3: Operational Definition of a Recurrent Condition in a Child**

Quarter Time Periods	Sum of Quarters**	Pattern of Recurrence
Recurrence in children with visits in 4 <sup>th</sup> quarter if:		
4,3,2,1	10	4/4
4,3,2	9	$\frac{3}{4}$ consecutive
4,3,1	8	$\frac{3}{4}$ non-consecutive
4,2,1	7	$\frac{3}{4}$ non-consecutive
4,3	7	$\frac{2}{4}$ consecutive
Non recurrent if:		
4,2	6	$\frac{2}{4}$ non-consecutive
4,1	5	$\frac{2}{4}$ non-consecutive
Recurrence in children with visits in 2 <sup>nd</sup> and 3 <sup>rd</sup> quarters if:		
3,2,1	6	3/3
3,2	5	$\frac{2}{3}$ consecutive
2,1	3	$\frac{2}{3}$ consecutive
Non recurrent if:		
3,1	4	$\frac{2}{3}$ non-consecutive

\*\* quarter periods were summed to identify different patterns of recurrence; children were grouped by visits in the 2<sup>nd</sup>/3<sup>rd</sup> vs. 4<sup>th</sup> quarter in order to differentiate sums of quarters which were the same but indicated different patterns of recurrence

1<sup>st</sup> quarter(Apr,May,Jun);2<sup>nd</sup> quarter(Jul,Aug,Sep);3<sup>rd</sup> quarter(Oct,Nov,Dec);4<sup>th</sup> quarter(Jan,Feb,Mar)

**Table A4: Prevalence of Children with Recurrent Disease  
Following Changes to Definition**

Change in Definition	% of Children with Recurrent Conditions in 217,761 Children with Visits for Recurrent Diagnoses
Original (see Table 5)	13.9
1) recurrence if intensity of visits is $\geq 3$ per quarter	14.5
1) and 2) recurrence if hospital $> 21$ days	14.4
1) and 3) recurrence if visitation in $4/4$ and $3/4$ year-quarters	6.2

**Table A5: Physician and Hospital Contacts  
For Recurrent Conditions  
/1000 Children in Treatment**

(n=229,262)

Condition	< 1 years old	1-4 years old	5-9 years old	10-14 years old	All
Allergy & other respiratory	0.10	2.26	3.94	2.70	9.0
Anaemia	0.02	0.15	0.00	0.02	0.2
Benign skin growth	0.01	0.08	0.15	0.34	0.6
Bronchitis & other respiratory	0.55	4.38	2.95	1.55	9.4
Eye infections	0.25	1.32	0.66	0.53	9.4
Constipation & other GI	0.10	0.55	0.22	0.10	1.0
GI ulcer & other	0.03	0.09	0.06	0.11	0.3
Hernia	0.07	0.30	0.19	0.06	0.6
Joint pain	0.00	0.10	0.27	1.26	1.6
Migraine	0.01	0.19	0.52	1.03	1.8
Nephritis	0.00	0.03	0.06	0.01	0.1
Neurotic disorders (e.g. ADD)	0.01	0.57	2.19	3.30	6.1
Non-infectious GI diseases	0.45	2.27	0.41	0.23	3.4
Nutritional disorders	0.32	0.91	0.16	0.19	1.6
Otitis media	5.42	42.10	0.90	0.19	74.6
Reproductive disorders	0.04	0.78	0.47	0.99	2.3
Respiratory, other	0.18	1.31	0.80	0.29	2.6
Skin diseases	1.16	5.25	2.19	2.09	10.7
Urinary Tract Infections & other	0.18	1.50	1.46	0.57	3.7
Any Condition	6.77	53.40	33.80	19.60	113.5

**Table A6: ICD-9 Diagnosis Classification System for Childhood Conditions**

Classification	ICD-9-CM Diagnosis Code
<b>A. Permanent conditions</b>	
AIDS [incl. HIV positive] *	042, V08, 0795
Arthropathies (excl. infectious, joint pain) *	710, 712-718, 720-723, 725-728, 731-39, V49
Asthma *	493
Cardiac disease *	392-454, 456-458
Cerebral palsy and other paralyses	342-344
CNS disorders (excl. epilepsy, paralyses)	324-341, 347-349, V48
Congenital anomalies (excl. spina bifida)	740, 742-59, 771
Cystic fibrosis and other *	277
Diabetes Mellitus *	250
Endocrine, other than diabetes	252-259
Epilepsy *	345
Gastroenteritis, colitis & malabsorption *	555-7, 579, V44
Haematologic (sickle cell, excl. anaemia) *	281-289
Mental Retardation	317-319
Metabolic/immune disorders *	270-3, 279
Neoplasms *	140-215, 217-239, V10
Neuromuscular disorders (incl. polio)	350-359, 045-049, 138
Ophthalmic disorders (excl. conjunctivitis)	360-71, 374-9, V41
Dental diseases	520-522, 524-526
Otic disorders (excl. otitis media)	383-387, 389
Renal failure *	582-589
Spina bifida *	741
Thyroid disease *	240-246
Miscellaneous	V12, V13, V15, V42, V43, V45-V47

\* conditions which require chronic use of medications/devices

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<b>B. Conditions Which are Likely to Recur</b>	<b>ICD-9-CM Diagnosis Code</b>
Anaemia	280
Benign tumour	216
Conjunctivitis/blepharitis	372-373
COPD (e.g. bronchitis)	490-2,494-6
Gastroenteritis (non-infectious diarrhea)	558
Gastrointestinal ulcer and diseases	530-537
Gastrointestinal disease, other (e.g. constipation)	560-569
Hepatic/pancreatic disease	570-577
Hernia	550-553
Joint pain	719, 724, 729
Migraines and headaches	346,784
Nephritis/nephrosis	580, 581
Neurotic disorders (e.g. enuresis, ADD)	300-316, V11, V40
Otitis media	380-382
Pregnancy diseases (incl. birth)	630-676, V22-V24, V27, V28
Psychotic disorders (autism)	290-299
Renal disease (e.g. pyelonephritis, UTI)	590-599
Reproductive organ disorders	600-629
Respiratory disease, chronic (allergies)	470-478
Respiratory disease, other	500-519
Skin diseases (psoriasis)	690-698
Social problems	V60-V62
Tuberculosis	010-018, 137
Under-nutrition/Obesity	783, 278, 260-269

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### **C. Acute Self-limiting Conditions**

Appendicitis	540-543
Ear symptoms	388
Electrolyte disorders	274-276, 251
Helminthiasis	120-129
Haemorrhage (incl. GI, other)	578, 459
Haemorrhoids	455
Ill-defined symptoms (excl. 783)	780-799
Infectious/Parasitic diseases	001-9, 020-041, 080-088, 100-104, 130-6
Injuries	800-999
Meningitis	320-323
Mouth disorders	523, 527-529
Mycoses	110-118
Pneumonia and influenza	480-487
Procedures	V50-V59, V63, V64, V66-V68
Respiratory infections	460-466
Rheumatic fever, acute	390-391
Skin diseases, other (e.g. rashes)	700-709
Skin infections	680-686
Venereal diseases	090-099
Viral diseases (e.g. chickenpox, mumps)	050-7, 060-066, 070-079, 139

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**D. Perinatal Conditions (incl. birth)** 760-779, V29-V39

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**E. Preventive Care**

Immunizations	V01-V07
Preventive, other	V25, V26, V65, V69, V71-V82
Routine Examinations	V20, V21, V70

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## APPENDIX REFERENCES

- Cadman D, Boyle MH, Offord DR, Szatmari P, Rae-Grant NI, Crawford J et al. Chronic illness and functional limitation in Ontario children: findings of the Ontario Child Health Study. *Can Med Assoc J* 1986;135:761-7.
- Gortmaker SL, Walker DK, Weitzman, Sobol AM . Chronic conditions, socioeconomic risks, and behavioural problems in children and adolescents. *Pediatrics* 1990;85:267-76.
- Montgomery SM, Bartley MJ, Cook DG, Wadsworth ME. Health and social precursors of unemployment in young men in Great Britain. *J Epidemiol Community Health* 1996;50:415-22.
- Newacheck PW, Starfield B. Morbidity and use of ambulatory care services among poor and nonpoor children. *Am J Public Health* 1988;78:927-33.
- Newacheck PW, Stoddard JJ, McManus M. Ethnocultural variations in the prevalence and impact of childhood chronic conditions. *Pediatrics* 1993;91 Suppl:1031-9.
- Newacheck PW, Taylor WR. Childhood chronic illness: Prevalence, severity and impact. *Am J Public Health* 1992;82:364-71.
- NLSC Project Team, "What Works" for Children Information Development Program. National Longitudinal Survey of Children: Survey instruments for 1994-95 data collection; cycle 1, Feb 1995. Ottawa: Human Resources Development, Statistics Canada.
- Perrin EC, Newacheck P, Pless B, Drotar D, Gortmaker SL, Leventhal J et al. Issues involved in the definition and classification of chronic health conditions. *Pediatrics* 1993;91:787-93.
- Schaubel D, Johansen H, Mao Y, Dutta M, Manfreda J. Risk of preschool asthma: Incidence, hospitalization, recurrence, and readmission probability. *J Asthma* 1996;33:97-103.
- Starfield B, Hankin J, Steinwachs D, Horn S, Benson P, Katz H et al. Utilization and morbidity: Random or tandem? *Pediatrics* 1985; 75:241-7.
- Starfield B, Katz H, Gabriel A, Livingston G, Benson P, Hankin J et al. Morbidity in childhood: A longitudinal view. *N Engl J Med* 1984;310:824-9.
- Stein REK, Bauman LJ, Westbrook LE, Coupey SM, Ireys HT et al. Framework for identifying children who have chronic conditions: the case for a new definition. *J Pediatr* 1993;122:342-7.
- Stein REK, Jessop DJ. What diagnosis does not tell: The case for a noncategorical approach to chronic illness in childhood. *Soc Sci Med* 1989;29:769-78.

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