

# Socioeconomic status and injury risk in children

Catherine S Birken MD FRCPC, Colin MacArthur MBChB PHD

CS Birken, C MacArthur. Socioeconomic status and injury risk in children. *Paediatr Child Health* 2004;9(5):323-325.

Research has consistently shown that low socioeconomic status (SES) is associated with an increased risk of poor health and death in adults and children. Studies from around the world have shown an inverse relationship between SES and childhood injury morbidity and mortality. For example, compared with children with high SES, children with low SES are at an increased risk of death from pedestrian collisions, fires, falls and drownings, and at an increased risk of hospitalization from recreation or play injuries. Research from England and Wales shows that these disparities in mortality between high and low SES children may be widening over time. This paper provides an overview of the literature on the relationship between SES and childhood injury morbidity and mortality, outlines the postulated mechanisms for this relationship, and highlights some intervention studies targeted to low SES children.

**Key Words:** *Health promotion; Poverty; Socioeconomic factors; Wounds and injuries*

## SOCIOECONOMIC STATUS AND HEALTH

Socioeconomic status (SES) is defined as "a hierarchical continuum according to prestige, lifestyles, attitudes and values, which define a person's position in society" (1). Income, education and occupation are the most common measures used, alone or in combination. No matter which SES measure is used or what health outcome is evaluated, research has consistently shown that low SES is associated with an increased risk of poor health and death (2-5). This paper provides an overview of the literature on the relationship between SES and childhood injury mortality and morbidity, outlines the postulated mechanisms for this relationship, and highlights some intervention studies targeted to low SES populations.

## SES AND CHILDHOOD INJURY MORTALITY

An inverse relationship between SES and childhood injury mortality has been noted in several studies (6-10). Some of these use individual-level measures of SES (such as individual income or educational level), while others use area-level measures (such as neighbourhood income levels). For example, Roberts et al (6) studied the influence of SES (using social class, an individual-level measure of SES based on occupation) on unintentional injury mortality rates in children under 16 years in England and Wales. Compared with children with high SES, low SES children were

## Le statut socioéconomique et le risque de blessure chez les enfants

Les recherches ont toujours démontré qu'un statut socioéconomique (SSÉ) peu élevé s'associe à un risque accru de mauvaise santé et de décès chez les adultes et les enfants. Des études du monde entier démontrent un lien inversement proportionnel entre le SSÉ et la morbidité et la mortalité secondaires à des blessures pendant l'enfance. Par exemple, par rapport à des enfants au SSÉ élevé, ceux au SSÉ peu élevé présentent un risque accru de décès découlant d'une collision à pied, d'un incendie, d'une chute ou d'une noyade, ainsi que d'hospitalisation par suite d'une blessure infligée pendant les loisirs ou les jeux. Des recherches menées en Angleterre et au pays de Galles révèlent que ces disparités entre la mortalité des enfants au SSÉ élevé et peu élevé pourraient se creuser au fil du temps. Le présent article fournit un aperçu de la documentation scientifique sur le lien entre le SSÉ et la morbidité et la mortalité découlant de blessures pendant l'enfance, expose les mécanismes postulés de ce lien et présente quelques études d'intervention ciblant des enfants au SSÉ peu élevé.

1.89 times more likely to die from fire and flame injuries (95% CI: 1.75, 2.04), 1.47 times more likely to die from pedestrian injuries (95% CI: 1.41, 1.53), 1.46 times more likely to die from fall injuries (95% CIs: 1.31, 1.63), 1.36 times more likely to die from unintentional poisoning (95% CIs: 1.14, 1.62) and 1.30 times more likely to die from cyclist traffic injuries (95% CIs: 1.20, 1.41). Using census tract income data, studies in Philadelphia and Boston showed that children in lower income neighbourhoods were 2.61 times (95% CI: 1.76, 3.86) and 3.18 times more likely to die in a house fire (95% CI: 1.55, 6.51), respectively, compared with children in higher income neighbourhoods (7,8). In 1981, Dougherty et al (9) showed that children living in the poorest income quintile in urban areas in Canada were 3.53 times more likely to die in pedestrian and motor vehicle traffic collisions compared with children living in the richest income quintile (95% CI: 1.64, 7.22). A similar study by Choiniere et al (10) in 1997 also found that Canadian children living in poor income quintiles were at increased risk of death from pedestrian traffic collisions, fires, falls and drownings.

## SES AND CHILDHOOD INJURY MORBIDITY

Studies from around the world have shown that low SES is associated with an increased risk of injury morbidity (11-15). For example, a study in Trent, England (11), examined

*Division of Paediatric Medicine (PORT), The Hospital for Sick Children, and Department of Paediatrics, Faculty of Medicine, University of Toronto, Toronto, Ontario*

*Correspondence: Dr Catherine Birken, Division of Paediatric Medicine, Hospital for Sick Children, 555 University Ave, Toronto, Ontario M5G 1X8. Telephone 416-813-8157, fax 416-813-5663, e-mail catherine.birken@sickkids.ca*

hospital admission rates and found children with the lowest SES (using an area-level measure of SES that aggregates unemployment, overcrowding, lack of a car and occupation) had three to four times the risk of hospital admission because of pedestrian traffic collision injuries, burns/scalds and poisonings compared with those in the highest SES. Children with low SES also had a 1.53 fold increased risk of admission for falls (95% CI: 1.46, 1.61) and a 1.61 fold increased risk of admissions for bicycle injuries (95% CI: 1.42, 1.82), compared with higher SES children. This SES gradient in hospital admission rates persisted after taking into account the severity of the injury (11).

A study in Ontario found that children with low SES (based on an area-level income measure) were at 1.75 times increased risk of hospital admission for home injuries (95% CI: 1.44, 2.13), 1.37 times increased risk of hospital admission for recreation or play injuries (95% CI: 1.13, 1.65), and 1.42 times increased risk of hospital admission for fall injuries (95% CI: 1.21, 1.68), compared with high SES children (12). Children five to 14 years of age in the lowest social class in Sweden were 23% to 36% more likely to be admitted to hospital because of traffic collision injuries compared with children in the highest social class (13). In Manhattan, New York, children with a low SES (based on income, parental education and parental unemployment rate) were also at increased risk of injury-related hospitalization compared with those with the highest SES (14).

A primary care setting study in England showed that over a two year period, children with low SES were 1.78 times more likely to have had one or more injuries requiring medical attention (95% CI: 1.24, 2.54), and 3.97 times more likely to have had one or more injury-related hospital admissions (95% CI: 1.50, 10.48), compared with children with high SES (15).

#### TEMPORAL TRENDS IN SOCIOECONOMIC VARIATIONS IN INJURY MORTALITY

The preceding data indicate the strong relationship between SES and injury. In many countries, efforts have been made to diminish these disparities. Over the last 50 years, childhood injury mortality has decreased by over 50% (16). In Canada, the mean annual injury mortality rate in children has decreased from 47 per 100,000 in 1952 to 17.1 per 100,000 in 1997 (16). Similar declines have been seen throughout the developed world (17). However, there is some evidence that the SES disparities have actually widened over time. For example, Roberts and Power (18) examined the effect of social class on the decline in injury mortality rates in children in England and Wales. They found that between 1979 and 1983, the odds of low SES children dying from traffic collisions (pedestrians and motor vehicle occupants) was 2.9 times the odds of high SES children dying. However, between 1989 to 1992 the odds increased to 4.16 times ( $P < 0.05$ ). Conversely, Morrison et al (19), found no temporal change in SES gradient for all-cause injury mortality among children in Scotland (from 1981 to 1995).

#### POSTULATED MECHANISMS

A number of factors may explain the inverse relationship between SES and childhood injury. Childhood traffic injuries are a notable example. Mueller et al (20) showed that children living in areas of low SES were more exposed to higher traffic volumes and faster vehicle speeds compared with children living in areas with high SES. In addition, Towner et al (21) showed that children from disadvantaged households were more likely to walk to school and less likely to be accompanied by parents. Housing designs that are more common in poorer neighborhoods, such as houses that open directly to the street, may also increase the risk of childhood pedestrian injuries (22).

Low parental safety knowledge and other barriers to the adoption of preventive interventions (such as cost and availability) may also contribute to this relationship. For example, higher levels of bicycle helmet use were observed in high-income areas (23). Similarly, a study evaluating an infant car seat restraint program also showed that mothers with higher education had higher rates of car seat use (24). A recent qualitative study showed that cost was a major barrier to child passenger booster seat ownership (25).

The literature on the mechanisms associated with social inequities in childhood injuries is limited. Laflamme and Diderichsen (26) have developed a conceptual framework that identifies the mechanism through which social context, social position and exposures may interact to determine inequities in childhood traffic injuries. A broad determinants of health framework, which examines the influence of social, economic and physical environments, as well as the influence of personal health practices, individual capacity and coping skills, health services, human biology, and development on injury occurrence, may be needed to fully understand these mechanisms.

#### PREVENTION OF UNINTENTIONAL INJURIES IN LOW SES CHILDREN

Few studies have evaluated interventions to prevent unintentional injuries in children with low SES. Only one intervention aimed at reducing pedestrian injuries in low SES groups has been evaluated. This pre-post observational study showed that after training, low income preschool children were less likely to select unsafe places to cross the road (27). Studies on SES and bicycle helmet use in the context of free or discounted helmets have had mixed results. For example, a pre-post observational study of an educational and bicycle helmet subsidy program showed no change in observed helmet use in five to 14-year-old children attending schools in low socioeconomic areas (28).

An observational study on car restraint devices found that parents in a low income neighborhood with an infant car seat program (compared with parents in a low income neighborhood with no infant car seat program) were 48% more likely to report having a car seat and 90% more likely to report using one (24). However, no differences in observed use were noted between the two groups.

Several studies have investigated the prevention of home injuries in low-income families. Clamp and Kendrick

(29) showed that families receiving state benefits who were randomized to receive home safety advice and given access to low-cost safety equipment were more likely to report safer practices and use of safety equipment compared with low-income parents in the control group.

Following a multimedia community educational campaign and distribution of free window guards, Spiegel and Lindaman (30) found a 35% decrease in mortality because of falls and a 31% decrease in reported falls. A randomized control trial in Newcastle, England (31) also showed that families living in low income areas who received a home visit with advice about hazards in the home were 6.40 times more likely to make at least one change to make their homes safer (95% CI: 2.42, 16.87) compared with families not receiving a home visit.

Parkin et al (32) evaluated the influence of SES on the effectiveness of bicycle helmet legislation on observed helmet use in children and found a 28% increase in helmet use in low-income areas subsequent to legislation. The relative risk of helmet use after legislation compared with before legislation was 1.86 (95% CI: 1.64, 2.11).

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## SUMMARY

Research has shown that the inverse relationship between socioeconomic level and injury morbidity and mortality is pervasive, persistent and profound (6-15). However, there are few studies on effective injury prevention strategies for children of low SES and it is still not clear whether injury risk in children with low SES is partly attributable to lack of exposure to health promotion activities. Thus, it is difficult to recommend targeting injury prevention programs to low SES children without evidence of effective prevention strategies. However, a universal population approach to injury prevention may not be as accessible to low SES children and may even increase inequities between rich and poor children (33). Research using a determinants of health framework to better understand the mechanisms associated with inequities in unintentional injuries in children is needed. Hopefully, the development of effective and accessible injury prevention interventions for all children will result.