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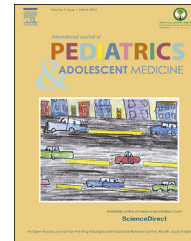


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ORIGINAL RESEARCH ARTICLE

# Foreign body injuries in children: Are the younger siblings doomed?



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## KEYWORDS

Foreign body;  
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**Abstract** *Background and objectives:* Foreign body injury (FBI) is a considerable public health issue for children. Although the relationships of FBI with age, gender, and objects of injury have been studied, the extent to which other demographic factors influence FBI is unclear. We hypothesized that the risk for FBI increases with the number of children in the household.

*Design and settings:* This was a retrospective analysis of 223 patients aged 2–10 years who presented to the emergency department of an inner-city pediatric hospital and who were found to have FBI.

*Patients and methods:* The guardians were contacted via phone to examine the associations of FBI with income, parental educational level, number of children in the household, and birth order while controlling with a matched population of 250 patients. Statistical analyses using frequencies and univariate and multivariate analyses were performed.

*Results:* For each increase in the number of children, the risk of FBI increased 1.44-fold (OR = 1.442). With each increase in the number of caregivers, the risk of a FBI decreased 33% (OR = 0.673). With each increase in income category, the risk of a FBI decreased 59% (OR = 0.413).

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**Conclusion:** The results suggest that an increase in the number of children in a household is associated with a greater risk of FBI.

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## 1. Introduction

Foreign body injuries (FBIs) in the auditory canal, nasopharynx, and oropharynx of pediatric patients represent substantial causes of morbidity and mortality in young children. Foreign body exposure is one of the five most common hazardous pediatric exposures, and 4100 deaths were attributed to FBIs in the oropharynx and trachea in 2006 [1,2]. The current body of literature suggests that FBI is associated with the male gender, a young age, and medical and psychiatric comorbidities [3–5]. The combined rate of death and anoxic brain injury associated with pediatric foreign bodies is approximately 4% [1,4]. Furthermore, FBI represents a large financial burden. The annual overall inpatient cost associated with pediatric oropharyngeal FBI is approximately \$12.8 million. The current body of evidence suggests that foreign bodies are most commonly found in the auditory canal followed by the nasopharynx and oropharynx, and oropharyngeal injury results in the greatest mortality [1]. The population that is at the greatest risk is young children; studies have reported increased risk among children ranging in age from under 18 months to less than 10 years [3–6]. Furthermore, male children appear to be at a greater risk of FBI [3]. The most common objects of injury include beads, toys, and seeds [3]. More recent studies have linked FBI vulnerability with different populations. A study by Shlizerman et al identified young male Arab patients as a population in the area that is more vulnerable to FBI [6]. Furthermore, medical comorbidities, such as developmental delays, have long been established as risk factors, and recent literature has identified links between FBI and psychiatric and behavioral conditions such as ADHD (Attention Deficit Hyperactivity Disorder).

Although previous studies have identified age, male gender, and medical and psychiatric comorbidities as risk factors for FBI, the roles of other demographic factors, including urban neighborhood, number of children in the household, parental education, and socioeconomic status (SES), are unclear [3,4,7–13]. The primary objective of the present study was to investigate the associations of household demographics, parental education level and socioeconomic status with and foreign body injuries in a pediatric population [14].

We hypothesized that the risk of FBI would increase with increases in the number of children in the household, lower parental educational level and lower socioeconomic status and decrease with the number of adults in the household.

The clinical goals of this study were to establish specific and effective protocols of anticipatory guidance for families to prevent injuries such as FBI that are associated with potentially high mortality and morbidity.

## 2. Patients and methods

This study was approved by the St. Christopher's Hospital for Children and the Drexel University College of Medicine institutional review boards.

### 2.1. Participants and data collection

The hospital records of 650 patients between the ages of 2 and 10 years who were seen at the St. Christopher's Hospital for Children Emergency Room with FBI beginning in 2010 were obtained through a retrospective electronic medical record review. St. Christopher's Hospital is a level 1 trauma center with approximately 75,000 visits per year. Patients with documented developmental delays were excluded. The remaining 250 patients were contacted by telephone, and demographic parameters, including household members, caregivers, highest level of education in the household, and income, were collected via surveys conducted by research personnel. Two hundred twenty-three of those contacted agreed to participate. Once the data were collected, the study was expanded to include matched controls. Another 250 patients between the ages of 2 and 10 years who were seen at St. Christopher's Emergency Room for reasons other than FBI were identified and contacted for phone survey. Of these patients, 250 agreed to participate, and the same demographic information was collected. Of the 250 controls, the three most common diagnoses were otitis media ( $n = 66$ ), acute upper respiratory infection ( $n = 49$ ), and viral infection ( $n = 39$ ). In total, there were 473 participants aged 2–10 years, and the mean age was 3.4 years.

### 2.2. Predictor variables

The investigated predictor variables included household members, caregivers, level of education, and household income. The participants were asked to list all of the people living in their household, their relationships, and the total number of children cared for. The participants were asked to specify the primary caregiver, which was defined as the individual who spent the greatest portion of time caring for the child outside of teaching professionals. Education levels were tabulated in the following categories: some high school, high school graduate or equivalent, some college, and college graduate. Yearly income levels were categorized as follows: \$0–20,000, \$21,000–\$40,000, \$41,000–60,000, \$61,000–90,000, and greater than \$90,000. These intervals were modeled after the categorization for state benefits of the Pennsylvania Department of

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