

# Analyzing and Modeling Risk Exposure of Pedestrian Children to Involvement in Car Crashes

## Abstract

Child pedestrian injury and fatality in road crashes is an overall world concern and a major public health burden. Among the Israeli Arab minority pedestrian fatalities consist of about 30% of the total road crash fatalities, while children aged 0-14 years consist 60% of the total pedestrian fatalities, 8 times more than the Jewish children. In light of this situation and in order to improve children pedestrians' safety a number of researchers attempted to study child pedestrian injuries in road crashes in the Israeli Arab minority, but to our knowledge, none of these studies attempted to examine pedestrian injuries in depth and at the individual level. This research studied child pedestrian injuries among the Israeli Arab minority.

This research studied child pedestrian injuries among the Israeli Arab minority. The main aim of this study is to identify means for reducing the rate of child pedestrian involvement in road crashes by:

- identifying population groups with the highest level of pedestrian road crashes risks, taking into consideration the impact of the demographic and socio-economic characteristics on the children's risks of being injured in pedestrian road crashes;
- developing a child risk exposure measure to identify the characteristics of the daily activity patterns of children groups with the highest risk to be injured in road crashes;
- identifying children and parents' knowledge lack, and identifying unsafe behavioral patterns;
- provide insight to plan intervention programs to reduce children's injury in pedestrian road crashes and for changes in parents' and children's behavioral norms.

This research focuses on the Arab sector and the city of Shefaram was chosen as a case study. Shefaram is characterized by a high rate of road crashes. In addition, Afula, a Jewish city was chosen as a control group because of the similarity in size and the socioeconomic characteristics. The study includes a variety of components, therefore, a variety of methods and data sources were used. The data includes injuries in road crashes among the Jewish and the Arab in Israel, and injuries in road crashes in Shefaram and Afula, all based on the Central Bureau of Statistics. For studying in depth the characteristics of children injured in road crashes a household survey was conducted. The survey includes data about the demographic and socio-

economic characteristics, parents' attitudes, and trip diaries. The survey included 199 households, of which 120 were randomly selected and enriched by 79 households whose children were injured in pedestrian road crashes. To identify the crash's reason and its location, police files were analyzed.

Descriptive statistics are used to test the relationship between the various characteristics of the children involved in pedestrian road crashes. Furthermore, a disaggregate child pedestrian risk model is developed to estimate the probability of a child being involved in a pedestrian road crash. This model is innovative in examining in depth at the individual level the relationship between children's involvement in pedestrian road crashes and the demographic and socio-economic characteristics of the household taking into consideration the child's daily activity patterns and household location.

The research results show that children's injury in road crashes is derived from the children's exposure to the risk which is affected by a variety of factors: road characteristics, driver, car, environment, and the injured child. Correspondingly, to this finding, multiple strategies for combating pedestrian severe and fatal injuries should be applied.