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The role of built environment on pedestrian crash frequency

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Abstract

This study investigates (i) the link of land use and road design on pedestrian safety and (ii) the effect of the level of spatial aggregation on the frequency of pedestrian accidents. For this purpose, pedestrian accident frequency models were developed for New York City based on an extensive dataset collected from different sources over a period of 5 years. The assembled dataset provides a rich source of variables (land-use, demographics, transit supply, road network and travel characteristics) and two different crash frequency outcomes: total and fatal-only collision counts. Among other things, it was observed that the census tract analysis (disaggregate data) provides more insightful and consistent results than the analysis at the zip code level. The results indicate that tracts with greater fraction of industrial, commercial, and open land use types have greater likelihood for crashes while tracts with a greater fraction of residential land use have significantly lower likelihood of pedestrian crashes. Moreover, census tracts that have a greater number of schools and transit stops – which are determinants of pedestrian activity – are more likely to have greater crashes. Results also show that the likelihood of pedestrian – vehicle collision increases with the number of lanes and road width. This suggests that retrofitting or narrowing the roads could possibly reduce the risk of pedestrian crashes.

Highlights

► Land use and transit supply characteristics are associated with pedestrian injuries. ► Number of lanes and road width are also positively linked to pedestrian crashes. ► The spatial data aggregation level plays an important role in the model results. ► The results imply that retrofitting roads could help reduce pedestrian injuries. ► Active transportation policies should include pedestrian safety countermeasures.

Keywords

Built environment; Road geometry; Pedestrian crash occurrence; Spatial aggregation

Figures and tables from this article:

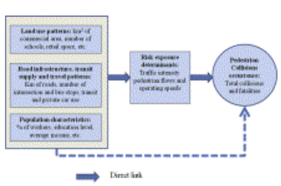

Fig. 1. Built environment and pedestrian collision occurrence.

Figure options

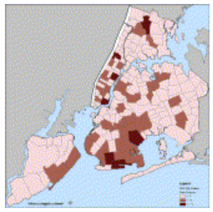

Fig. 2. Fatal crashes aggregated by zip code.

Figure options

Fig. 3. Fatal crashes aggregated by census tract.

Figure options

Table 1. Descriptive statistics of model variables.

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Table 2. Census tract level – total collision frequency models.

(s.e) stands for standard error.

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Table 3. Census tract fatal models (negative binomial model).

(s.e) stands for standard error.

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Table 4. Zip code results (negative binomial model).

(s.e) stands for standard error.

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