

**Title:** CHARACTERIZING ILLEGAL MID-BLOCK PEDESTRIAN CROSSINGS IN CHINA

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**Abstract:**

China has experienced major growth and expansion in the last few decades. This massive economic growth brings its share of challenges in the transportation sector; including congestion, reduced air quality, and safety, to name a few. With rising motorization, many pedestrians are coming into conflict with automobiles and pedestrians currently bear a large proportion of the fatality burden. One of the current challenges is accommodating pedestrians by providing a walkable environment along major transportation corridors. Many legal crosswalks in China are spaced hundreds of meters apart, forcing pedestrians to walk excessive lengths or make dangerous and illegal mid-block crossings to cross the major street. Besides being dangerous, this behavior negatively impacts traffic, worsening China's congestion challenges. Illegal mid-block crossings cause longer travel times, queuing traffic, minor rear-end accidents and in the worst case, pedestrian harm. One of the primary goals of the research described in this paper is to characterize crossing behaviors, primarily the distance that a pedestrian is not willing to travel to cross legally, implying a minimum distance to a legal crossing that are required for them to cross legally. This study tracked 450 pedestrians via video cameras on two geometrically different roadways in Kunming, China to determine their crossing behaviors. The observed roads were busy urban arterials with lengths between crosswalks of 420m and 240m and widths of 31m and 23m, respectively. Several measures were observed, including the ratio of the distance actually traveled to the legal crossing distance, gap acceptance, vehicle density when crossing. The observations indicate that pedestrians tend to cross to save both time and distance as expected. Interestingly, many pedestrians cross illegally when a gap is available, with little or no walk distance savings, implying the travel time savings outweighs the perceived safety risk.

Higher flows of traffic on a roadway discourage a pedestrian to cross illegally to save time but not necessarily distance. This can also be seen with wider cross-sectional widths of roadways. The wider the roadway, the less likely a pedestrian is to cross illegally to save time. This study also investigated accepted gaps between vehicles in adjacent lanes and showed that the 85th percentile of pedestrians felt comfortable crossing a lane illegally when a gap of 11 seconds was available from the time a pedestrian enters the lane to the time an oncoming vehicle passes their path of travel.

China's superblock urban development pattern is often suggested to be hostile to pedestrian activity and network connectivity. One of the negative outcomes is an abundance of illegal mid-block crossings, outside of designated crosswalks. In wide cross sections pedestrians often are stranded between lanes of moving vehicles creating hazardous situations. This research begins to characterize illegal pedestrian crossings and identify how different motivations for crossing imply different countermeasures. A few solutions include: increasing frequency for pedestrians to cross at legal crossings by shortening the signal cycle length, adding a mid-block crosswalk, increasing enforcement to deter pedestrians from crossing illegally, and also educating pedestrians so that they know the potential dangers and consequences for crossing a roadway illegally. Engineering countermeasures must be coupled with increased enforcement and education in order to be effective and ultimately improve the safety of the transportation system.