

Research Report  
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**PEDESTRIAN ACCIDENTS IN KENTUCKY**

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## INTRODUCTION

When a pedestrian is hit by a motor vehicle, he is usually injured or killed; there is no protective cushion to absorb the impact. The high concentration of pedestrians in urban areas, coupled with heavy vehicle traffic, often results in large numbers of pedestrian accidents. In rural areas, there are considerably fewer pedestrians but traffic speeds are higher and, therefore, accidents are more often fatal.

Pedestrian fatalities have increased in the United States from about 7,800 in 1960 to approximately 10,500 in 1973 (1). There are 120,000 pedestrian accidents each year. Total traffic accidents in the US number about 17 million annually with about 56,000 fatalities. Thus, pedestrian accidents account for less than one percent of the total traffic accidents nationwide but over 18 percent of all traffic fatalities. Total accident costs from pedestrian accidents amount to over \$1.2 billion annually (using \$3,400 per injury and \$82,000 per fatality) (2).

In 1973, there were an estimated 1,500 pedestrian accidents in Kentucky in which 167 pedestrians died. This is a pedestrian death rate of 5.2 deaths per 100,000 population compared to the national rate of 5.0 (1). The pedestrian death rate in Kentucky has exceeded the national rate in nine of the last 14 years since 1960. The number of pedestrian deaths in Kentucky has varied between 129 and 167 annually since 1960 (3). Total costs for pedestrian accidents in Kentucky amounted to over \$18 million in 1973.

Kentucky is predominately a rural state. Since 1960, most pedestrian fatalities have occurred in rural areas. However, only 342 pedestrian accidents have occurred annually on the rural state-maintained highway system out of an estimated 1,500 pedestrian accidents in Kentucky in 1973. Nearly 30 percent of all rural pedestrian accidents are fatalities whereas only 4 percent were fatalities in urban areas. There were virtually no property-damage-only pedestrian accidents reported.

To obtain information on rural pedestrian accidents, files of state-police-reported rural accidents for 1972 and 1973 were searched. To study pedestrian accidents in urban areas, data were obtained directly from local police departments of cities -- Louisville, Lexington, Covington, Owensboro, Bowling Green, Paducah, Ashland, Newport, and Frankfort. The populations of these cities range from about 362,000 (Louisville) to about 22,000 (Frankfort). The accident information was analyzed to determine major causes and patterns of pedestrian accidents.

## HUMAN FACTORS

Many traffic accidents result from errors in human judgment. Past research indicates that about two out of every three pedestrians killed in traffic accidents violated a traffic law or committed an unsafe act (4). Thus, a reasonable approach to reducing traffic accidents of any kind is to analyze the

nature and possible causes of human error and seek to remedy them. The human factors considered were the effect of the ages of the pedestrian and the driver, pedestrian action preceding the accident, and the cause of the accident.

The age of pedestrians killed in traffic accidents was plotted against percentage of occurrence. Pedestrian fatalities were highest for ages under 9 and over 64. Most people killed in all statewide traffic accidents are between the ages of 15 and 44, which corresponds to the age range of the vast majority of drivers (5). The large percentage of deaths of very young pedestrians results from their lack of understanding of traffic dangers. The high percentage of fatalities within the elderly pedestrian group results from reduced mobility and failing eyesight or hearing. A plot of annual fatality rate for ages of pedestrians from 1 to 75 years resulted in an U-shaped curve.

The major pedestrian action preceding the fatal accidents involved crossing the street (69 percent). As expected, walking with traffic causes three times as many pedestrian fatalities as walking against traffic (15 to 5 percent). Standing, lying, or playing in the roadway was associated with 11 percent of the pedestrian fatalities.

Most pedestrian fatalities were the fault of the pedestrian (69 percent). A large percentage of fatalities (25 percent) involved children under 10 playing in or running across the street. Although a national study (4) indicated about 23 percent of all pedestrians killed in accidents had been drinking, only 5 percent were identified as such in Kentucky. It may be important to also note that, although 20 percent of all pedestrian fatalities occur at intersections, only 3 percent of them resulted from an illegal intersection crossing. The major driver fault was speeding or reckless driving (12 percent). Inattentiveness was a factor in 9 percent of the cases, and drinking caused 4 percent of the fatalities. Alcoholic affectation, therefore, was responsible for about 9 percent of the pedestrian fatalities compared to about 17 percent of all traffic fatalities in Kentucky.

### ENVIRONMENTAL FACTORS

Environmental conditions associated with fatal pedestrian accidents are of particular importance because they give the engineer information that may be helpful in deciding what physical characteristics of the roadway may contribute to pedestrian fatalities. Particular environmental conditions considered herein are road defects, road character, weather and light conditions, type and class of road, and area or county where pedestrian fatalities are most prevalent.

Of the 321 pedestrian fatal reports examined, only 12 indicated any road defect which could have contributed to the accident. Of the 12 road defects, five were defective shoulders and two were road construction zones. One defect was indicated as holes, ruts, or bumps in the roadway. Other defects

included a dirt road and mud, sand, and other loose material on the road surface.

The most common characteristic of pedestrian fatality locations was a straight, level roadway (41 percent). Other types with appreciable fatalities were intersections (20 percent), straight roads on a grade (14 percent), and alleys and driveways (13 percent). The remaining fatalities occurred on curves (8 percent), in parking lots (2 percent), and at interchanges and bridges (1 percent each).

A summary of weather and light conditions showed that most (52 percent) pedestrian fatalities occurred during daylight hours (46 percent on dry pavements and 6 percent on wet pavements). Lighted streets accounted for only 12 percent (7 percent on dry and 5 percent on wet pavements) and dark street conditions existed during 36 percent (28 percent on dry and 8 percent on wet pavements) of the pedestrian fatalities. Dry highway surfaces were reported in 81 percent of these accidents.

The percentage of fatalities by location type (rural, small urban, and large urban) and number of lanes was also determined. Two-lane roads accounted for 75 percent of these fatalities, and about 61 percent of them were in rural areas. Interstates and parkways accounted for 9 percent even though pedestrians are prohibited on these facilities.

#### **TIME FACTORS**

The relationship between time of day and the percentage of pedestrian fatalities in Kentucky was determined. Maximum occurrences were noted at approximately 4:00 p.m. and a minimum at 4:00 a.m. However, there was a large increase in pedestrian fatalities between 7:00 and 8:00 p.m., corresponding either to dusk or early nighttime hours when the pedestrian is particularly hard to discern. Much of the pedestrian activity normally subsides after 10:00 p.m.

The relationship between day of the week and the percentage of pedestrian fatalities shows a broad peak from Wednesday through Saturday. Pedestrian fatalities are more evenly distributed through the week; the exposure of school children to motor vehicles before and after school on weekdays, combined with weekday pedestrian shopping trips, tends to smooth the curve of pedestrian fatalities over the week. Mondays and Tuesdays have the lowest percentages of pedestrian fatalities.

#### **PEDESTRIAN ACCIDENT CONCENTRATIONS**

The urban pedestrian accidents included 1,650 which occurred in the nine largest Kentucky cities in 1972 and 1973. In the larger cities there are large numbers of accidents due to congestion. There were over 20,000 traffic accidents within the city limits of Louisville in 1973 compared to about 30,000 accidents reported over the entire rural highway system in Kentucky by state police in 1973. There were 476 pedestrian accidents in Louisville in 1973 compared to 342 over the statewide rural highway

system.

The annual number of pedestrian accidents is shown in Figure 1 as a function of city population. The plot shows a uniform increase in pedestrian accidents as population rises from 22,000 to 360,000. As can be seen, a straight line closely represents six of the nine cities. Covington and Newport, therefore, have a more serious pedestrian accident problem than the other cities. The annual occurrence rates for pedestrian accidents (per 100,000 population) were also plotted versus city populations. The rates of 208 in Newport in 169 in Covington were high relative to the other cities. Paducah showed a slightly lower pedestrian accident rate for its population.

The 120 Kentucky counties were grouped by nine population groups. The number of fatalities per county, the average population of the counties in each group, and fatality rates for each of the groupings were computed. The pedestrian fatality rate decreases with increasing population because of the high percentage of deaths in predominately rural counties. The higher vehicle speeds in pedestrian-related accidents on rural roads present a greater likelihood of a fatality. Because of the large number of pedestrian accidents in urban areas, combined with a high risk of any pedestrian accident resulting in a fatality, the pedestrian death rate rose in the most highly populated Jefferson County. The average annual number of pedestrian fatalities increased from about 0.5 in sparsely populated counties to about 40 in Jefferson County with a population of over 600,000 (Figure 2).

### COUNTERMEASURES

Because of the random occurrence of pedestrian accidents and the low numbers of them as compared to other accidents, cost-effective countermeasures are not always possible. The pedestrian accident problem must be handled in the planning stages of highway networks instead being treated only after a concentration of such accidents is noted at a particular location. Some measures which have been used successfully in reducing the potential for pedestrian accidents include

1. vehicle parking prohibition,
2. designation of one-way streets,
3. improvements in overhead street lighting,
4. crosswalk usage,
5. installation of pedestrian signals,
6. use of pedestrian barriers,
7. pedestrian prohibition (on interstates),
8. driver regulations,
9. installation of pedestrian refuge islands,

10. reflectorized apparel for pedestrians,
11. special pedestrian signing and markings,
12. shoulder widening (rural areas),
13. sidewalk installation,
14. grade-separated crossings,
15. construction of pedestrian malls,
16. playgrounds built in urban areas,
17. pedestrian education programs, and
18. increased enforcement of pedestrian and driver regulations.

#### REFERENCES

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3. **Standard Summary of Motor Vehicle Accidents in Kentucky**, Kentucky State Police, 1960 to 1973 Editions.
4. **Facts About Pedestrians**, American Automobile Association, May 1973.
5. **Kentucky Fatal Accident Facts**, Kentucky Bureau of Highways, 1972 and 1973 Editions.

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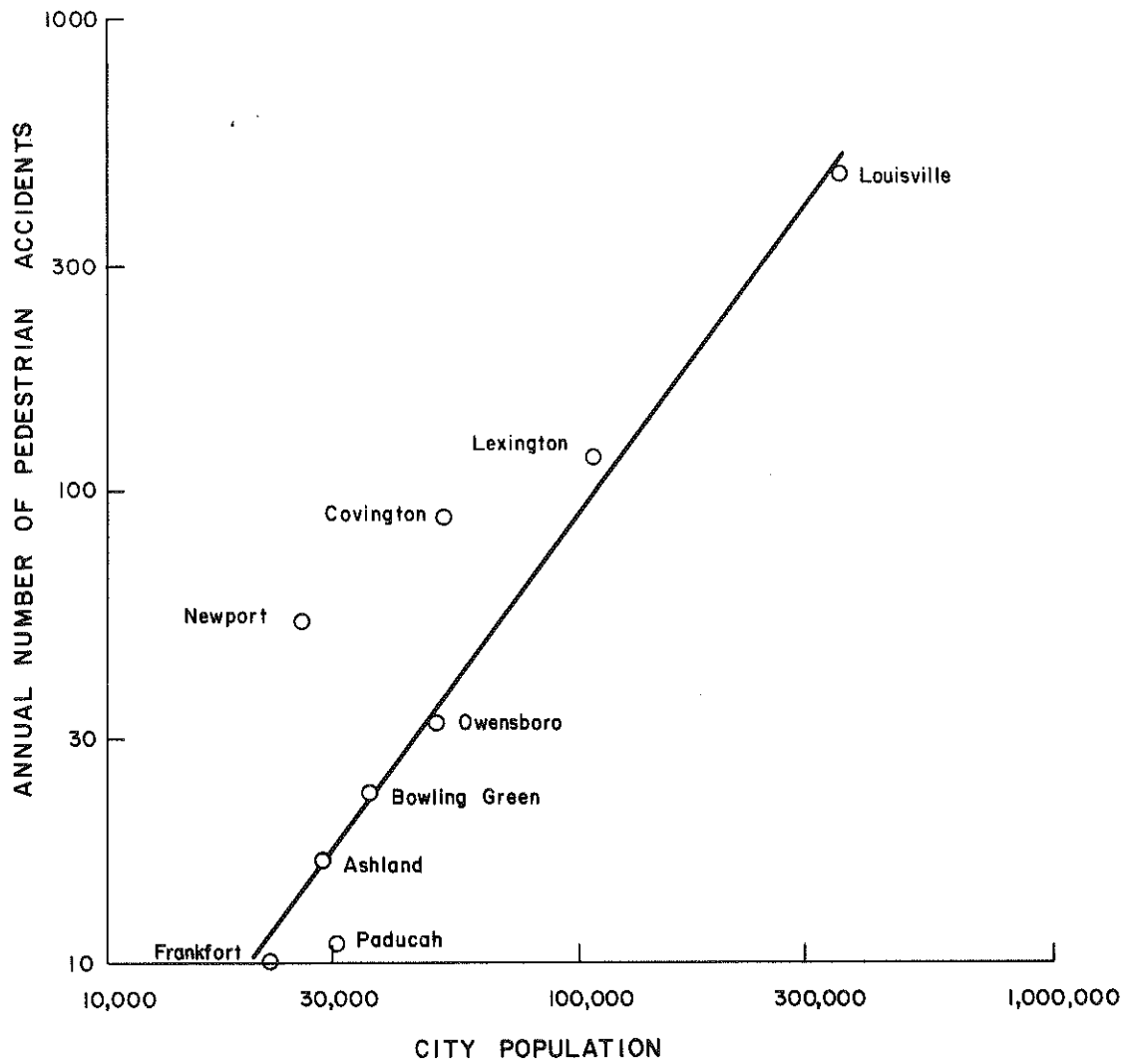


Figure 1. Relationship between Annual Number of Pedestrian Accidents and Population in Major Kentucky Cities.



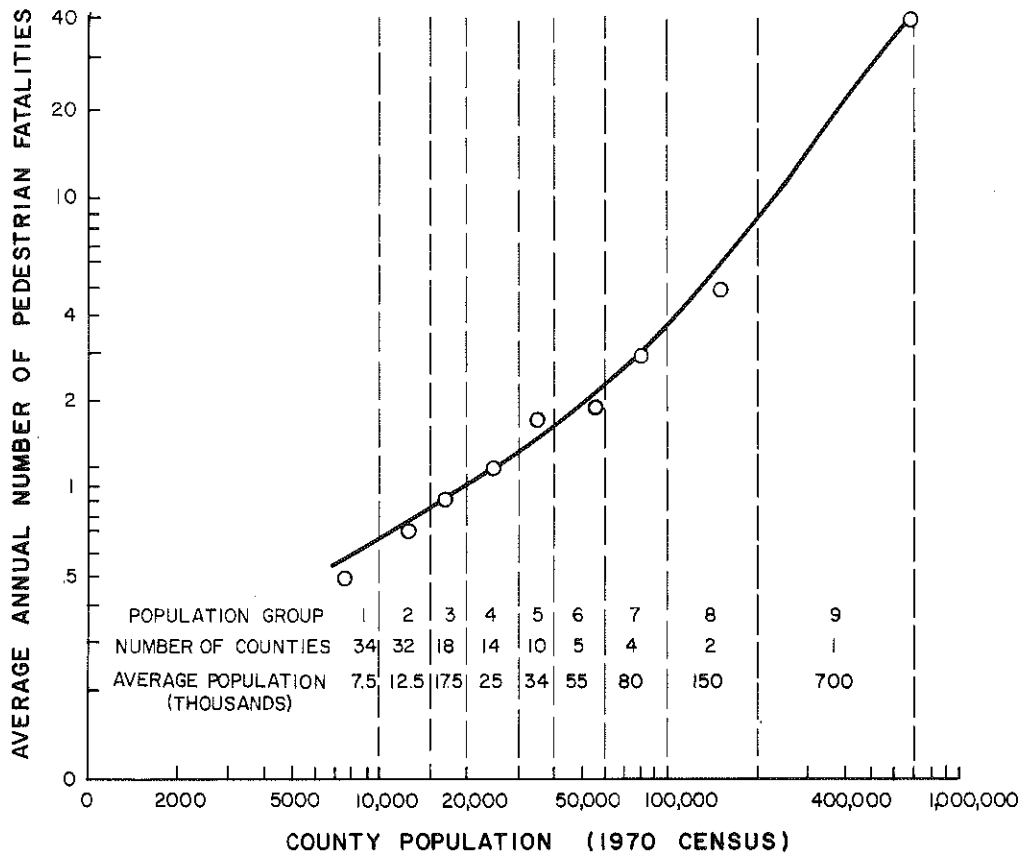


Figure 2. Relationship between County Population and Average Annual Pedestrian Fatalities.