<u>The incidence burden of unreported pedestrian crashes in Illinois</u>

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Abstract

Communities with high rates of pedestrians struck by motor vehicles may miss out on mitigation resources and suffer worse medical outcomes if crashes there go unreported to police. Using hospital records of pedestrians treated for injuries sustained by a motor vehicle that were not able to be linked with a corresponding police report, this paper investigates the places, people, and communities in Illinois where struck pedestrians are most likely to go unreported. We find that the incidence of unreported struck pedestrians was not randomly distributed. Blacks struck by a motor vehicle were disproportionately likely to go unreported to police. Zip codes with the most unreported crashes per capita on average had double the poverty rate and 2.6 times the carless household rate as the rest of Illinois. Struck pedestrians diagnosed at the hospital with an intoxicating substance went unreported to police nearly 70% of the time. Generally, more severe head and thorax injuries were more likely to be reported. Struck pedestrians outside of Cook County averaged a 60% discordance rate, those within Cook County averaged a discordance rate of about 50%. Struck pedestrian cases reported to police averaged emergency department charges of about $2,500 more than unreported cases. Recommendations are made for community outreach to stress the importance of reporting incidents to police, along with adjusting case count numbers in police records using hospital data.

Introduction

An accurate accounting of the communities in which pedestrians are struck by motor vehicles is critical for policymakers to appropriately distribute resources for mitigation efforts. But when police crash records are used to make resource allocation decisions, an inequitable distribution may result. This inequitable distribution of resources may occur because of a propensity among some community members to not report incidents involving motor vehicles and pedestrians. Instead, some pedestrian crash victims may bypass alerting police and secure unofficial means of transport to a hospital for treatment of injuries. In these cases, a police record of the incident is unlikely to exist. This paper seeks to answer two related questions: 1) how prevalent are unreported struck pedestrians? 2) If they do occur, where do they happen the most and who are most affected?

Related literature

Doggette et al. (2018) assert that this stream of research on pedestrian and bicycle crashes rely upon police and hospital data, while treating unlinked cases between the two data sets as those unreported to police. At issue is the underreporting of crashes can lead to ineffective policies and interventions. The ten articles reviewed by Doggett et al. (2018) agree that pedestrian and cyclist

crashes are commonly underreported across a wide sampling of geographies. This may be especially concerning during the COVID-19 pandemic, "… with less cars on the roads, people drive faster, making roadways less safe for drivers, passengers, pedestrians and cyclists" (McFarland, 2021).

Stutts and Hunter (1999) study pedestrian and cyclist crashes across a mix of urban, suburban, and rural sites in California, New York, and North Carolina. Results show that a high number of injured pedestrians and cyclists do not involve a motor vehicle, and some of them were injured in non-roadway settings, like sidewalks, parking lots, off-road trails, or private property (Ibid). Similarly, Langley et al. (2003) find that crashes on public roads involving non-motorized vehicles are rarely reported to the police.

Sciortino (2005) argues that Black males are less likely to be included in crash records because of a reluctance to call police, leading to an underreporting of injuries by an estimated 21%. Tarko and Azam (2011) find that pedestrians are less likely to be included in the database if the crash took place on a state road, a Y intersection, or a divided highway. They also find crashes are more likely to be included if they happened while crossing a road, rather than walking or standing along a road. Their analysis further shows that males and older pedestrians were particularly prone to the most severe injuries. Finally, vehicle type also played a role in injury severity, they assert, "size and weight of the vehicle involved in a pedestrian crash were also found to have an effect on the pedestrian injury level" (Ibid).

Langley et al. (2003) find that pedestrian and bicycle crashes are less likely to involve insurance compensation, implying a lower propensity to report the incident to police. Similarly, Lujic et al. (2008) find that those entitled to insurance compensation were more likely to alert the police, since such a report is often required for remission by insurance companies. Moreover, Langley et al. (2003) estimate that only 22% of bicyclist crashes can be linked to a corresponding crash report – indicative of potentially systemic issues in the administration of record keeping. In those crash reports, injury classification judgements are made by police officers. Since police officers are not normally trained medical professionals, they may classify minor injuries as severe (like those that involve bleeding), or overlook more severe injuries like internal bleeding (Doggett et al., 2018). Additionally, age, race/ethnicity, injury severity, and cumulative length of hospital stay were all significant predictors of whether crashes were likely to be reported (Langley et al., 2003).

Sources and methods

Funded by a grant from the Centers for Disease Control and Prevention, the Illinois Department of Public Health in collaboration with the Illinois Department of Transportation and the University of Illinois at Springfield successfully linked Illinois crash and hospital records for the years 2016 through 2018. The linkage was accomplished using the software LinkSolv – consisting of

probabilistic methods developed in the National Highway Traffic Safety Administration's Crash Outcome Data Evaluation System program (McGlincy, 2021). These linked files are critical in our understanding of the effects of motor vehicles on the lives of the citizens of Illinois. Such an investigation as presented here would not be possible without the successful linkage of the disparate crash and hospital files.

Discordance rate

Unlinked, or discordant, hospital records of pedestrians struck by a motor vehicle did not necessarily go unreported to police. It is possible some cases were simply unable to be successfully linked despite an existing corresponding police crash record. On the other hand, it is unlikely that such cases exist in quantities as to alter the results of the analysis presented here. Finally, results are shown to be statistically significant by several measures.

The rate of unreported pedestrians struck by a motor vehicle is calculated using the discordance rate equation published by Watson et al. (2015):

$$Discordance\ \% = \left(1 - \frac{c}{b}\right) x\ 100$$

where *C* equals the number of linked cases, and *B* equals the number of cases in the hospital file. The discordance rate communicates the proportion of cases found to be unlinked. Yet Doggett et al. (2019) find the inverse of the discordance rate, the hospital link rate, to be the most commonly used metric in the research literature. The hospital link rate, then, communicates the success rate, or the proportion of linked cases.

Some 11,595 cases were coded in the hospital file using the International Classification of Diseases, Tenth Revision (ICD-10) as a pedestrian struck by a motor vehicle. Of those, 5,148 cases were successfully linked to the corresponding crash file. Using the equation above, this calculates to a discordance rate, or unlinked rate, of 55.6%. The hospital link rate method then calculates to a 44.4% success rate. Since just about 83% of Illinois hospitals report ICD10 codes, these numbers are most certainly an under-counting of the true scale of discordant pedestrian crashes.

Data independence

To check for independence in the linked and unlinked hospital records, several Chi-squared (χ^2) tests were performed across characteristics that may affect discordance rates. The tested characteristics (age, sex, and race) were all found to have significant alpha values of <0.01, suggesting a lack of bias in the linkage process and methodology. To estimate the strength of the association between files a Cramer's V (Φ_c) test was performed (Table 1) for the same characteristics (age, sex, and race).

Table 1: Chi-squared and Cramer's V tests of linked and unlinked hospital files

Characteristic	χ^2	Φ_c	p
Age	9787	.143	< .01
Sex	7395	.565	< .01
Race	7482	.284	< .01

Predictive modeling of pedestrian sociodemographics

An ordinary least squares (OLS) regression model was fitted to the discordance rate data at the zip code level to predict those sociodemographic factors that may have an effect on pedestrian crashes. The dependent variable was the discordance rate per capita in each Illinois zip code. The independent, or predictive, model variables were as follows: proportion of carless households in zip code *(crlshh)*, median household income of zip code *(medhh)*, zip code poverty rate *(povrte)*, crash victim under 18 years of age *(yngbnry)*, crash victim aged 65 or older *(senbnry)*, crash victim Hispanic *(hispbnry)*, crash victim White *(whbnry)*, crash victim Black *(blkbnry)*, crash victim Asian *(asibnry)*, crash victim race "other" *(othbnry)*. The OLS model takes on the following general form:

$$N_k = \beta_0 + \beta_1 crlshh + \beta_2 medhh + \beta_3 povrte + \beta_4 yngbnry + \beta_5 senbnry + \beta_6 hispbnry + \beta_7 whbnry + \beta_8 blkbnry + \beta_9 asibnry + \beta_{10} othbnry + \varepsilon$$

The OLS model as fitted was predicted to be significant, able to explain 49.4% of the variation (R^2) in the dependent variable (discordance per capita in each Illinois zip code), and had a *p* value of < 0.001. OLS model estimations are presented in the Results section below.

Results

Summary statistics

A geographical divide emerges between Cook County (home to Chicago) and the rest of Illinois when investigating unreported pedestrian crashes. Cook County had an average discordance rate about ten percentage points lower than the rest of Illinois, 50% compared to 60%, respectively. Still, almost 64% of unreported pedestrian crashes occurred in Cook County and 33.5% of them were in Chicago. Statewide, Blacks were victims in 35.3% of unreported pedestrian crashes, and Hispanics accounted for 14.3% of unreported cases. Whites, meanwhile, comprised about 44% of unreported struck pedestrians statewide. As for a source of apprehension in contacting police, some 6.4% of pedestrians who did not report the incident to police were diagnosed at the hospital as having an intoxicating substance present in their system.

Illinois is a large and diverse state. From the streets of Chicago in the north to the corn fields of Jefferson County in the south. Given that diversity a thorough parsing of each county and city across the state is beyond the scope of this paper. However, an attempt is made to control for the unique differences experienced between a dense urban environment and a more rural agrarian

environment. Three sets of discordance rates are presented in Table 2 by pedestrian characteristic and geographic location: 1) all of Illinois 2) just Cook County 3) Illinois exclusive of Cook County.

Relative to the rest of Illinois, Cook County had lower discordance rates by most pedestrian crash victim characteristic measures. The average discordance rate in Cook County was 50.2% compared to the relatively higher 60% in the rest of Illinois. The lower rate implies that when a pedestrian was struck by a motor vehicle in Cook County it was more likely to be reported to police relative to other parts of Illinois. Though relatively lower, the discordance rate of Cook County still implies that some 50% of cases went unreported to police.

Age groups and reporting

Children had the lowest discordance rate among age groups throughout the state. This may be explained, in part, by a protective posture taken by a parent or guardian and a strong preference for securing appropriate medical care for a minor dependent. In Cook County, seniors had a similar discordance rate to that of children – about 47%. For struck senior pedestrians concern of serious injury is elevated relative to other adults, likely prompting more victims and crash witnesses to report the incident to police. Struck adult pedestrians (aged 18 to 64) outside of Cook County had a discordance rate of greater than 66%, implying that only one-in-three cases were reported to police. Sex had a diminished effect outside of Cook County, but within those boundaries males had a discordance rate about six percentage points higher than females.

Race, ethnicity, and reporting

Among racial/ethnic groups, Blacks had the highest discordance rate both inside and outside of Cook County at 56.1% and 68.1%, respectively. Whites had the second highest discordance rate at 50% and 64.1% within and outside of Cook County, respectively. Interesting to note is the high number of "Other" category occurrences. Some 2,139 pedestrian crash victims had their race classified as "Other" in the hospital file. It is not known if this classification was self-applied or whether the medical professional recording the information was uncertain of the victim's race. A third possible explanation is there was no field in the record keeping device that matched with how the victim identified.

The discordance rate of Hispanic pedestrian crash victims falls somewhere in between that of Blacks and Whites. Within Cook County the Hispanic population had a discordance rate of 51.2%. Outside of Cook County that rate climbed to 65.7%.

Substance use and reporting

Apprehension to report a pedestrian crash to police likely has its roots firmly planted within multiple sources. One of those sources may be substance use among crash victims. Substance use may impair judgement that impedes reporting of an incident to police by crash victims and witnesses alike out of fear of a punitive response. Substance use may also impair the judgement of injury severity, leading victims to underestimate the extent of their injuries and to believe reporting their case is unwarranted. The section above reports that Blacks have the highest

discordance rate among racial groups with Hispanics and Whites not far behind. But a careful examination of records reveals that substance use may be dependent upon a combination of race and geography. For example, Blacks were disproportionately diagnosed at the hospital as having cannabis in their system. Among unreported pedestrian crash victims in Cook County, Blacks made up 40.6% of cases, but represented 50% of those diagnosed at the hospital with cannabis in their system. Outside of Cook County, Blacks made up 30.8% of positive cannabis diagnoses and 26% of unreported cases. Cook County Whites made up 33.2% of unreported cases and 24.2% of positive cannabis diagnoses. Whites outside of Cook County were 63.2% of unreported cases and 51.3% of positive cannabis diagnoses – still representative of the majority of cases but disproportionately low.

Cook County Whites were disproportionately diagnosed at the hospital as testing positive for alcohol at 39% of such cases, but again just 33.2% of unreported cases. Blacks in Cook County were underrepresented in positive alcohol diagnoses at 32.2% of cases, and again 40.6% of unreported pedestrian crash cases. Whites outside of Cook County were also overrepresented in positive alcohol diagnoses at about 66% of cases and 63.2% of unreported cases. Blacks outside of Cook County remained underrepresented in alcohol related cases at 22.7% and 26% of unreported cases. Hispanics in Cook County were also overrepresented in positive alcohol diagnoses by about seven percentage points at 25.4% of such cases, and 18.2% of unreported pedestrian crashes. Outside of Cook county Hispanics were underrepresented in alcohol diagnoses at 4.5% of cases but 7.5% of unreported pedestrian crashes. But they were overrepresented in cannabis diagnoses at 12.8% of cases outside of Cook County.

Table 2 shows that in the aggregate, positive substance diagnoses were associated with the highest discordance rates among characteristic groups. The effect is especially strong outside of Cook County with an average discordance rate across substances of almost 69%. Within Cook County the average discordance rate across substances drops, but only by a few percentage points to 65.5%.

*Table 2: Discordance rates of selected pedestrian characteristics by geography**

Pedestrian Characteristic		All of Illinois			Cook County			IL Exclusive of Cook Co.		
		Cases in Hospital File	Unlinked Hospital Cases	Discordance Rate	Cases in Hospital File	Unlinked Hospital Cases	Discordance Rate	Cases in Hospital File	Unlinked Hospital Cases	Discordance Rate
Age	<18	1889	938	49.7%	1199	559	46.6%	690	379	54.9%
	18-64	8434	4850	57.5%	5858	3133	53.5%	2576	1717	66.7%
	65+	1272	659	51.8%	888	415	46.7%	384	244	63.5%
Sex	Male	6472	3739	57.8%	4251	2327	54.7%	2221	1412	63.6%
	Female	5121	2708	52.9%	3692	1780	48.2%	1429	928	64.9%
Ethnicity	Hispanic/Latino	1730	925	53.5%	1462	749	51.2%	268	176	65.7%
	Non-Hispanic	9791	5448	55.6%	6424	3133	48.8%	3367	2155	64.0%
Race	American Indian or Alaska Native	49	18	36.7%	39	13	33.3%	-	-	-
	Asian	333	132	39.6%	284	111	39.1%	49	21	42.9%
	Black or African American	3867	2276	58.9%	2974	1668	56.1%	893	608	68.1%
	Native Hawaiian or Other Pacific Islander	40	20	50.0%	34	16	47.1%	-	-	-
	White	5037	2844	56.5%	2728	1364	50.0%	2309	1480	64.1%
	Declined or Unknown	56	24	42.9%	52	23	44.2%	-	-	-
	Other	2139	1100	51.4%	1789	897	50.1%	350	203	58.0%
	Two or More	74	33	44.6%	45	15	33.3%	29	18	62.1%
Substances	Alcohol	165	103	62.4%	99	59	59.6%	66	44	66.7%
	Cannabis	151	101	66.9%	93	62	66.7%	58	39	67.2%
	Opioid	152	89	58.6%	130	75	57.7%	22	14	63.6%
	Cocaine	120	79	65.8%	87	56	64.4%	33	23	69.7%
	Other Drug	36	28	77.8%	19	15	78.9%	17	13	76.5%
Head Injury Severity	0	9058	5275	58.2%	6223	3369	54.1%	2835	1915	67.5%
	1	1518	699	46.0%	981	406	41.4%	537	293	54.6%
	2	604	284	47.0%	454	209	46.0%	150	75	50.0%
	3	400	182	45.5%	279	128	45.9%	121	54	44.6%
Thorax Injury Severity	0	10395	5812	55.9%	7233	3737	51.7%	3162	2075	65.6%
	1	658	375	57.0%	392	215	54.8%	266	160	60.2%
	2	361	175	48.5%	209	104	49.8%	152	71	46.7%
	3	172	84	48.8%	105	50	47.6%	67	34	50.7%

"-" Indicates cell count of <10 redacted for patient privacy: Abbreviated Injury Scale (AIS) for head and thorax severity – 0: No injury, 1: Minor, 2: Moderate, 3: Serious, 4: Severe, 5: Critical, 6: Maximal (untreatable)

Injury severity and reporting

Generally, as head and thorax (upper body that houses vital organs) injury severity increased, discordance rates decreased, with some variation. Intuitively, one would expect a pedestrian crash victim, or witness thereof, to have a greater predilection to notify authorities when the injury seems more severe. Still, akin to other pedestrian characteristics measured, cases outside of Cook County generally took on a higher discordance rate. Several forces are likely at work influencing whether an incident is reported to police. Among them may be prevalence of witnesses and

expectation of care. Pedestrians struck within Cook County, where population is dense, have a greater chance of someone witnessing the crash and notifying the police. Those involved in a pedestrian crash in Cook County also likely expect a speedy medical response by emergency personnel to the crash scene. Outside of Cook County, especially in agrarian parts of the state where the population is not dense, pedestrians struck by a motor vehicle have a diminished chance of another bearing witness and alerting police. Rural crash victims may also seek out other means of transport to medical facilities because of an expectation of delayed emergency medical response to the scene of the incident.

On average, pedestrian crash victims with head injuries had lower discordance rates than those with thorax injuries – which makes intuitive sense as even minor head lacerations can be notoriously bloody. Further, head injuries are commonly understood to be of a serious nature. Still, pedestrian crash victims with "serious" thorax injuries had a discordance rate over 50% outside of Cook County, and a rate approaching 48% within. And "serious" head injury discordance rates were in the mid to upper 40% range both inside and out of Cook County.

Economic indicators where discordance rates are high

When unreported incidents are examined at the zip code level, socioeconomic disparities begin to take shape. On average, unlinked pedestrian crash victims residing in Chicago live in a zip code where greater than one in four (25.6%) households do not own a car. Statewide, exclusive of Chicago, unlinked pedestrian crash victims live in a zip code where on average only 11.2% of households have no car. Looking more closely, when examining zip codes that have a per capita discordant incident rate of 0.001 or greater, 30 cases emerge. Figure 1 graphs the carless household rate and the poverty rate for each of these zip codes. The high rates of poverty and households without cars implies inadequate and/or unreliable access to transportation and may lead to more walking among residents. Though there are some who choose not to own a car in pursuit of a particular lifestyle even though they can afford it (Brown, 2017), and Chicago may have a higher population of such individuals compared to other cities. Still, relative to the rest of Illinois all 30 zip codes have a higher carless household rate or a higher poverty rate, and all but three are higher in both. In fact, the average poverty rate of these zip codes is double that of the rest of Illinois at almost 24%, compared to about 12% statewide. Finally, these zip codes have a carless household rate some 2.6 times the rest of Illinois at about 23%, compared to about 8% statewide.

Figure 1: Poverty and carless household rates of the 30 highest discordant incidents per capita zip codes
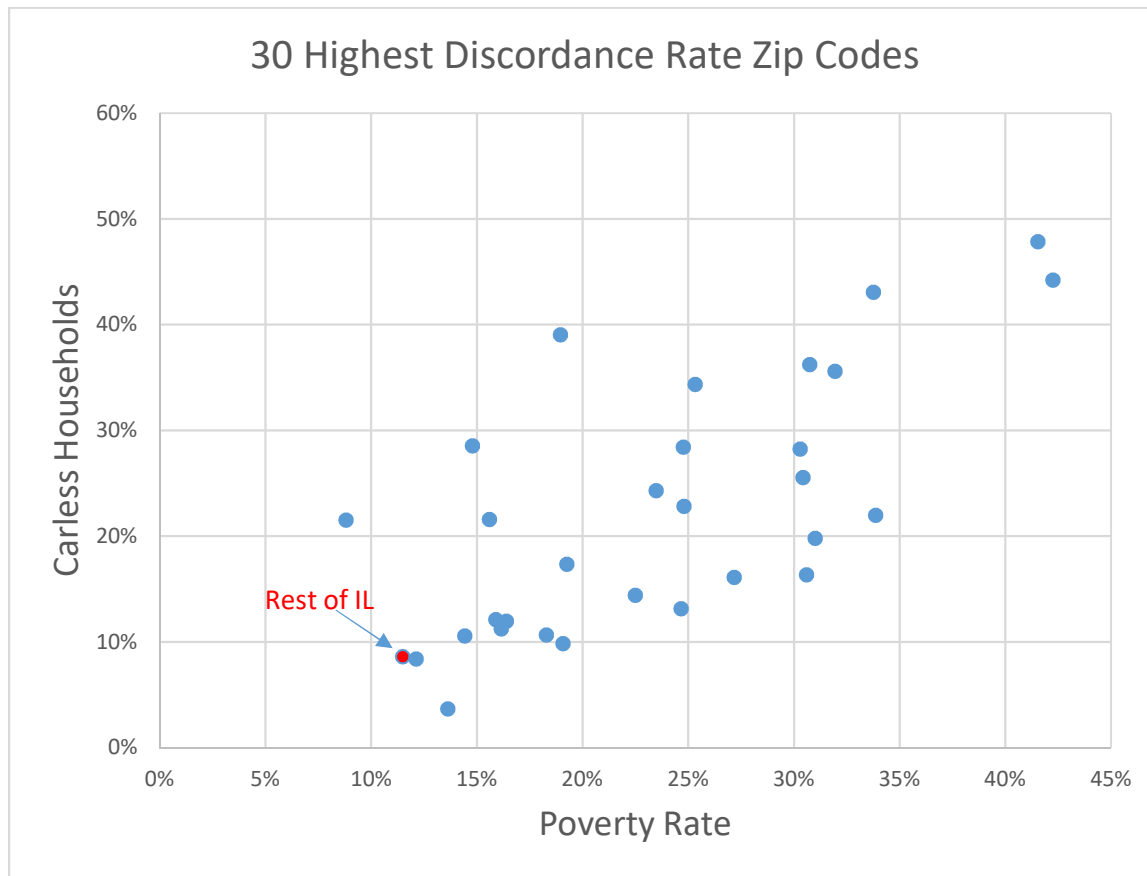
The roughly linear relationship between poverty and carlessness is evident in Figure 1: generally, poverty and carlessness increase together. The poverty rate commonly exceeds the proportion of carless households in these zip codes, even when the poverty rate extends into the 30% range. That some in poverty within these zip codes would prioritize financing car ownership is suggestive of the strong desire and even necessity for cars for some of these residents.

Sociodemographic modeling results

Table 3 presents the OLS model results that estimate the relationship between selected sociodemographic factors of pedestrian crash victims and zip code discordance rates. Because of the manner in which the variables are measured the effect each has (the coefficient column) on the dependent variable appears small. For example, the model estimates that every dollar increase in zip code median household income is correlated with a 1.73×10^{-9} percentage point decrease in discordance per capita rate for that zip code. Which indeed may be small, but significant. Those variables estimated to add significantly to the model at the 5% level with a positive sign are predicted to correlate with an increase in zip code discordance rate. In other words, the model

estimates those variables are associated with an increase in unreported pedestrian crashes. Conversely, those variables that add significantly to the model with a negative (-) sign are predicted to correlate with a decrease in zip code discordance rate – a decrease in unreported pedestrian crashes.

The results presented in Figure 1, increasing discordance rates and its relationship with poverty and carlessness, are supported by the results of the fitted OLS model. Increased proportions of carless households in Illinois zip codes is estimated to correspond with increased rates of unreported pedestrian crashes. Zip codes with higher poverty rates are also predicted to correlate with higher rates of un-reporting. These findings also suggest that those more affluent zip codes correlate with decreased rates of unreported pedestrian crashes, a finding also supported by the model. Further, the model predicts that being Black or Hispanic is also correlated with higher discordance per capita rates at the zip code level.

Table 3: OLS results modeling sociodemographic factors of pedestrian crash victims and discordance per capita rates at the zip code level (dependent variable: zip code discordance per capita)*

| Variable	Coefficient	Significance
Carless HH (%)	**.001**	**.000**
Median HH Income ($)	**-1.73x10^{-9}**	**.000**
Poverty Rate (%)	**.002**	**.000**
Child (binary)	1.33x10^{-5}	.257
Senior (binary)	-1.49x10^{-5}	.288
Hispanic (binary)	**4.69x10^{-5}**	**.001**
White (binary)	-8.54x10^{-7}	.979
Black (binary)	**7.86x10^{-5}**	**.015**
Asian (binary)	-7.33x10^{5}	.069
Other (binary)	4.82x10^{-5}	.137

Sociodemographic factors significant at the 5% level are in **bold*

Mapping high discordance rate zip codes

So where in Illinois are these high discordance rate zip codes? Figure 2 provides a geographical representation of their locations. The five highest tend to be in the western portion of Chicago and the southwestern portion of Cook County. The sixth and twentieth highest discordance rate zip codes are in the downtown to northwest, and southeast portions of Rockford, respectively. The ninth highest zip code is located in the southwestern portion of Peoria, stretching from just outside of downtown to Interstate 474. The thirtieth highest discordance rate zip code is also in Peoria, just to the northeast of downtown in the area of the Peoria Zoo. In fact, one-in-three of the zip codes with the highest discordance rates are well outside of Chicago and Cook County, further supporting the finding that the un-reporting of pedestrian crashes is not just a big city problem. When standardizing unreported cases per 100,000 people at the zip code level (Figure

2) those communities with elevated rates become evident within Peoria, Rockford, and Chicago, among others.

Figure 2: Discordant rates at the zip code level per 100k population across Illinois 2016-18
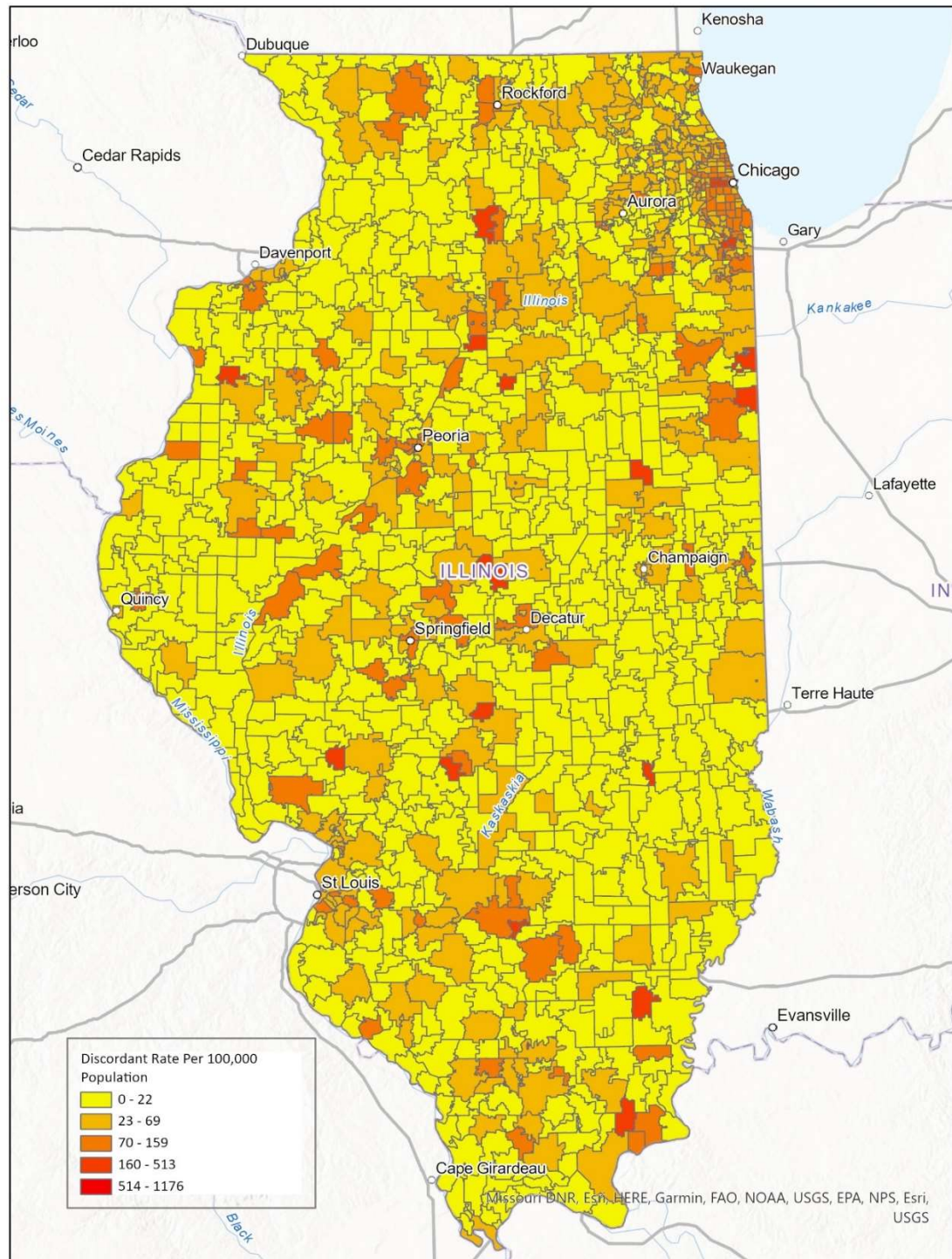
Hospital charges

The difference in cost of medical care between reported and unreported pedestrian crash victims is yet another important dimension to consider. Table 4 shows the distribution of hospital charges by linked and unlinked pedestrian crashes and by length of stay. Intuitively there is a significant difference in charges between inpatient stays and emergency department visits. What is not necessarily intuitive is that linked cases commonly resulted in higher charges. Inpatient stays for linked cases were about $16,000 more on average than unlinked cases. Emergency department visits also saw some variation in charges, though to a lesser degree. Linked emergency department visits were charged about $2,500 more on average than unlinked cases. A factor influencing these higher charges among linked pedestrian crash cases may be found in Table 2: those with more severe injuries tended to have a higher linkage rate.

Table 4: Hospital charges by linkage, payer, and length of stay

Hospital Charges	Unlinked Inpatient	Unlinked Emergency Dept.	Linked Inpatient	Linked Emergency Dept.
Average	$92,401	$6,377	$108,590	$8,857
Median	$52,216	$3,258	$67,509	$4,847
Standard Deviation	$116,469	$7,824	$140,817	$9,896
Length of Stay				
Average	7 days	-	7.5 days	-
Median	4 days	-	5 days	-
Standard Deviation	10.7 days	-	8.9 days	-

Another contributing factor to the deviation in hospital charges across linked and unlinked pedestrian crashes may be the victims' length of stay. Unlinked cases stayed an average of a half day shorter and a median of one day shorter, compared to linked cases. Once more, more severe injuries among linked cases combined with longer stays are likely contributing factors.

Discussion

It cannot be stated with absolute certainty that each unlinked pedestrian crash went unreported to police. Still, results were shown to be statistically significant. It was demonstrated that the incidence of unreported pedestrian crashes was not randomly distributed. Incidents disproportionately fell upon communities with high poverty rates and high rates of households without access to a car. In fact, on average the zip codes with the highest discordant incidents per capita had poverty rates double that of the rest of Illinois. Those zip codes also contained carless households at 2.6 times the state average. Cases involving Blacks struck by a motor vehicle were also disproportionately likely to go unreported to police. Crashes outside of Cook County were shown to go unreported to police at a higher rate than cases within, possibly because of an expectation of long arrival times for emergency responders. The presence of intoxicating substances was demonstrated to be related to discordance rates approaching 70%, suggesting a

misjudging of injury severity or even an apprehension to involve law enforcement. Finally, cases involving more severe injuries were more likely to be reported to police.

When used in this manner, the data give us a pretty good idea of where unreported pedestrian crashes occur, the circumstances around the crash, and even who are disproportionately affected. Yet, the factors influencing whether or not victims and/or witnesses decide to report a struck pedestrian to police are likely complex, making the improvement of discordance rates likewise complex. Still, this report has examined a few possible, if partial, explanations for un-reporting which can be used to inform strategies for improvement.

Conclusion

Without correct data on where pedestrians are being struck, those communities most affected by high incidence rates may miss out on badly needed resources for mitigation efforts. For a more equitable distribution of those available resources an effort should be made for better accounting of incidents. Two suggestions are made which may help policymakers have a more complete understanding of where the problem persists. First, a communications and outreach strategy targeted at communities with high discordance rates to encourage the reporting of pedestrian crashes. Outreach strategies should specifically address the presence of intoxicating substances in struck pedestrians to assuage victim apprehension in contacting police. Communications should also stress the importance of reporting every incident, even those in which injuries seem less severe. Finally, it should be made clear that receiving appropriate and professional medical treatment as soon as possible is critical in ensuring the best possible medical outcomes.

Second, a more administrative approach could prove both efficient and effective. Struck pedestrian data could be adjusted using the discordance rate as shown above in combination with crash records to more equitably allocate resources. An adjustment to reported struck pedestrians using hospital records would more accurately reflect the true distribution of incidents. Finally, a combination of both community outreach and statistical administrative adjustments would work together to improve medical outcomes and make streets safer for pedestrians.

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Acknowledgments

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