REGIONAL HIGH INJURY NETWORK

Methodology and Analysis

JULY 2022

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INNOVATING FOR A BETTER TOMORROW

Regional High Injury Network

Methodology and Analysis

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1. Introduction

On average, more than 1,450 fatalities and 5,500 serious injuries occur as a result of traffic collisions each year in the Southern California Association of Governments (SCAG) region. These numbers represent children, parents, spouses, relatives, and friends. Collisions are happening in every community in California, from El Centro in Imperial County to Oxnard in Ventura County. They are happening to people who are driving, and disproportionately, to people who walk and bicycle, and those living in low-income areas and communities of color. There are many reasons that collisions are occurring, but unsafe speed is a top contributing factor of all collisions, accounting for about 20% of fatalities in the region.

Vision Zero is a strategy to eliminate all traffic fatalities and serious injuries and has been gaining traction in the U.S. after years of success in Europe. Southern California jurisdictions such as Culver City, Los Angeles (City and County), and Santa Ana have all adopted Vision Zero strategies. Vision Zero planning approaches across different jurisdictions often address engineering, education, and establishing safe speed limits. Countermeasures that address the three key elements of the road systems (roads, vehicles, and speed) are encouraged because these three elements typically determine trauma levels in a collision.

In an effort to map their existing conditions, many agencies have developed High Injury Networks (HINs), mapping corridors where people have been fatally or seriously injured in traffic collisions. HINs reflect stretches of roadways where the highest concentrations of collisions occur on the transportation network. An HIN is intended to show where fatal and serious collisions are occurring – it is not an assessment of whether a street or location is dangerous. When developing an HIN, jurisdictions typically want to identify a subset of the network where the most collisions are occurring (>50%). Developing an HIN can prove helpful for a variety of reasons, including:

- Determining geographic areas where crashes are concentrated and the causes of these collisions, so that efforts can be focused on the most challenging areas and crash factors;
- Strengthening collaboration to focus street improvements and education campaigns (e.g., *Go Human*) along the HIN; and
- Prioritizing investments.

SCAG first developed a Regional HIN in 2018 (2018 HIN) and updated it in 2022. SCAG's Regional HIN is a network of designated corridor-level segments where the highest concentrations of serious and fatal collisions occur over the course of the most recent five years of available collision data (2015 – 2019). SCAG developed six high injury networks, one for each county in the region, analyzing concentrations of collisions by fatal or serious injury auto-auto, auto-bike, or auto-pedestrian collisions. Overall, the Regional HIN represents 5.5% of the overall transportation network in the region.

SCAG incorporated an overlay showing where the Regional HIN overlaps with Disadvantaged Communities (DAC), Environmental Justice Areas (EJA), and Communities of Concern (COC), and

found the HIN disproportionately overlaps with low-income areas and communities of color. As detailed in the Equity Analysis below, SCAG's Regional HIN is primarily located in equity areas, with about 81% of the roadway miles in DACs, EJAs, or COCs.

In addition, SCAG incorporated another overlay reflecting where the Regional HIN overlaps with High Quality Transit Areas (HQTAs) and Transit Priority Areas (TPAs), where active transportation is encouraged. Within the SCAG region, almost half of SCAG's Regional HIN is in transit areas, with about 46.9% of the roadway miles in HQTAs or TPAs.

SCAG also compared the updated version of the Regional HIN with SCAG's previous 2018 HIN and HINs from other jurisdictions within the region. The 2022 HIN overlapped with 71% of the 2018 HIN. Although there is overlap with HINs from local jurisdictions, there are significant differences between regional and local HINs due to methodological differences, data years, and geographic scale. In light of these differences, SCAG recommends deferring to the designations of local HINs wherever they are available.

2. Goals

Developing an HIN at a regional level presents several challenges. SCAG is an expansive region that includes six counties, 191 cities, and 19 million people. Transportation safety is a multifaceted issue and the sets of challenges facing any one city or county as well as the solutions for addressing those challenges may be very different. Still, transportation issues know no boundaries, and so it is worthwhile to consider collisions occurring across jurisdictions. To stay focused on creating an HIN that is accurate and functional for the entire region, SCAG developed the following goals for the HIN methodology.

SCAG's Goals for Developing the HIN Methodology

- Be sensitive to differing county contexts (e.g., to allow for additional weighting for other factors)
- Be replicable so that it could be used over time to track changes
- Be quantifiable so that assessments can be made objectively
- Focus on collisions resulting in fatalities or serious injuries
- Consider all modes of travel, but provide the option for reviewing only auto-auto, auto-bike, auto-pedestrian collisions
- Identify high injury corridors and not only hot spots
- Include segments that are normalized by length

One way this HIN is sensitive to county contexts is that SCAG created six HINs, one for each county in the region. If a "true" regional HIN were developed for the SCAG region, the concern is that the entire HIN would be concentrated in Los Angeles County due to a higher number of collisions and other areas of the region that have issues that warrant investment by cities/counties would be overlooked. For simplicity, this report refers to the combined product of the six county-level HINs as one HIN (singular) for the entire region.

3. Methodology

From the moment the statewide collision data is downloaded to the presentation of a final HIN, an agency must make several decisions that influence which corridors are included in an HIN. This report provides in depth documentation of the development of SCAG's Regional HIN. For ease of reference, the following table provides a summary of the major decisions SCAG made to shape the HIN.

Quick Reference for Core Elements of SCAG's HIN Methodology	
How many years of data were included?	SCAG included five years of Statewide Integrated Traffic Records System (SWITRS) data made available through UC Berkeley Safe Transportation Research and Education Center's Transportation Injury Mapping System (TIMS) for years 2015-2019.
What levels of victim injury severity were considered?	SCAG exclusively considered collisions resulting in fatalities or serious injuries. This approach aligns with the region's focus on its annual serious injury and fatality targets.
What modes of travel were considered?	SCAG considered auto-auto, auto-bike, and auto-pedestrian collisions.
Should collision data be analyzed at the intersection or corridor-level?	SCAG analyzed collisions at the corridor-level (1-mile segment lengths, no highways). As other jurisdictions have noted, intersection level analysis has a high level of variability.
What road network was used, and which roadway facility types were considered?	The road network is TomTom 2019. SCAG focused on street corridors under the jurisdictions of city and county agencies and freeway on-ramps/off-ramps (if they intersected with an arterial/local/collector road). Collisions that occurred on access-restricted roads, namely freeways and freeway interchanges, were excluded.
What is the threshold for including a corridor in the HIN?	SCAG successively added segments greater than 0.25 miles in length to the HIN in order from greatest to least victims per mile until 65% of the victims of a given collision mode (i.e., auto-auto, auto-ped, and auto-bike) was met.

Quick Reference for Core Elements of SCAG's HIN Methodology	
Does the HIN include any weighting based on population characteristics?	SCAG did not apply weighting to adjust for collision severity, geography (e.g., Communities of Concern), population characteristics (e.g., children or older adults), or modes. The base HIN can be modified to include weighting if the region or a particular county or city is interested.
How is equity considered in the development and implementation of an HIN?	SCAG provided an overlay showing where the HIN overlaps with Disadvantaged Communities, Environmental Justice Areas, Communities of Concern. Additional weighting could be applied for collisions occurring in these areas.
How is the data normalized?	SCAG normalized the data by calculating a "Victims per Mile" rate based on the number of seriously injured victims and fatalities involved in collisions along a road segment and the length of that segment.
Is the Regional HIN consistent with other high crash networks developed by other jurisdictions (e.g., Los Angeles)?	The Regional HIN does not contradict the locations identified by these agencies but does provide a base methodology for all counties in the SCAG region.

The following sections describe in detail how SCAG collected, prepared, and presented the collision and network data to create the HIN.

Data Collection

SCAG's Regional HIN drew upon two sources of original data, one for collisions and another for the street network.

Collision data was sourced from the Statewide integrated Traffic Records System (SWITRS) made available through UC Berkeley Safe Transportation Research and Education Center's Transportation Injury Mapping System (TIMS).[1] SCAG used five years of aggregated data, including data from January 1, 2015 to December 31, 2019.[2] As other jurisdictions have noted, one or two years of data may be too short a timeframe to capture longer trends, but 10 years of data

[1] TIMS uses SWITRS data, but only SWITRS data that contains location details and can be geolocated. Thus, TIMS data may not perfectly match SWITRS data and may omit certain collisions due to the lack of locational data.

[2] At the time of data analysis, 2020 and 2021 data were considered provisional and subject to change.

may be too long, spotlighting problems that have since been resolved. High Injury Networks are usually developed using four- or five-years of collision data and consider the frequency of collisions on the street network along with various other causes of collisions.

The street network was sourced from TomTom 2019.

Preparation of Collision Data

SCAG prepared the collision data by filtering out collisions that did not fall into the scope of this analysis per the location, collision severity, and mode parameters.

Location

Collisions without location information (i.e., latitudinal/longitudinal data) were excluded from this analysis since precise locations are required to assign a collision to a proximal street segment. Collisions that occurred on access-restricted roads (i.e., freeways and freeway interchanges) were also excluded from this analysis as the intent of the HIN is to identify corridors where local jurisdictions can implement safety strategies, including setting new speeds. Note that freeway on- and off-ramps were included in the analysis if they intersected with locals/collectors/arterials (i.e., non-freeway roadways).

Collision Severity

The HIN analysis only considered collisions resulting in a serious injury or fatality. Serious injuries are non–fatal and result in one or more of the following:

- Severe laceration resulting in exposure of underlying tissues/muscle/organs or resulting in significant loss of blood;
- Broken or distorted extremity (arm or leg);
- Crush injuries;
- Suspected skull, chest, or abdominal injury other than bruises or minor lacerations;
- Significant burns (second and third degree burns over 10% or more of the body);
- Unconsciousness when taken from the crash scene; and/or
- Paralysis.

The definition of serious injuries was changed to include suspected serious injuries and was implemented in mid-2017. At the statewide level, the first full year of suspected serious injuries resulted in an increase of 21% from the last full year using the former definition. SCAG converted the codes from the pre-2017 definition to the new codes so that data across years could be combined and analyzed.

Non–serious injuries are also non–fatal or serious, but more common. They may include visible injuries and/or a complaint of pain.

Mode

Collisions were sorted into one of the following collision types[3]:

1. Auto-Auto (including motorcycles)
2. Auto-Pedestrian
3. Auto-Bicyclist
4. All other collisions

Collisions in the "All other collisions" were excluded from this analysis. This category includes non-collisions (e.g., overturned vehicles) and fixed-object collisions involving only one vehicle.

Auto-Pedestrian collisions were determined using the field that indicates whether the crash involved a pedestrian (PEDESTRIAN_COLLISION[4]) and PED_ACTION fields. The rules were:

- if PEDESTRIAN_COLLISION is "Y", the value of PED_ACTION cannot be "A" (No Pedestrian Involved)
- if PEDESTRIAN_COLLISION is blank, the value of PED_ACTION should be "A" (No Pedestrian Involved)

After checking the above rules, records that met the condition "PEDESTRIAN_ACCIDENT is Y" were classified as AUTO-PEDESTRIAN.

The Auto-Bicyclist collisions were determined using the field that indicates whether the collision involved a bicycle (BICYCLE_COLLISION[4]) and MVIW (Motor Vehicle Involved With) fields. The rules were:

- if BICYCLE_COLLISION is "Y", the value of MVIW should include "G" (Bicycle)
- if BICYCLE_COLLISION is blank, the value of MVIW cannot be "G" (Bicycle)

After checking the above rules, records that met the condition "BICYCLE_ACCIDENT is Y" were classified as AUTO-BICYCLIST.

The remaining collision records were assigned to the Auto-Auto category.

For collision records where a collision type was unclear (e.g., collisions involving both pedestrians and bicyclists), the collision type was assigned to the mode with the greater number of fatalities. If there were no fatalities or it was a tie, the collision type was assigned to the mode with the greater number of serious injuries. If there was still a tie, a mode was randomly assigned.

[3] The order of these pairings does not indicate fault.

[4] The field name is referenced as "COLLISION" instead of "ACCIDENT" (e.g., PEDESTRIAN_ACCIDENT and BICYCLE_ACCIDENT) to advocate for a shift in thinking traffic fatalities are inevitable to one that sees opportunities to prevent any traffic fatalities

Preparation of the Street Network

The TomTom 2019 network data includes street segments divided where the characteristics of the road changes (e.g., flows from two lanes into one lane, median to no median).

SCAG ran a Python script within ArcGIS software to dissolve the street layer by name, direction, and connecting geometry to represent streets as a single line until they met or exceeded 1-mile in length. The dissolve accounts for direction for streets separated into multiple line segments, possibly by a median or some other physical divide between lanes (e.g., porkchop island), cul-de-sacs, and loop roads. For streets with common names (e.g., Main Street) that appeared in multiple places around a county, the script used connecting geometry to spatially separate these streets into multiple single-part segments.

There were minor issues in the network that SCAG will consider in future improvements, including incorrectly named streets on the same corridor (e.g., Barbara Dr. vs. Barbara Rd.) and parallel street lines due to a median.

Assigning Collisions to the Street Network

After both the collision and street network data were prepared, SCAG developed a script to assign collisions to a single street within the street network using the ArcGIS "Near" function and matching the primary street name associated with the collision. Matching the names of the streets ensured that collision points that may be slightly offset due to geocoding errors were assigned to the correct street.

Some collisions were unable to be assigned to roadway segments with the script because of inconsistencies (some more minor than others) in the naming or location of collisions and roadways. SCAG conducted a manual checking process that involved staff reviewing the information of each unpaired collision in ArcGIS and manually assigning the appropriate primary and secondary link IDs. Staff assumed that the names of the primary and secondary segments within the TIMS data were correct.

Common reasons that allowed the collision location to be confirmed included use of an address instead of a roadway, a minor typo in the street name, listing the State Route number instead of a name, error in the street suffix (Dr, Ave, St, Wy, Rd) or direction (N, S, E, W), a change in the street name at or near the collision, and private or mislabeled roads in the TomTom network.

Collisions that listed the same road, roads that did not intersect, roads that did not exist, or intersections that had the same name as others in the same county with no distinction could not be confirmed and were removed from consideration. Collisions occurring within the complex network of seaports or airports (notably Los Angeles International Airport, the Port of Los Angeles, and Port of Long Beach) were also removed as roadway configurations have been changing over the five years of the collision data and because of stacked roadways.

For collisions that occurred on or near freeway ramps, staff made a decision to include the collision based on the Location Type, Intersection, Ramp Intersection fields.

For collisions that occurred on the border of two counties, street layers for both counties were activated, and the county of the closest segments was selected. This involved moving some collisions between county datasets manually.

Setting Thresholds and Selecting High Injury Network

The selection of corridors that were included in the HIN depended on the determination of a threshold. Based on prior research, the threshold was set so that at least 50% of all collisions occurred on the HIN. Other agencies typically use higher thresholds (60 to 70%) to achieve a balance of the majority of collisions reflected on a smaller subset of roadways. SCAG's prior HIN set a threshold of 65% of collisions.

To set a threshold, SCAG evaluated the network that it created at various thresholds (i.e., 60%, 65%, 70%, 75%, and 80%) and searched for a "natural break" where the difference between the resulting lane miles for each county was minimized. As previously mentioned, for this iteration of the High Injury Network, SCAG settled on a threshold of 65% of collisions.

Streets were prioritized for inclusion in the HIN based on the victims per mile (number of seriously injured victims and fatalities per segment mile). Segments were included one at a time, in the order from highest victims per mile to fewest victims per mile, until the sum of collisions that occurred on the selected segments met the established threshold. This process was completed for each of the three modes in all six counties. SCAG combined all the resulting networks into one final HIN for the region.

4. Methodology Improvements

Through the development of the Regional HIN, SCAG staff encountered a few decisions-points that required more time and resources to make an informed decision. The following topics should be further explored and researched in future iterations of the Regional HIN.

Threshold Setting

SCAG's Regional HIN was developed using a threshold of 65% of all fatal and seriously injured victims. SCAG intentionally adopted a threshold based on victims (as opposed to collisions or roadway mileage) to ensure that victims stayed central to the purpose of developing an HIN and that the network truly captured a majority of the victims in each county. The selection of the 65% threshold was more arbitrary, as the "stability," or minimization of the change between two thresholds, improves the lower the threshold is set. In the next iteration, SCAG would like to incorporate a tool that allows users to manually adjust the threshold. This would allow the Regional HIN to serve multiple purposes such as finding the roadways with a simple majority of victims or visualizing the roadways with the absolute highest victims per mile.

50-50 Split for Intersections

To ensure the overall count of victims considered in the creation of the Regional HIN remained equal to the actual number of victims, collisions that occurred at intersections dedicated a fraction of each victim to each street involved in the intersection. For example, if a collision involving one victim occurred at an intersection of two roadways, each roadway would receive 0.5 victims. This method results in the de-prioritization of victims at intersections. For example, two corridors of equal length, one with 6 victims at intersections, another with 3 victims along the route, would be considered equal in the current methodology of the Regional HIN.

For future iterations of the Regional HIN, SCAG would like to see that each roadway of an intersection receives a full victim to be able to identify the HIN, while also noting the split to be able to share the actual number of victims involved when the reports are prepared.

5. Analysis

SCAG's Regional HIN shows that 65% of all fatal and serious injuries occurred on just 5.5% of the regional transportation network. **Table 1** summarizes the roadway mileage included in the modal and total HINs for each county and the entire SCAG region. Because roadway segments can be considered as a part of the HIN for more than one mode, the modal HINs overlap and cannot be added together. Los Angeles and Orange counties have a higher percentage of roadway miles considered in the HIN. This indicates that the fatal and serious injuries in these two counties are spread more widely than others, especially compared to Imperial, where only 2.2% of their roadway network is in the HIN.

Table 1. Modal High Injury Network (HIN) Roadway Mileage by County

County	Total Roadway Miles	Total HIN		Auto-Auto		Auto-Bike		Auto-Ped	
		miles	*%*	*HIN miles*	*%*	*HIN miles*	*%*	*HIN miles*	*%*
Imperial	4,136.87	89.8	2.2%	66.4	73.9%	4.9	5.5%	18.8	20.9%
Los Angeles	30,359.94	2,489.4	8.2%	1,574.7	63.3%	556.4	22.4%	1,028.5	41.3%
Orange	10,357.26	684.2	6.6%	425.3	62.2%	150.4	22.0%	241.3	35.3%
San Bernardino	21,741.47	681.8	3.1%	456.0	66.9%	88.6	13.0%	225.6	33.1%
Riverside	16,186.73	619.3	3.8%	424.5	68.5%	58.1	9.4%	218.0	35.2%
Ventura	4,965.42	249.3	5.0%	159.3	63.9%	46.3	18.6%	63.0	25.3%
SCAG Region	**87,747.69**	**4,813.8**	**5.5%**	**3,106.2**	**64.5%**	**904.7**	**18.8%**	**1,795.2**	**37.3%**

Source: SCAG 2022

Equity Overlays

To evaluate whether collisions were disproportionately affecting one community over another, SCAG calculated the HIN roadway miles that were included within Disadvantaged Communities (DAC), Environmental Justice Areas (EJA), and Communities of Concern (COC), as are summarized in **Table 2**.

Disadvantaged Communities (DACs) are census tracts that have been identified by the California Environmental Protection Agency (Cal/EPA) based on the requirements set forth in SB 535, which seeks to identify areas disproportionately burdened by and vulnerable to multiple sources of pollution.

Environmental Justice Areas (EJAs) are Transportation Analysis Zones (TAZs), which are similar to Census Block Groups, that have a higher concentration of people of color OR low-income households than is seen in the region as a whole. The inclusion of this geography helps to fulfill SCAG's Title VI requirements, along with other state and federal Environmental Justice guidelines.

Communities of Concern (COC) are Census Designated Places (CDPs) and City of Los Angeles Community Planning Areas (CPAs) that fall in the upper 1/3 of all communities in the SCAG region for having the highest concentration of people of color AND low-income households.

Table 2. High Injury Network (HIN) Roadway Mileage in Equity Areas by County

County	Total HIN Miles	DAC		EJA		COC		All Equity Areas	
		miles	*%*	*miles*	*%*	*miles*	*%*	*miles*	*%*
Imperial	89.8	65.7	73.2%	84.1	93.7%	30.4	33.9%	86.3	96.1%
Los Angeles	2,489.4	1,670.1	67.1%	2,068.7	83.1%	943.0	37.9%	2,119.6	85.1%
Orange	684.2	241.8	35.3%	392.6	57.4%	89.0	13.0%	416.0	60.8%
San Bernardino	681.8	341.4	50.1%	559.6	82.1%	89.7	13.2%	591.4	86.7%
Riverside	619.3	345.0	55.7%	539.4	87.1%	129.9	21.0%	562.5	90.8%
Ventura	249.3	33.3	13.4%	124.7	50.0%	4.3	1.7%	125.1	50.2%
SCAG Region	**4,813.8**	**2,697.3**	**56.0%**	**3,769.1**	**78.3%**	**1,286.3**	**26.7%**	**3,900.9**	**81.0%**

Source: SCAG 2022
DAC = Senate Bill 535 Disadvantaged Communities (2022)
EJA = Environmental Justice Areas
COC = Communities of Concern

Overall, SCAG's Regional HIN is primarily located in equity areas, with about 81% of the roadway miles in DACs, EJAs, or COCs. Approximately 56% of the Regional HIN is within DACs, 78% within EJAs, and 27% within COCs. Imperial, Los Angeles, San Bernardino, and Riverside have even higher percentages of their HIN in equity areas, most notably Imperial County with about 96% of their network located within equity area boundaries.

Transit Overlays

To evaluate how collisions are occurring in relation to transit, especially where active transportation is encouraged, SCAG provided another overlay showing where the HIN overlaps with High Quality Transit Areas (HQTA) and Transit Priority Areas (TPA), as is summarized in **Table 3**.

High Quality Transit Areas (HQTAs) are areas within one half mile of an existing or planned fixed guideway transit stop or a bus transit corridor where buses pick up passengers at a frequency of every 15 minutes (or less) during peak commuting hours.

Transit Priority Areas (TPAs) are areas within one half mile of existing or planned 'major' transit stops in the region. A 'major' transit stop is defined as a site containing an existing or planned rail or bus rapid transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.

Table 3. HIN Roadway Mileage in Transit Areas by County

County	Total HIN Miles	HQTA		TPA		All Transit Areas	
		miles	*%*	*miles*	*%*	*miles*	*%*
Imperial	89.8	0.0	0.0%	0.0	0.0%	0.0	0.0%
Los Angeles	2,489.4	1,712.3	68.8%	1,325.3	53.2%	1,736.9	69.8%
Orange	684.2	328.2	48.0%	185.4	27.1%	333.0	48.7%
San Bernardino	681.8	26.7	3.9%	26.7	3.9%	26.7	3.9%
Riverside	619.3	108.2	17.5%	75.0	12.1%	142.5	23.0%
Ventura	249.3	15.8	6.3%	16.2	6.5%	16.2	6.5%
SCAG Region	**4,813.8**	**2,191.2**	**45.5%**	**1,628.6**	**33.8%**	**2,255.3**	**46.9%**

Source: SCAG 2022
HQTA = High Quality Transit Area
TPA = Transit Priority Area

Overall, almost half of SCAG's Regional HIN is in transit areas, with about 46.9% of the roadway miles in HQTAs or TPAs. Approximately 46% of the Regional HIN is within HQTAs and 34% within TPAs Los Angeles and Orange carry a significant portion of that mileage, particularly Los Angeles County with about 69% of their network located within transit areas.

Comparison of Past Regional HIN and Local HINs

To evaluate the HIN, SCAG compared the new version of the HIN with SCAG's previous HIN and HINs from other jurisdictions in the region, including Culver City, El Monte, Long Beach, City and County of Los Angeles, Santa Ana, and Santa Monica.

SCAG's prior version of the High Injury Network was created in 2018 using a different methodology, which is summarized in SCAG's Regional High Injury Network Toolbox Training

(April 16, 2019). Aside from the updated data years for both the collisions and roadway network, there are two main changes to the methodology:

1. **Shift from set number of segments to a victim-based threshold**. Previously, the threshold for whether a roadway segment would be considered part of the HIN was constructed to allow for a given percentage roadway segments. Now, staff uses a threshold based on the percentage of victims. This allows the HIN to capture the majority (65%) of all victims, prioritizing the segments with higher concentrations of victims.
2. **No weighting**. SCAG's 2018 HIN incorporated weighting for victim age and active transportation modes. This update eliminates the use of weighting with the understanding that the HIN spans over a substantial number of communities with different prioritization needs. The data provided should allow jurisdictions to add their own weighting based on mode, transit areas, and equity areas as they desire.

Though the changes to the methodology are minimal, the resulting HIN contains significantly more segments compared to the previous iteration. The 2018 HIN included 530.7 miles of roadway, representing 1.3% of total roadway miles across the six-county region. With the updated collision data and simplified methodology, SCAG's HIN includes 4,813.8 miles of roadway, representing 5.5% of total roadway miles in the region, where 65% of fatal and serious injuries occur.

Despite the changes to the methodology and updates to the data years, the overlap between the two HINs is substantial. An average[5] of 71.5% of the lane miles in the 2018 HIN have some overlap with the HIN. With the nine-fold increase in lane miles, about 1,212.9 miles (about 25%) of the HIN intersects with the 2018 HIN.

SCAG evaluated the Regional HIN against seven local HINs[6] to see how they overlapped. Overall, there are no jurisdictions with a complete match for segments, but a nuanced assessment seems to confirm that we have similar analyses. SCAG found that the deviations come from three main areas of difference:

1. **Methodological differences**. As emphasized by the length of this methodology document, numerous decisions shape the development of an HIN. For example, Long Beach limits their HIN to the top 20 segments in the city, whereas SCAG's HIN captures an undetermined number of segments until reaching the 65% victim threshold.
2. **Data years**. Similar to the comparison with the 2018 HIN, the difference in data will guarantee different outcomes, particularly when there is a low bar for inclusion in an HIN where just one victim can qualify a segment as part of the HIN. For context, SCAG's HIN is

[5] Since the 2018 HIN involves multiple layers (one for each of the modes [Pedestrian, Bike, Auto, and All]) and there is no single layer that includes all HIN segments, staff relied on an average of the four layers for this comparison.

[6] City of Los Angeles, County of Los Angeles, Long Beach, Culver City, El Monte, Santa Ana, and Santa Monica

based on 20,213 collisions (4,647 fatalities and 18,156 serious injuries) occurring between 2015 and 2019.

3. **Geographic scale**. For the same reason that SCAG decided to develop six county-level HINs, there are imbalances within larger geographic areas that will result in a greater portion of the HIN. For example, the City of Los Angeles might be capturing 60% of their own collisions, but SCAG's HIN might be capturing more than that 60% because there are more segments with higher victims per mile in the City of Los Angeles compared to the other cities in the county.

Because local jurisdictions can provide a more context-specific assessment in their own HINs, SCAG recommends deferring to the designations of local HINs wherever they are available.

6. Resources

- Recommendations for California Statewide Guidance on High Injury Networks (September 2021)
- Go Human Traffic Safety Peer Exchange Webinar on High Injury Networks (June 2021)
- Traffic Safety Webinar Series, Accessing and Using Data to Evaluate Traffic Safety (September 2021)
- SCAG Regional High Injury Network Toolbox Training (April 16, 2019)

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