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Mixed-methods approach to describing Vision Zero initiatives in United States' municipalities

Kelly R. Evenson^{a,*}, Seth LaJeunesse^b, Elyse Keefe^c, Rebecca B. Naumann^{a,c}

^aDepartment of Epidemiology, Gillings School of Global Public Health, University of North Carolina - Chapel Hill, Chapel Hill, NC, United States

^bHighway Safety Research Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, United States

^cInjury Prevention Research Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, United States

Abstract

Vision Zero (VZ) aims to reduce fatalities and serious injuries from road traffic crashes to zero through a Safe Systems approach. Little is known about the extent of uptake of VZ in the United States (US), or the attributes and functioning of the initiatives. Using a mixed-methods design, our objectives were to describe the status of VZ implementation and characteristics of those initiatives among US municipalities. Websites of all US municipalities with a population of at least 50,000 (n = 788) were searched to identify involvement in VZ. When initiatives were identified, we abstracted information from their website and other published documents, using a comprehensive framework of best practice VZ components. From the VZ initiatives identified, we interviewed representatives from 12 municipalities with diversity by region of the country, population size, and VZ implementation. Interviews were recorded, transcribed, and coded for themes. Through systematic web-based searching, we identified 86 of 788 (10.9%) municipalities with a VZ initiative. Among 314 larger municipalities (population $\geq 100,000$), 68 (21.7%) were identified. Among 476 medium-size municipalities (population of 50,000–99,999), 18 (3.8%) were identified. VZ initiatives began as early as 2014, starting with larger municipalities, and followed in 2015 with medium-size municipalities. Among the VZ initiatives, 58 (67.4%) recorded a vision statement, with 51 (59.3%) setting a target year to reach zero deaths. Thirty-nine (45.3%) had published VZ plans, with another 22 (25.6%) working towards a plan. Twenty-five initiatives (29.1%) shared resources across stakeholder groups, such as funding

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*Corresponding author. kelly_evenson@unc.edu (K.R. Evenson).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRedit authorship contribution statement

Kelly R. Evenson: Conceptualization, Methodology, Data curation, Writing – original draft, Project administration, Funding acquisition. **Seth LaJeunesse:** Funding acquisition, Writing – review & editing. **Elyse Keefe:** Data curation, Writing – review & editing. **Rebecca B. Naumann:** Funding acquisition, Writing – review & editing.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.aap.2023.107012>.

or staff. Forty-six initiatives (53.5%) had an established coalition, and 18 (20.9%) proposed or were developing a coalition. Twenty-six initiatives (30.2%) provided regular updates or evaluation on progress towards performance metrics, but only 4 (4.7%) had implemented a performance management system to regularly track progress on VZ-related actions. The interviews provided further context and a more detailed understanding of results. Documenting the characteristics of VZ initiatives among US municipalities can contribute to an understanding of current practice, potential opportunities to support ongoing initiatives, and information to assist new initiatives. Ultimately, the impact of municipal-level VZ efforts should be evaluated with regards to traffic-related serious injuries and fatalities.

Keywords

Accident prevention; COVID-19; Qualitative research; Safety management; Safe systems; Traffic deaths

1. Introduction

While the number of people killed in traffic crashes has declined over the last few decades, surveillance data indicates that this progress has stalled in the United States (US) (Insurance Institute for Highway Safety 2022). In 2020, an estimated 36,680 people died in motor vehicle traffic crashes, which is the highest number since 2007 (National Highway Traffic Safety Administration 2021). Recognizing the magnitude and persistence of the traffic crash problem, a number of US communities adopted or are considering Vision Zero.

Vision Zero uses a Safe Systems perspective in an effort to reduce fatalities and serious injuries from road traffic crashes to zero, while increasing healthy, equitable, and safe mobility for all (Kim et al., 2017; Vision Zero Network, 2017b). A Safe Systems perspective takes “a holistic view of the road system that first anticipates human mistakes and second keeps impact energy on the human body at tolerable levels” (Federal Highway Administration 2022). Originally developed in the early 1990s, Vision Zero passed in 1997 as the official road policy in Sweden (Fahlquist 2006). Vision Zero was also adopted in 1997 as “Sustainable Safety” in The Netherlands and in 1999 by Norway (Fahlquist 2006; Cushing et al., 2016; Archer et al., 2021). Since then, Vision Zero and the Safe Systems approach has spread worldwide.

One of the first applications of Vision Zero in the US occurred in the year 2000 when the state of Washington developed a Target Zero plan to reduce fatal and serious road injuries to zero by 2030 (US Department of Transportation and Federal Highway Administration 2022). In 2009, US stakeholders worked to create a national strategic highway safety plan, coalescing around a goal to eliminate traffic deaths to zero (Toward Zero Deaths 2022). This effort was soon called “Toward Zero Deaths”, an approach with roots in Vision Zero (Fleisher et al., 2016). In January 2015, the US Department of Transportation announced that the official target of the federal government transportation safety policy was zero deaths. Then, in January 2016, ten US cities announced plans to lead initiatives to eliminate traffic fatalities on their roadway networks applying Vision Zero (Shahum 2016).

Only two years later, a survey among US road safety professionals indicated widespread dissemination of Vision Zero among planning and engineering professionals, but less so with public health, law enforcement, and emergency medical services professionals (Evenson et al., 2018). Following this, researchers applied a case study approach to four prominent US Vision Zero initiatives and found that government agencies played a central role in the development, productivity, and resource acquisition of the initiative, and constituted a large proportion of coalition membership (Naumann et al., 2019). Results also highlighted the importance of political will, formal plan development, and stakeholder cooperation and collaboration to sustain the Vision Zero initiative and make progress towards implementation.

Vision Zero initiatives generally center their work around common key principles, but how they are developed and implemented is not well understood. In particular, we lack a systematic overview of the uptake and implementation of Vision Zero across the US. We also need a better understanding of how best to support communities in their Vision Zero efforts. Using a mixed-method design, our objectives were to describe municipal-level US Vision Zero initiatives using both quantitative and qualitative inquiry. We used a framework of promising Vision Zero components to understand and assess uptake and to describe key components including: involvement of stakeholders, community engagement, use of data, implementation, evaluation, and resource needs among municipalities with Vision Zero. Secondarily, we documented if these characteristics differed by the size of the community the Vision Zero initiative was located in.

2. Methods

2.1. Quantitative approach: web-based assessment of municipal vision zero initiatives

From July to October 2020, we conducted web searches to find municipal Vision Zero programs in the US. The municipal list was based on US Census documentation of 788 incorporated places with a population size of at least 50,000 at any time between April 2010 to July 2019 (United States Census 2021). A protocol for searching was developed, piloted, and refined. Searching commenced by using the Google search engine with the terms “Vision Zero + municipality name + state”. The first page of search results was reviewed. If an initiative was not found, then the search continued in a similar manner for the terms “Safe Systems” (defined elsewhere (Naumann, Kuhlberg et al. 2020, Naumann, Kuhlberg et al. 2020)), as well as other terms that may be used instead of “Vision Zero” (e.g., Target Zero, Towards Zero, Road to Zero). If an initiative was still not found, then a final search was conducted on the municipality website. Most of the municipalities had a search engine function, and using this, the terms Vision Zero, Safe Systems, and safety were entered, either for the entire municipality or specifically in their transportation or public works departments. The search ended if no initiative was found.

An abstraction form was developed, piloted, and refined. For all 788 municipalities, we abstracted whether the community was considering or supporting Vision Zero or a similar type of initiative. If the answer was yes to this screening question, then we abstracted detailed information about the initiative, guided by our work documenting Vision Zero plans (LaJeunesse et al., 2020; LaJeunesse et al., 2022) and using a framework on key components

of a strong Vision Zero commitment as outlined by the US-based Vision Zero Network (Vision Zero Network 2017) and further refined through discussion with transportation experts (Table 1). The detailed abstraction included several descriptive characteristics of the initiative (e.g., timeline, vision, guiding principles), stakeholders (e.g., meetings, involvement of stakeholders, coalition formation), use of data, funding, champions (e.g., local public commitment, local official endorsement), plans, implementation, performance measures and management (e.g., strategies implemented, data, progress around goals), and resource implementation (e.g., staffing, on-boarding procedures). We abstracted evidence of community engagement both before the year 2020 and during 2020 in order to account for differences associated with the COVID-19 pandemic. We collected guiding documents, such as Vision Zero plans and resolutions, and reviewed those, as well as any initiative-related web pages for the abstraction. We also assigned each municipality to one of five US census regions (Midwest, Northeast, Pacific, South, West) for descriptive purposes (US Census Bureau 2022).

The 788 municipalities were screened for a Vision Zero initiative between July to October 2020. The detailed abstraction on the characteristics of the Vision Zero initiative was completed (i) for 314 municipalities with a population size $\geq 100,000$ between July to October 2020 and (ii) for 474 municipalities with a population size of 50,000 to 99,999 in March 2022. Frequencies of the abstractions were presented overall and by municipality size. For initiatives that paused or ended, defined as no documented meetings or updates to their website for at least one year at the time of the survey (2020), we revisited their website in June 2022. We assessed their initiative status based on any updates to their website.

In order to maintain high reliability and identify any discrepancies where more training or clarification was needed, a second rater independently conducted screening on a random sample of municipalities. The reliability assessment indicated that agreement for identifying larger-size municipality initiatives was 96.8% (14 vs. 16 identified out of a subsample of 37), while for the medium-size municipality initiatives, agreement was 93.3% (3 vs. 4 identified out of a subsample of 15).

2.2. Qualitative approach: in-depth interviews

Prior to initiation, the interview procedures and guide were reviewed by the University of North Carolina – Chapel Hill Institutional Review Board. Using the sample of Vision Zero initiatives from the web-based abstractions, we invited a subsample of Vision Zero coordinators from diverse municipalities with a population size of at least 100,000 for an in-depth interview. They were selected from all five US Census regions (Midwest, Northeast, Pacific, South, West) (US Census Bureau 2022). Similar to the abstraction tool, an interview guide was developing using a framework of key components of a strong Vision Zero commitment as outlined by the US-based Vision Zero Network and further refined through discussions with transportation experts (Table 1). The interview guide included several questions about the Vision Zero initiative including: how the initiative began, diversity of organizational involvement, changes in goals over time, and resources that would help their work. During the interview, we discussed and identified one of four implementation stages to assign to the initiative. The Active Implementation Research

Network developed the implementation stages, and we tailored them to Vision Zero, as described in Supplement 1 (Active Implementation Research Network 2022).

Between December 2020 and June 2021, the interviews were conducted using video calling. Interviews were recorded, with permission, and transcribed verbatim. A codebook was developed from the interview questions, and then expanded as themes emerged. The transcripts were entered into ATLAS.ti (version 8) for coding and analysis. A deductive and inductive process was used to create a coding scheme (Miles and Huberman, 1994; Ulin et al., 2005). The data were reviewed line-by-line with codes assigned by two team members and discrepancies resolved through consensus. All transcripts were then reviewed one final time to ensure important themes were not missed.

3. Results

In the following sections, we present the web-based results on the Vision Zero initiatives followed by the in-depth interviews for additional context. Table 1 provides the framework used to create the abstraction tool and interview guide, and further serves as a guide for the structure of the results.

3.1. Characteristics and initiation among municipal Vision Zero initiatives

Web-based Survey: From the web-based searches, we found 86 Vision Zero initiatives among 788 (10.9%) municipalities. Sixty-eight initiatives (21.7%) were among 314 municipalities with a population size of at least 100,000 and 18 initiatives (3.8%) were among 474 municipalities with a population size of 50,000–99,999. The proportion of municipalities with Vision Zero was higher with larger population size, as displayed in Fig. 1.

The Vision Zero initiatives began as early as 2014, starting with the larger municipalities and followed in 2016 with medium-size municipalities (Table 2). Initiatives were located in all regions of the US, with more in the Pacific (32.6%) and South (31.4%) regions. From the web-based assessments, we identified local public commitment to Vision Zero (i.e., resolution, policy, ordinance) for 61 (70.9%) initiatives and endorsement by a high ranking official (i.e., mayor, city council member) for 55 (64.0%) initiatives. While evidence of local public commitment did not vary much by municipality size (69.1% larger-size vs. 77.8% medium-size), endorsement by a high-ranking official was higher among larger-size municipalities (70.6%) compared to medium-size municipalities (38.9%).

Interviews: A sample of 20 coordinators were invited for interviews from the 68 larger-size municipal Vision Zero initiatives (29.4%). In total, 12 completed the interview, 6 did not respond, and 2 declined to participate in order to assess selection bias (Supplement 2). The characteristics of those who did and did not participate are presented in Table 3. The 12 participating municipalities were located in four of the five US Census regions, with a range of estimated population sizes. Three-fourths had a Vision Zero initiative at the municipal level, while one-fourth had an initiative that linked the municipality and county in the effort. Five (42.0%) of the municipalities had a Vision Zero plan. There was a range in Vision Zero implementation stages for the participating municipalities.

Interview data indicated that Vision Zero initiation often began with a champion in leadership, such as a mayor or city council member, or internally with a key departmental person advocating and supporting Vision Zero (Table 4). A tragic traffic injury or fatality or exceedingly high serious traffic crash counts spurred some initiatives to begin. Community demand, advocacy, and recommendations from a task force were also mentioned as reasons the initiative began. One initiative described state Vision Zero-related declarations as a supporting reason for the initiation of their Vision Zero initiative, while another initiative described the lack of support from their state. Several initiatives described leadership from their respective Metropolitan Planning Organization (MPO) as a supporting factor. Examples included the MPO passing a Vision Zero resolution, funding their action plan, providing traffic data, or participating in regular meetings to coordinate safety efforts with a regional focus. One initiative mentioned concurrent prioritization for the county where the municipality was located. While not the original instigator, a few interviewees identified Vision Zero inclusion in community plans that facilitated their work. We found that in most communities, several of these key factors co-occurred to initiate Vision Zero, while in other communities there was one key factor the interviewee could identify that initiated Vision Zero.

3.2. Vision among municipal Vision Zero initiatives

Web-based Survey: Among the 86 initiatives, 58 (67.4%) had a stated vision (Table 2); however, this varied by municipality size, with 70.6% of larger-size municipalities declaring a vision, as compared to 55.6% of medium-size municipalities. Of those with a vision, the date to achieve the vision ranged from 2020 to 2040 with medium-size initiatives generally setting later dates (2030 to 2040). The vision statements almost always connected to eliminating all traffic fatalities and serious injuries. Seven (8.1%) initiatives had a vision but did not set a target date.

Interviews: When initiatives begin, they often consider the development of a vision statement, typically to reduce serious traffic injuries and deaths to zero by a certain year. One initiative reflected on the difficulty with setting a target date for reaching zero serious traffic injuries and deaths. “We also had to do a lot of thinking about how we set goals. And I’m not sure if I have a lesson here. What I’ve gotten more of is a dilemma because we debated about, ‘Do we want to set a target date for when we get to zero? So how aggressive should we be?’ And we ended up settling on 2040, which is not that far off. It’s very ambitious and, you know, the nice thing about that would be that ambition can push us to make rapid changes and, you know, prevent unnecessary deaths much more quickly. The downside of that is that we get to 2040 and if there are traffic fatalities then it can undercut the credibility of the process.”

3.3. Guiding principles among municipal Vision Zero initiatives

Web-based Survey: We found equity mentioned or incorporated in 49 (57.0%) initiatives and a Safe Systems-based approach mentioned in 59 (68.6%) initiatives (Table 2). Notably, a greater percentage of larger-size municipalities had evidence of incorporating a Safe Systems approach than medium-size municipalities (72.1% vs. 55.6%).

Interviews: Some interviewees highlighted both equity and Safe Systems in their work. Regarding equity, one interviewee stated, “[W]e’re seeing those areas also have historically probably have not been invested in the same as other areas and without that investment are all seeing higher numbers of crashes. Maybe because they don’t have wider sidewalks, maybe it’s because the traffic signals haven’t been upgraded like in other areas of the city necessarily. Roadways are a higher speed. And maybe it’s that people haven’t called 311 to complain about x, y, or z and therefore, squeaky wheels sometimes get the grease. Now we’re overlaying that with, well maybe there’s a reason why people aren’t calling, maybe they don’t know who to call, maybe they don’t have time to call, maybe they just don’t want to call with distrust. So, we’re using this information to better invest in areas where haven’t maybe gotten investment before.” Another interviewee stated, “We have gone out of our way to make sure a lot of those voices are incorporated into our thinking about where do we go from here and how do we work together with our community. So definitely on the engagement side, equity features prominently.”

Interviewees also discussed how Safe Systems was integrated into their work. “Within Safe Systems, we have three priority actions. One of those is to switch how we’re analyzing traffic. Right now, we’re looking at vehicle level of service and we want to switch that to multi-modal level of service. And then we also want to incorporate Vision Zero goals in our city-wide design manual. So, we think that’s part of a Safe Systems approach is thinking about all road users and the impact there. And then making sure we’re analyzing all of our roadway projects to consider multi-modal safety from the project inception and having a standardized way of doing that from the start.” Another interviewee stated, “We use Safe Systems for speed setting where we could.” Challenges with understanding and communicating Safe Systems was mentioned by several interviewees. “I think a big piece of it up until this point, has really been trying to help our partners, especially within the city, understand those Safe Systems. It’s something that I learned about early on, and I think just in a planner mindset we learn about systemic—how systems impact all of our decisions. So, to me it wasn’t like a new thing, but I think that our work up to this point, has really been about really trying to help our on the ground staff understand those things and understand how those systems are important.”

3.4. Stakeholder involvement and community engagement among municipal Vision Zero initiatives

Web-based Survey: Among the 86 Vision Zero initiatives across the US, we searched for documentation related to stakeholder involvement and community engagement. We found documentation of meetings with both governmental agencies and stakeholders for 49 (57.0%) and meetings with only governmental agencies for 24 (27.9%) of the initiatives (Table 5). Stakeholders that were frequently mentioned in any capacity included, from highest to lowest percent, included law enforcement (55.8%), transportation (48.8%), public health (39.5%), planning (38.4%), positions of leadership (i.e., mayor, city manager, city council member; 37.2%), non-profit organizations (36.0%), and engineering (32.6%). For medium-size municipalities, non-profit organizations (27.8%), engineering (27.8%), and public health (16.7%) were involved in fewer initiatives. About half (53.5%) of the initiatives had an established coalition, and 20.9% had either proposed or was developing a

coalition. Community engagement could be documented for 52.3% of the initiatives before 2020 and for 22.1% of the initiatives in 2020. Prior to 2020, medium-size municipalities appeared less likely to have community engagement efforts (33.3% vs. 57.4% for larger-size municipalities).

Overall, 45 (52.3%) of the Vision Zero initiatives engaged with community stakeholders to gather, utilize, or share data to understand traffic safety issues. Almost half of the initiatives (46.5%) shared road safety related data with their community; however, this occurred less often in medium-size municipalities (27.8% vs. 51.5% for larger-size municipalities). We found that one-quarter (24.4%) of the initiatives used data, beyond traffic crashes, to assess their Vision Zero progress, and a similar proportion of municipalities (29.1%) shared resources, such as funding and staffing, across stakeholder groups.

Interviews: All interviewees described Vision Zero as an initiative that involved multiple municipal departments; the key groups were mostly internal to the municipality. One interviewee stated that Vision Zero is “being led by our Department of Public Service, but it’s a multi-agency initiative.” From the interviews, departments supporting Vision Zero included public works and facilities, municipal development, city planning, transportation services including public transit, mayor’s or city manager’s office, fire, and police. Other departments that were mentioned less often included human resources, emergency medical services, communications, information technology, public health, parks and recreation, and the city attorney’s office.

Vision Zero initiatives were most often based within the major internal organizations identified. One interviewee commented that “there was some debate as to whether to put [Vision Zero] in the sheriff’s office or whether to put that in the mayor’s office. I think our feeling was basically wherever it had a home provided it had adequate resources, that would be fine.” Others mentioned their initiative being led across two departments. “The lead person for the city’s traffic enforcement unit is really kind of the key partner with the transportation engineer, and we get our data directly from the police department. The other key person is a communications manager, and when we started that was a person out of our city manager’s office. It is now a person that is within our public works department.”

Interviewees were asked to identify two or three key partners/organizations involved in the Vision Zero effort, and then reflect on whether their involvement in road safety efforts increased, remained the same, or decreased since Vision Zero began. Most key partners were internal departments within the municipality. All of the interviewees identified an increase in traffic safety involvement from at least one partner since Vision Zero began (Table 6). One interviewee noted that the increased involvement across departments brought them together. “So, I would say that the planning department played a strategic role in thinking about traffic safety that we haven’t quite done to this scale before. And so that was a shift and I think it did bring us closer together with public works. I mean, we work closely with them, but you know there’s a lot going on and so I think this was a way to bring those two worlds together of public works.” Several interviewees cited no change in traffic safety involvement with specific partners, and two interviewees cited a decrease in traffic safety involvement due to staffing and the COVID-19 pandemic.

Many interviewees acknowledged the importance of community engagement. One interviewee stated, “We also reached out to minority groups to participate in some of our working groups and collaborations, but again, you know the ability for people to delve into that is a challenge if, you know, they were working during when our meetings were being held. I know we would have liked to have more of that than we did. We tried, it’s just a really tough time to be launching this and planning this.” Another interviewee stated, “The conversation with communities is also about equity. We can’t just apply the same safety treatment to each community. We need to talk to them about what their needs are and what their vision is for safer streets. And that’s how we get to the equitable outcomes piece too, I think.”

3.5. Guiding documents, evaluation, and implementation among municipal Vision Zero initiatives

Web-based Survey: Among the 86 Vision Zero initiatives across the US, 39 (45.3%) had completed plans and 22 (25.6%) had plans in progress as of time of the search (Table 7). Publication dates of plans occurred as early as 2014; however, the earliest plan publication found among medium-size municipalities was 2017. In 2022, we searched on all of the initiatives with Vision Zero plans in development to check on progress. Among the 4 medium-size municipalities, 1 published a Vision Zero plan in 2021 and 3 remained in development or stalled. Among the 17 larger-size municipalities, 7 published a Vision Zero plan in 2020, 4 published in 2021, 1 published in 2022, and 5 remained in development or stalled.

About half of the initiatives (54.7%) had documented implemented strategies, regardless of the plan status; however, this was more common among larger-size than medium-size municipalities (61.8% vs. 27.8%). About one-third (38.4%) had a process to provide regular updates or evaluation on progress, and a similar proportion ensured those updates were disseminated (30.2%). While medium-size municipalities had a process in place more than half of the time (55.6%), updates were less frequently disseminated (16.7%). Twenty (23.3%) initiatives documented progress towards Vision Zero goals, but only 4 (4.7%) had a performance management system in place. We found 21 initiatives (24.4%) documented on-boarding procedures (e.g., to ensure new stakeholders were quickly integrated into efforts). However, only larger-size municipalities had evidence of such procedures, with no medium-size municipalities providing evidence of these procedures.

Interviews: To further understand the process of Vision Zero implementation, interviewees were asked to identify their initiative with one of four implementation stages, as described in Supplement 1. While we identified four stages for the initiatives to self-select into, sometimes they fell in more than one stage depending on the focus. For example, one interviewee stated, “[O]n certain aspects of safe streets, safe speeds, safe vehicles, we’re full on implementation. We’re leading in the pack. On other facets, we’re still scratching our heads, figuring it out.” As another example, a participant stated, “In some ways we’re in installation and in some ways we’re in exploration. Another participant reframed the stages into ‘why, what, how’. We are moving from the why statement to what steps and now we’re really engaged with the how. How are we going to continue this link of chains

to implementation? So it's been why, what, how." Another interviewee marked the release of the Vision Zero plan as the first day of implementation. "[W]e felt that was sort of the signal; let's now move to implementation." For our interviewees, we had four initiatives in the exploration stage for plan development, but three were in the initial implementation stage for projects while one was in the full implementation stage for projects (Table 3). The other eight interviewees could be assigned to one of the four stages: four installation, one initial implementation, and three full implementation.

3.6. Changes over time: goals and perspectives among municipal Vision Zero initiatives

Interviews: During the interviews, we asked if goals around Vision Zero changed since they were initially formulated. Many of the initiatives agreed that some of their goals had changed over time (Table 8). Changes included realigning with the state, being more specific about where to focus resources as they learned more about the need, and less focus on the E's (e.g., engineering, enforcement, education, encouragement). One initiative expressed the need for more short-term goals and another reflected on the need to update goals as accomplishments happened. Two initiatives reflected that their goals had not changed over time.

Interviewees were also asked if Vision Zero was a shift in thinking or viewed as another program or project. Respondents often indicated that the answer was mixed between answers. "Depends who you're asking. I will speak for the city as a whole and say that definitely a new thing, a new program, you know. I think there's some on the taskforce that would say the latter, that this is more of a shift in thinking. But by and large the mindset, I think, especially within the public works department is this is just another added project." Another interviewee stated, "I was having this conversation with one of our engineers the other day that like if we're really going to say that we're a Vision Zero city and that this is a commitment we're making, when we're deciding on and scoping projects, we should be having the conversation about safety projects over capacity projects. So, getting that conversation to kind of stick."

3.7. Suggestions for resources

Interviews: Interview participants were asked what resources would benefit their Vision Zero work, to aid their work or other initiatives early in the developmental process. A variety of recommendations were provided and are summarized in Table 9, regardless of the frequency of response. Interviewees provided a variety of recommendations to foster Vision Zero. Recommendations included: (i) the need for crash and other community level data, (ii) improving procedures around management of the initiative and communication internally and externally, (iii) assistance on making both change within their organization and in their community, (iv) best practices around Vision Zero, (v) funding, (vi) resources on specific issues, and (vii) national guidance to add credibility to their work. Quotes that expand upon the recommendations are provided in Supplement 3.

3.8 Initiatives that paused or ended

Web-based Survey: Among the 86 Vision Zero initiatives, 21 (24.4%) had either paused or ended their work in 2020. In 2022 we reassessed the initiative status and found that 7

were active again and 14 appeared to be still paused or ended. Activity was documented, for example, by identifying plans being published or adopted, blog postings written, crash dashboard updated, or updates to the website.

Among the 14 Vision Zero initiatives that were paused or ended, half (50.0%) had local public official commitment, but fewer had endorsement from a high-ranking local official (42.9%; Supplement 4). Often these initiatives were not as far along in development. For example, fewer of these initiatives had a vision (35.7%) or incorporated either equity (21.4%) or Safe Systems (35.7%). About two-thirds (35.7%) did not have a coalition and only 21.4% conducted community engagement before 2020. The sharing of data (21.4%) and other resources such as funding or staffing (7.1%) across stakeholder groups was low. In 2020, fewer than one-third (28.6%) had a Vision Zero plan completed and another 14.3% had one in development. Furthermore, 21.4% had implemented some Vision Zero related strategies.

4. Discussion

Employing a mixed-methods approach, the results provide insight into the status and characteristics of Vision Zero initiatives across the US. Using web-based searching, we found that for the 86 Vision Zero initiatives, more than half were located in the Pacific and South regions. Further, larger-size municipalities tended to adopt Vision Zero initiatives historically earlier than medium-size municipalities. This finding is consistent with other research we conducted in the US, where we identified seven larger-size municipalities as “opinion leaders” (i.e., example or reputation they follow related to road safety; census regions: 1 Midwest, 2 Northeast, 3 West, 1 South) and another four larger-size municipalities as “boundary-spanning leaders” (i.e., leaders with the ability to permeate organizational or geographic boundaries to guide action around road safety (Miller 2008); 1 Midwest, 1 Northeast, 2 West) (LaJeunesse et al., 2019). At that time, diffusion of Vision Zero appeared to be germinating from larger-size municipalities, as no medium-size municipalities were consistently identified.

Municipalities with a population size of 50,000–99,999 (mediumsize) were less likely to have a vision statement created, indicate evidence of incorporating equity and Safe Systems principles, and have endorsement from a high-ranking official compared to municipalities with a population size of 100,000 or more (larger-size). We were also less likely to find evidence of any community engagement around Vision Zero, implementation of strategies related to Vision Zero, documentation of progress towards vision and goals, or evidence for on-boarding procedures being implemented into practice among these medium-size communities. These differences may be attributable to the fact that more medium-size Vision Zero initiatives stopped or paused; therefore, the development of the initiative as documented on the website was discontinued. The differences could also be attributed to the start date, as medium-size initiatives on average started more recently than larger-size initiatives, and thus had less time to develop or acquire resources. There may also be higher resource constraints on these smaller municipalities. It would be helpful to confirm these findings using other data sources, such as through direct surveys or interviews with initiatives of various sizes. Either way, it seems particularly important to provide layers of

support for Vision Zero initiatives from communities with less population, such as through regional (e.g., MPO) and state support, to sustain the initiative through changes in political leadership and staffing.

Interestingly, when Vision Zero began in Sweden it was not prompted because of high traffic fatalities, but rather because advocates “argued that any deaths were too high of a price to pay for mobility” in contrast to accepting road crashes as part of the system (Kim et al., 2017). From our interviews, the Vision Zero initiatives started for a variety of reasons. Often there were several precipitating factors, while in other communities there was a singular key event that prompted the initiative. The convergence of several precipitating factors or streams coming together to initiate change is in line with Kingdon’s multiple streams framework which seeks to explain why some issues make it onto the policy agenda and others do not (Kingdon 2003). When three streams converge, policy action can take place. The three streams include a problem stream (e.g., a publicly recognized issue), policy stream (e.g., issues that rise on the political agenda), and political stream (e.g., willingness of decision makers to place the issue on the agenda). The convergence of these streams creates a window of opportunity, which seems to be reflected for some of the Vision Zero initiatives to begin. For the political stream, changes in government or an impending election can affect the presence and salience of a topic on the agenda. We also found this may have been the case for a few initiatives, whereby the Vision Zero initiative fades when mayor or board support changes. Interestingly, none of the interviewees cited nearby Vision Zero initiatives as a reason for starting up. However, based on the spatial distribution of the initiatives, there was likely some peer support influence. Of note, the reasons for initiating Vision Zero were collected from the initiative leadership. There may be additional reasons, or a different distribution of reasons, had we also asked the same question of local advocates and community leaders.

Equity and Safe Systems are important facets of Vision Zero (Naumann, Kuhlberg et al. 2020). Approximately two-thirds of the initiatives were far enough along to develop a vision for their initiative, almost all focused on reducing serious traffic injuries and deaths to zero. The date to achieve this vision ranged widely, and one interviewee noted how hard it was to choose the correct date, balancing urgency and attainability. Through web-based searching, we identified some documentation on “equity” in about half of the initiatives and on “Safe Systems” in about two-thirds of the initiatives. The lack of documentation of these principles does not necessarily indicate a lack of focus from the Vision Zero initiative. In fact, when interviewees were asked, they all spoke to both concepts. Some interviewees noted the need for more assistance around understanding and applying Safe Systems concepts to their Vision Zero initiative. We did not collect information on the connection of the vision to the goals, objectives, actions, and performance measures (LaJeunesse et al., 2020), nor the approaches to road safety (Safarpour et al., 2020). Future research could quantify the specific changes being implemented towards the goal of Vision Zero.

Researchers have documented the importance of champions in key leadership positions who can provide support for Vision Zero initiatives (Naumann et al., 2019). Moreover, public health theory and established frameworks have long stressed the importance of having credible lead agencies and trusted community gatekeepers involved in large-scale change

initiatives (Butterfoss and Kegler 2002). This critical leadership investment seemed to be confirmed in our web-based assessments wherein more than two-thirds demonstrated local public official commitment and a similar percentage had endorsement by a high-ranking local official.

Within the Vision Zero initiatives, a variety of groups were involved, with law enforcement and transportation mentioned most often from the list of seven groups we assessed. Others have identified the need for collaboration and cooperation among partners as a key to Vision Zero specifically, and to other large-scale health and safety initiatives more broadly (Roussos and Fawcett 2000; Butterfoss and Kegler 2002; Naumann et al., 2019). The collection of key stakeholders from websites very likely undercounted representation. During interviews, the stakeholders collected from the web-based assessment were mentioned. In addition, interviewees mentioned other key groups including public works and facilities, municipal development, fire, human resources, emergency medical services, communications, information technology, parks and recreation, and the city attorney's office. The breadth of stakeholders implies the wide sweeping impact Vision Zero can make, as well as the wide variety and diversity in the way Vision Zero is implemented in communities. From the web-based assessments, the data implied that medium-size municipalities engaged with public health, engineering, and non-profit organizations less frequently, although the reasons why are not clear.

We abstracted information about community engagement before the year 2020 and during 2020 to account for anticipated differences due to the COVID-19 pandemic. As anticipated, we found that community engagement was less in the year 2020 (22.1%) compared to beforehand (52.3%). However, it should be noted that for larger-size communities, the collection of these efforts occurred during the second half of 2020 and may have undercounted efforts. Interview data with Vision Zero program directors indicated that the pandemic limited their outreach efforts due to the limitations in travel and direct engagement with residents. Some initiatives overcame these barriers by conducting engagement sessions around Vision Zero topics online.

Even though community engagement is a fundamental tenet of city planning efforts (Vision Zero Network 2016), this is an area that may require more attention and research, particularly with respect to the most effective modes of engagement (Bobbio 2019). Researchers and practitioners have specifically encouraged initiatives to meet with under-represented community members in order to receive feedback and inform their processes, plans, and areas of focus (Vision Zero Network 2016). We found that about one-third of the Vision Zero initiatives involved non-profit organizations, which can help connect Vision Zero efforts to community members. Reaching the community will also require resources and relationship investments, so funding and time considerations of these efforts should be planned for as well.

The acquisition and analysis of traffic safety data to prioritize focus areas is another vital component of Vision Zero (Vision Zero Network 2017; Naumann et al., 2019). These safety data include police-reported crashes, hospital injuries, and qualitative insight from community members. We found about half of the initiatives had community stakeholders

willing to gather, analyze, utilize, and share data to understand traffic issues and prioritize resources. Many Vision Zero initiatives explore the safety data by indicators of wealth and other demographic characteristics to target efforts to underserved communities, often called a high injury network (Fox and Shahum, 2017). Involvement of public health stakeholders could enhance this effort by providing health and community capacity data to integrate with the traffic safety data.

An important policy tool that municipalities can use is the development, adoption, and implementation of Vision Zero is an action plan, also identified as a key element (Vision Zero Network 2017). A Vision Zero plan is a public document that provides the vision for future efforts to reduce traffic fatalities and serious injuries to zero. Each plan is unique and tailored to the community, creating variation between plans regarding their focus, scope, and strength. Prior research indicates the importance of a plan to Vision Zero efforts (Naumann et al., 2019), as well as to other health and safety initiatives (Butterfoss and Kegler 2002). Almost half of the initiatives we assessed had a Vision Zero plan, with one-quarter in the process of developing a plan.

Among the 86 initiatives, the 14 initiatives that had either paused or ended their work were mostly in the early stages of their initiative development, reflective in fewer having developed a vision or coalition, or conducting community engagement. These initiatives also had less public official commitment and support. Surprisingly, 3 initiatives documented progress on implementing Vision Zero strategies and 4 had a Vision Zero plan. It is not clear why each of these initiatives paused and either restarted or ended. It may have been that the COVID-19 pandemic impacted initiatives such that they had to take a break.

5. Limitations and Strengths

This study has several limitations. The acquisition of the descriptive characteristics relied on website postings, including meeting minutes, resolutions, and plans. A website may not reflect all that is happening with the initiatives and could certainly lead to underrepresentation of characteristics. In addition, a review of websites may specifically miss some municipalities in the exploration phase, which might occur before they began posting information on their initiative. We found that 21 of the 86 initiatives either ceased or paused their work, with more than one year without any meetings or updates on Vision Zero posted to their website. The inclusion of these initiatives in the data could lead to underrepresentation of what may have been happening with Vision Zero programming. Moreover, while we referred to all of the 86 municipalities as having a “Vision Zero initiative”, some of them in early stages may not have ever developed into an active initiative.

For the in-depth interviews, although we aimed to include a diverse set of initiatives, the sample may not reflect the breadth of Vision Zero initiative experiences. For example, none of those interviewed worked at a Vision Zero initiative in the exploration stage. The interviews were also limited to initiatives at municipalities with a population size of at least 100,000 persons. Further exploration would be worthwhile to identify adaptations of Vision Zero with small-to-mid size municipalities. Another worthy endeavor might be to

further explore the community engagement and workplans (e.g., goals, objectives, actions, performance measures (LaJeunesse et al., 2020)) identified by initiatives and identify how they might vary by municipality size. Finally, while the organizing framework used to shape data collection tools and analyses reflects observations from several transportation experts, ultimately the impact of municipal-level Vision Zero efforts should be evaluated with regards to traffic-related serious injuries and fatalities. Researchers have started exploring early impacts of interventions implemented within a Vision Zero framework, and future research and dissemination of findings is critically needed (Mammen et al., 2020).

Strengths of the project include an assessment of all municipalities with a population size of at least 50,000 in the US, and the enrichment of the findings through in-depth interviews. We conducted checks of reliability to try to ensure high quality extraction from the websites. Our work addresses a call from the National Academy of Medicine to develop simple methods to assess the presence of active transportation policies, with examples including Vision Zero and Complete Streets (Pate et al., 2018). Taking the qualitative and quantitative findings together from our work, a survey of Vision Zero initiatives could be created, to establish a surveillance system to be updated regularly.

6. Conclusions

This work is the first to comprehensively describe the initiation and implementation of Vision Zero in the US. The results can provide a nationwide assessment of communities addressing Vision Zero to aid our understanding in the creative ways that communities are adapting Vision Zero to fit their community's needs and facilitate uptake in other communities. The understanding of the community context where the initiatives take place, with its unique policy, environment, and culture, can be useful to communities considering Vision Zero as well as to those already working on Vision Zero. Interviewees identified many recommendations for other Vision Zero initiatives or to assist their own initiative. These recommendations can be considered when developing future resources and support for Vision Zero initiatives. Ultimately, this work can contribute to an understanding of current practice, potential areas of opportunity to support ongoing initiatives, and information to assist new initiatives.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data availability

The data that has been used is confidential.

Abbreviations:

MPO	Metropolitan Planning Organization
US	United States

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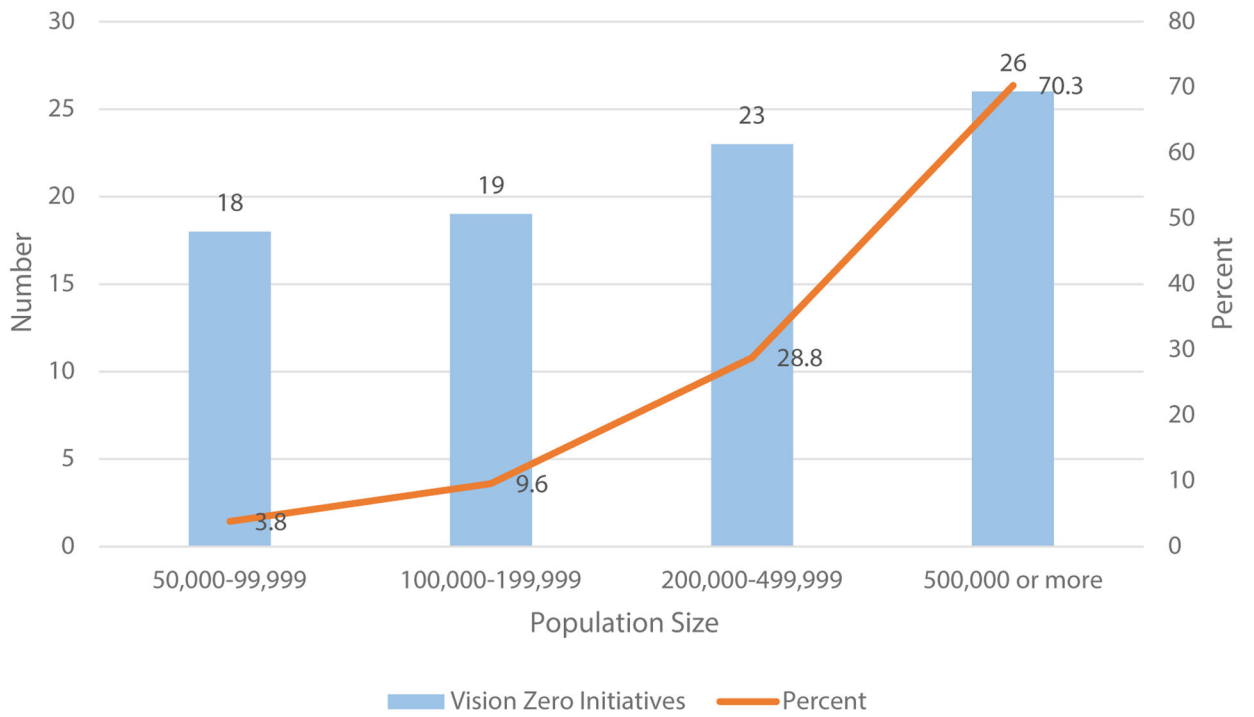


Fig. 1. Percent (orange line) and number (blue bars) of Vision Zero initiatives in the United States by population size (n = 86 of 788 municipalities).

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Table 1

Framework that describes the elements collected from Vision Zero municipal initiatives through two data sources (surveys and interviews).

Data Collection Element	Description	Interviews	Web-based Survey
<i>Key Components of Strong Vision Zero Initiatives</i>			
Champion	Local public official commitment such as through a resolution or policy, endorsement from a high-ranking official	Table 4	Table 2
Vision	Creation of a vision, date to achieve the vision	text only	Table 2
Guiding principles	Equity focused, Safe Systems based	text only	Table 2
Stakeholder involvement	Meetings within governmental agencies and with community members ² , involvement from certain groups, creation of a coalition ²	Table 6	Table 5
Community engagement	Engagement of the community to develop the Vision Zero initiative	text only	Table 5
Use of data	Community stakeholders work with data ² , measurements shared across groups ² , staff use data to assess progress ²	not collected	Table 5
Resources	Funding and staffing shared across groups ²	not collected	Table 5
Vision Zero plan	Plan in development or published	Table 3	Table 7
Performance measures and management	Provides regular updates and documents progress ² , performance management system in place ² , on-boarding procedures ² , changes in goals over time ¹	Table 8	Table 7
<i>General Characteristics of Initiatives and Resource Needs</i>			
Descriptive characteristics	Location (Census region), population size, how initiative began ¹ , year initiative began ² , did initiative end or pause ²	Table 3 and 4	Table 2
Implementation stage	Strategies implemented ² , assignment to a stage ¹ ; for more information on the stages refer to Supplement 1	Table 3	Table 7
Initiative paused or ended	No meetings or updates to the website for more than one year ²	not applicable	Supplement 4
Suggestions for resources	Describes recommendations that would benefit their work or to help others starting an initiative ¹	Table 9, Supplement 3	not collected

¹Collected only using the in-depth interview data.

²Collected only using the web-based survey data.

Table 2

Frequency and percent of Vision Zero initiative location, timeline, champion, vision, and guiding principles from the web-based surveys, overall and by population size.

	Overall		Municipality with $\geq 100,000$ Population Size		Municipality with 50,000–99,999 Population Size	
	n=86	%	n =68	%	n = 18	%
Location						
Census region:						
Midwest	13	15.1	12	17.6	1	5.6
Northeast	11	12.8	6	8.8	5	27.8
Pacific	28	32.6	19	27.9	9	50.0
South	27	31.4	24	35.3	3	16.7
West	7	8.1	7	10.3	0	0.0
Timeline						
Year Vision Zero began:						
2014	4	4.7	4	5.9	0	0.0
2015	15	17.4	14	20.6	1	5.6
2016	12	14.0	9	13.2	3	16.7
2017	14	16.3	12	17.6	2	11.1
2018	13	15.1	9	13.2	4	22.2
2019	15	17.4	10	14.7	5	27.8
2020	13	15.1	10	14.7	3	16.7
Vision Zero initiative ended or paused:						
Yes or maybe	21	24.4	13	19.1	8	44.4
No	65	75.6	55	80.9	10	55.6
Champion						
Local public official commitment to Vision Zero secured (e.g., resolution, policy, or ordinance):						
Yes	61	70.9	47	69.1	14	77.8
No or not mentioned	25	29.1	21	30.9	4	22.2
Vision Zero initiative endorsed by a high-ranking local official (e.g., mayor, city council member):						
Yes	55	64.0	48	70.6	7	38.9
No or not mentioned	31	36.0	20	29.4	11	61.1
Vision						
Initiative has a vision:						
Yes	58	67.4	48	70.6	10	55.6
No	28	32.6	20	29.4	8	44.4
Date to achieve vision:						
2020	1	1.2	1	1.5	0	0.0
2022	1	1.2	1	1.5	0	0.0
2024	2	2.3	2	2.9	0	0.0

	Overall		Municipality with >=100,000 Population Size		Municipality with 50,000–99,999 Population Size	
	n=86	%	n =68	%	n = 18	%
2025	5	5.8	5	7.4	0	0.0
2026	2	2.3	2	2.9	0	0.0
2027	3	3.5	3	4.4	0	0.0
2028	2	2.3	2	2.9	0	0.0
2029	1	1.2	1	1.5	0	0.0
2030	23	26.7	17	25.0	6	33.3
2035	6	7.0	3	4.4	3	16.7
2040	5	5.8	5	7.4	0	0.0
No date for the vision	7	8.1	6	8.8	1	5.6
No vision	28	32.6	20	29.4	8	44.4
Guiding Principles						
Equity mentioned or incorporated:						
Yes	49	57.0	40	58.8	9	50.0
No or not mentioned	37	43.0	28	41.2	9	50.0
Safe Systems-based approach mentioned or incorporated:						
Yes	59	68.6	49	72.1	10	55.6
No or not mentioned	27	31.4	19	27.9	8	44.4

Table 3

Description of the Vision Zero initiative among in-depth interview participants (n = 12) and non-participants (n = 8)*.

	Participated (n = 12)		Did not Participate (n = 8)	
	N	Percent	N	Percent
Census region location:				
Midwest	3	25.0	0	0.0
Northeast	0	0.0	2	25.0
Pacific	1	8.0	1	12.5
South	4	33.0	3	37.5
West	4	33.0	2	25.0
Population size estimated for 2019:				
100,000 to 199,999	5	42.0	2	25.0
200,000 to 499,999	3	25.0	2	25.0
500,000 or more	4	33.0	4	50.0
Vision Zero initiative:				
Municipality level	9	75.0	8	100.0
Municipality/county level	3	25.0	0	0.0
Vision Zero plan at time of interview:				
Yes	5	42.0	4	50.0
No	7	58.0	4	50.0
Implementation stage:				
Exploration	0	0.0	2	25.0
Exploration for plan, initial implementation for projects	3	25.0	2	25.0
Exploration for plan, full implementation for projects	1	8.0	0	0.0
Installation	4	33.0	0	0.0
Initial implementation	1	8.0	0	0.0
Full implementation	3	25.0	4	50.0
Job titles:				
			not applicable	
Vision Zero Coordinator/Manager/Liaison	6	50.0		
Transportation Manager/Planner	3	25.0		
Traffic Engineer	1	8.0		
Public Works Director/Information Officer	2	17.0		

*Nonparticipation due to no response to the invitation email (n = 6) or declined to participate (n = 2).

Table 4

How Vision Zero began from in-depth interviews with example quotes (n = 12).

Theme	Example Quotes
Someone in the community was killed	[T]here was a young girl, a middle school girl, who was killed in the crosswalk walking home from her school.
High fatalities in the community	[T]here was some interest there and then later on in [year] there were some news stories about how [name] County had the highest pedestrian fatalities rate of any metro area in the state. And so that spurred a [commissioner] to sponsor legislation starting the pedestrian safety review board. So, our avenue toward Vision Zero was really driven specifically by pedestrian safety. So [year] we passed that resolution. That year we had a lot of pedestrian fatalities... We've had a history, particularly of elderly pedestrian fatalities. We routinely rank worst for senior pedestrians killed. So there's been this kind of long-standing knowledge that we have issues. That was part of the impetuous for complete streets ordinance... But [year] we had this ordinance in place for six years and we're not necessarily seeing our safety numbers improve so I think there was just, by our council, there was a sense of urgency that we need to do more, that we need to have a stronger focus on safety.
Mayor	The mayor pledged Vision Zero in [year]..... I'd say our advocates and staff and the Mayor's Office. I think they all kind of saw this wave, this idea, Vision Zero idea with traffic fatalities increasing and that could be a better way to address those traffic fatalities under this philosophy of Vision Zero. [O]ur mayor is currently on the way out... and we're getting a new mayor. I don't know what the next administration will be like. This one has been willing to move forward on some controversial projects that had safety benefits and I don't know how our next mayor is going to be. We need the leadership from the mayor because literally, in our structure, if our mayor and our department director who's appointed by the mayor doesn't support our project, it can literally kill it, you know? Yeah so I feel like the Vision Zero action plan is going to be good and in a sense the administration is going to be involved and also some council members may become more sensitized. I think at an abstract level they all support safety and, you know, want it to be a top priority but maybe understanding some of the tradeoffs and you know, institutionally what we need to do... [Vision Zero coming] from the Mayor is another way. Him giving directive and appointing directors in each of the departments to say, "We are developing this plan and we are going to make a change here at the city about how we approach traffic safety." That was another important component because is [city] such a mayor strong city that it coming from him was important too.
City council or council member	So, the city launched the Vision Zero program on [date]... The program's sponsor was the city council member of district [name], so he's the one who started that with the city council and that's apart from the Mayor. So we have our mayor throwing support behind it as well as our city council.
Other champions or leaders within city departments	My understanding it was our Director of Public Service attended a conference and learned more about it at a conference, and having teenage drivers herself she was like, "Why aren't we doing this?" and really pushed an approach to our mayor for support and got it that way. So she was kind of the catalyst. I think there are other people who have kind of known about and desired it for a while but she championed it, at least getting it started. I've been the champion for it and I would say just a lot of professional passion for the topic, and so I think maybe have been the glue that has kind of held it together.
Across several city departments	I'd say public works at the time ... and the Police Department, especially the Traffic Investigations Unit. And kind of, before I got here, the Mayor's Office was pretty invested in it and they helped drive, from what I understand, a lot of the action items.
State encouragement	In [year] our city council passed a resolution basically saying the city should do Vision Zero and then [a year later] our state actually passed a Vision Zero legislation adopting Vision Zero as the policy of our state DOT and instructing all the counties to adopt their own policies. The state level not so much. I think, they have a Toward Zero Deaths initiative which is, is their name for their strategic highway safety plan. But really ... in general they still see something like Vision Zero with a ten-year time frame as aspirational.
MPO encouragement	Part of this effort was also brought about by the local MPO. [They] did a regional transportation safety action plan in [year] and one of their actions was for local jurisdictions to adopt Vision Zero.
Community advocacy and demand	[R]ecognizing this, hearing from the community that street safety is a priority for them, Vision Zero is really the strategy we wanted to improve our streets... we have a really strong group of people who are continually advocating for this and asking the questions, and asking why aren't we doing something, asking me why it hasn't happened. [W]e have a really motivated advocate base that was also sort of pushing our council members and Mayor at the time to adopt a Vision Zero policy.
Pedestrian task force	[T]he city had appointed a Pedestrian Safety and Access Task Force, and pedestrian advocacy and pedestrian activity has long been a policy focus of the city. There were unfortunate fatal crashes that resulted in the appointment of this Pedestrian Safety Task Force.
Plan/policy direction	[O]ne of the kind of starting places for that was in our pedestrian/bicycle master plan. It's a chapter of our transportation master plan. Adopting a Vision Zero policy was identified as one of our action items and key strategies to enhance safety of all road users, but especially vulnerable road users like pedestrians and bicyclists. The city has a complete streets ordinance that was passed in 2017 and so Vision Zero was always sort of a goal or follow-up.

Abbreviations: DOT, Department of Transportation; MPO, metropolitan planning organization.

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Table 5

Frequency and percent of Vision Zero stakeholder involvement, community engagement, use of data, and resources from the web-based surveys, overall and by population size.

	Overall		Municipality with ≥100,000 Population Size		Municipality with 50,000– 99,999 Population Size%	
	n=86	%	n=68	%	n=18	%
Stakeholder Involvement						
Meetings documented on Vision Zero:						
Yes within governmental agencies (local, regional, or state) and stakeholders in the community	49	57.0	43	63.2	6	33.3
Yes within governmental agencies only (local, regional, state)	24	27.9	16	23.5	8	44.4
No or not mentioned	13	15.1	9	13.2	4	22.2
Involvement from each group (<i>each row represents “yes ” and is not mutually exclusive</i>):						
Law enforcement	48	55.8	37	54.4	11	61.1
Transportation	42	48.8	33	48.5	9	50.0
Public health	34	39.5	31	45.6	3	16.7
Planning	33	38.4	24	35.3	9	50.0
Mayor, city manager, or council member	32	37.2	24	35.3	8	44.4
Non-profit organizations	31	36.0	26	38.2	5	27.8
Engineering	28	32.6	23	33.8	5	27.8
Vision Zero coalition to implement actions:						
Yes - established	46	53.5	37	54.4	9	50.0
Yes - proposed or in development	18	20.9	16	23.5	2	11.1
No or not mentioned	22	25.6	15	22.1	7	38.9
Community Engagement						
Community engagement on Vision Zero before 2020:						
Yes	45	52.3	39	57.4	6	33.3
No or not mentioned	41	47.7	29	42.6	12	66.7
Community engagement on Vision Zero in 2020:						
Yes	19	22.1	15	22.1	4	22.2
No or not mentioned	67	77.9	53	77.9	14	77.8
Use of Data						
Community stakeholders commit to gather, analyze, utilize, or share data to understand traffic safety issues and prioritize resources:						
Yes	45	52.3	38	55.9	7	38.9
Maybe	17	19.8	15	22.1	2	11.1
No	24	27.9	15	22.1	9	50.0
Measurements or data shared across stakeholder groups or with the community:						
Yes	40	46.5	35	51.5	5	27.8
No or not mentioned	46	53.5	33	48.5	13	72.2
Staff used data beyond traffic crashes to assess their Vision Zero progress:						

	Overall		Municipality with >=100,000 Population Size		Municipality with 50,000– 99,999 Population Size%	
	n=86	%	n=68	%	n=18	%
Yes	21	24.4	17	25.0	4	22.2
No or not mentioned	65	75.6	51	75.0	14	77.8
Resources						
Resources (e.g., funding, staffing) have been shared across stakeholder groups:						
Yes	25	29.1	20	29.4	5	27.8
No or not mentioned	61	70.9	48	70.6	13	72.2

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Table 6

Change in traffic safety involvement since Vision Zero began from in-depth interviews with example quotes (n = 12).

Example Quotes
<p>Increased traffic safety involvement</p> <p>I think in terms of our Public Works, our Municipal Development, they've increased.</p> <p>In terms of Parks and Rec[reation], I would say they're more involved. They weren't super involved in the beginning of this work and they've become more and more involved in seeing the connection to recreation.</p> <p>The public works department involvement, I would say increased.</p> <p>I'll give you an example. In our current CIP [Capital Improvement Plan] request, we are, we're requesting a large package for planning for improvements on those safety, those high injury locations. And so that's kind of a direct output. And that group was involved, that CIP request collectively comes from that group for planning to support complete streets. So you might say it's increased a little bit, in that way, at least from a pedestrian safety perspective.</p> <p>[T]he Police Department hasn't really decreased, it's maybe remained the same or increased in certain areas.</p> <p>I think [for EMS] it's probably changed a bit... They've become more involved, because they're interested in what's going on. I mean we all essentially have the same goals, right?</p> <p>[Planning has] absolutely increased - especially transportation planning.</p>
<p>No change in traffic safety involvement</p> <p>[For planning], I would say for now, stayed unchanged.</p> <p>And our police department, I feel like that kind of changes from day to day. Sometimes we get really great involvement from them and other times it's really difficult to work with them. So, I would say closer to the same. I think we had a little more support from the higher leadership when we started, and now we're a little more engaged with the on-the-ground officers, which is just a different type of engagement. But I would say it's probably about the same.</p> <p>I think the Police Department has remained the same because we do have some reports they send us for fatalities. And I think they always in fatality reporting explain the reason for it and we start looking at it if there's something we can do to mitigate that. And also, we had a traffic, whenever there's speeding or a complaint from the public and like not respecting turns or something, we get a lot of calls on traffic for that so we forward those to Police Department. I think it's remained the same.</p> <p>[For the Department of Health], I think it's pretty much stayed the same.</p> <p>I don't know. I can't really say that they've [i.e., the police department] increased.</p> <p>They have participated in our pedestrian plan and they're aware of what, you know, information that we've come up with. And participated in providing the data we needed, the crash reports and what not. But I can't say that at a level at which it's affected our work, that they've changed the type of enforcement or level of enforcement's. I do not believe that substantive things are happening.</p>
<p>Decreased traffic safety involvement</p> <p>For our Planning Department, I would say slightly less just because there's not a dedicated staff there anymore.</p> <p>And the Communications Department we started strong. I think when we saw it increased on assistance but it basically [with COVID] ... started like decreasing... They're now really busy with vaccines. So it's just a time where all the resources are going towards that.</p>

Example Quotes

Increased traffic safety involvement

Table 7

Frequency and percent of Vision Zero initiative plans, implementation, and performance measures and management from the web-based surveys, overall and by population size.

	Overall		Municipality with $\geq 100,000$ Population Size		Municipality with 50,000– 99,999 Population Size	
	n = 86	%	n = 68	%	n = 18	%
Plan						
Vision Zero plan:						
Yes, completed	39	45.3	34	50.0	5	27.8
Yes, in development	21	24.4	17	25.0	4	22.2
No	26	30.2	17	25.0	9	50.0
Vision Zero plan publication year:						
2014	1	1.2	1	1.5	0	0.0
2015	3	3.5	3	4.4	0	0.0
2016	5	5.8	5	7.4	0	0.0
2017	13	15.1	12	17.6	1	5.6
2018	3	3.5	2	2.9	1	5.6
2019	9	10.5	9	13.2	0	0.0
2020	5	5.8	2	2.9	3	16.7
No plan or in development	47	54.7	34	50.0	13	72.2
Implementation						
Vision Zero-related strategies have been implemented:						
Yes	47	54.7	42	61.8	5	27.8
No or not mentioned	39	45.3	26	38.2	13	72.2
Performance Measures and Management						
Has a process to provide regular updates or evaluation on progress towards performance measures and goals:						
Yes	33	38.4	23	33.8	10	55.6
No or not mentioned	53	61.6	45	66.2	8	44.4
Provided updates or evaluation on progress towards performance measures and goals:						
Yes	26	30.2	23	33.8	3	16.7
No or not mentioned	60	69.8	45	66.2	15	83.3
Documentation indicates progress towards the Vision Zero goal of zero traffic related serious injuries and deaths:						
Yes	20	23.3	18	26.5	2	11.1
No or not mentioned	66	76.7	50	73.5	16	88.9
A Vision Zero performance management system has been implemented:						
Yes	4	4.7	3	4.4	1	5.6
No or not mentioned	82	95.3	65	95.6	17	94.4
On-boarding procedures have been implemented into practice:						
Yes	21	24.4	21	30.9	0	0.0

	Overall		Municipality with $\geq 100,000$ Population Size		Municipality with 50,000–99,999 Population Size	
	n = 86	%	n = 68	%	n = 18	%
No or not mentioned	65	75.6	47	69.1	18	100.0

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Table 8

Changes in Vision Zero goals since the initiative began from in-depth interviews with example quotes (n = 12).

Changes in Goals	Example Quotes
Coordination with the state	We have some goals that talked about better coordinating with [the Department of Transportation]. Just you know people change, department's change, and some of the goals have kind of, they're just not as accurate as—they're not as timeless as when the plan was first developed.
Being more specific about where to focus resources to make changes in infrastructure	[F]or the complete streets program, we align it, like I said, generally to our maintenance program. We'll selection projects to do further planning on generally using a consultant and so it's influenced our project selection so our high injury corridors, we're giving priority to those, our limited dollars for planning consultants. And then we actually have a few ongoing projects and the Vision Zero piece has added, particularly pedestrian safety focus. So it led to us concentrating more on problem intersection. You know whereas, before you know, we were trying to address safety to all users and accommodation but we didn't necessarily where our critical problems were. So I think our main goal was to eliminating deaths and serious injuries by the year 2040. So that has been the set goal so I think the only change I see is more of how we approach Vision Zero as we get more information on Vision Zero programs from other cities.
Less focus on the five E's (engineering, enforcement, education, encouragement, evaluation)	[I]f you look at the executive order, which was released in [date], we talk about the five E's. Since that time, we don't even mention that in the plan because we recognize that it's kind of outdated. It doesn't really get us where we want to go. It continues to silo those components, whereas they need to work collectively. So yeah, so we say that in the plan, that that's where we're going to focus our effort, but actually we've shifted that to focusing on communication, safe systems, safe speeds, and programming. Yeah, I would say in some ways. When I first was brought on this was very much something trying to be put in the police department's realm, or the city was trying to put in the police department's realm as a police effort. So we've tried to, to sort of take inspiration from the E's of traffic safety and sort of flip it and put it into something that was more layperson friendly.
Moving from the why to what to how	I think the most notable evolution in our thinking is to go from what started with a why statement, zero by 2030. We spent a lot of time talking with our transportation commission and then city council on what steps and mentioned in June of this year, our council adopted a safe systems approach and strategies. I think that provides, you know, moving from the why statement to what steps and now we're really engaged with the how.
More short-term planning/goals	Yes, in that I think we were looking to do a more longer-term Vision Zero Action Plan and with the pandemic happening we're doing a two-year action plan. So all our strategies we're going to do is to start, to see, you know to do some things for the next two years, and see kind of maybe how our new normal shakes out, you know what's our traffic going to be, what, you know how are people moving and communizing now post-COVID or as these things change and transition. So that did change. But I think we were looking at more of a five to ten year plan and we were kind of like, because of COVID I think we reassessed that.
Update goals once accomplishments are made	So we focused on where our biggest problems were, and as we did our updated plan, we found that, you know, we've addressed concerns - I think issues within neighborhoods and schools have almost like gone away, and so that is no longer kind of a focus. Our focus in schools really is mode shift now, it's like we create a safe environment, how do we get more kids walking and biking to school?..... I believe public health is another area that we want to expand things, and then working with regional entities.
Goals did not change	The resolution we have passed by city council outlines specific steps for reducing traffic fatalities, I think it's by 2030. And then had some very specific components they wanted in this action plan. We haven't departed much from that outline when that was passed. I don't think so. I don't think at a high level the goals have changed much.

Table 9

Recommendations from the in-depth interviews to foster Vision Zero from in-depth interviews (n = 12).

Theme	Description
Data	Need for more accurate, complete, and timely crash data Lack of enforcement data Assistance on conducting analysis of crash reports Lack of demographic data related to crashes Better spatial data of infrastructure in the community
Management and Communication	Improving procedures for management of their initiative Improving communication internally and externally
Change in Their Organization and Community	Understanding how to make political change Understanding how to change the perspective of some engineers Integration of the initiative across the city Understanding how to shift social norms
Best Practices	Seeking information on other Vision Zero initiatives Participating in a Vision Zero peer exchange External review of the initiative Identify most important actions in plans to focus on
Funding	Monetary and staffing needs
Resources on Specific Issues	Equity information Safe Systems information Evaluation and performance monitoring
National Guidance	Recommendations from a national entity to add credibility to their work Industry safety developments

Note: Quotes regarding the recommendations can be found in Supplement 3.