

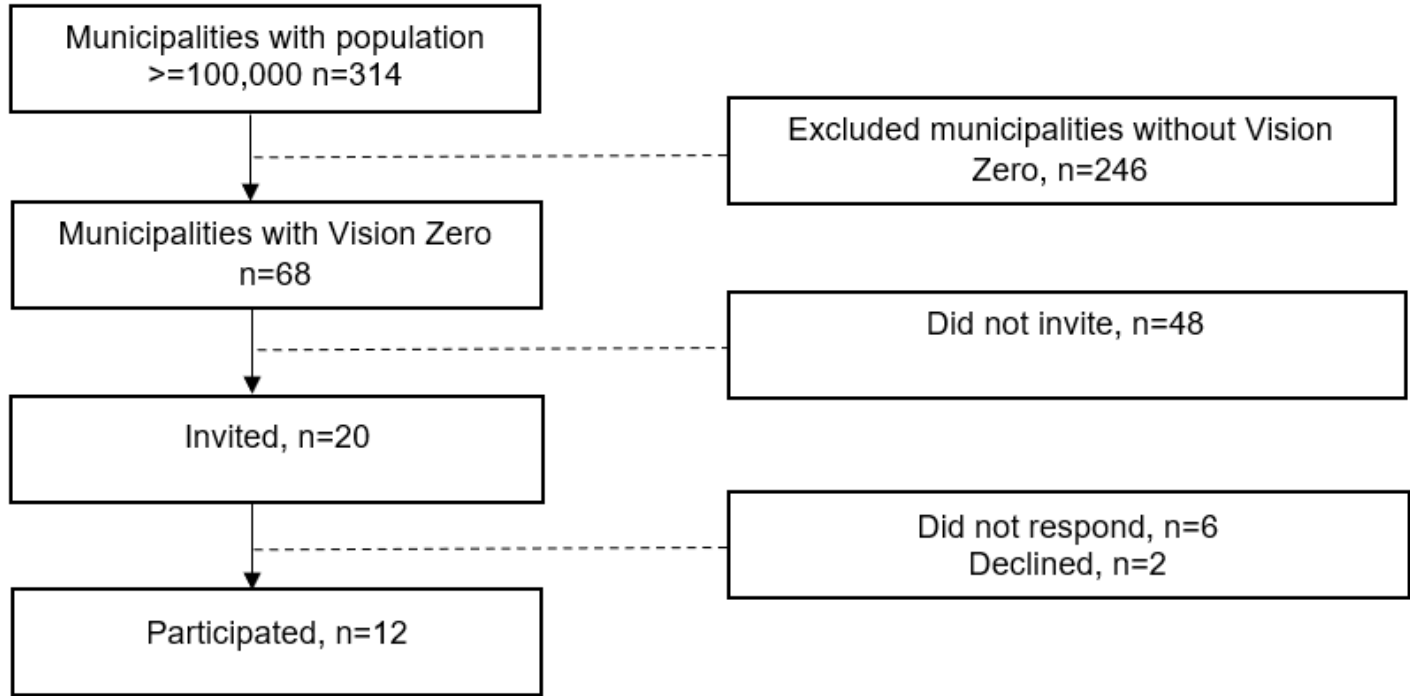
Supplementary Material

Supplement 1: Implementation stages for Vision Zero initiatives

1. Exploration Stage: includes shared communication about the needs and strengths of the community, identifying possible effective innovations that might help fill the gaps to their current approach, discussion of resources required, and assessment of what is needed to support the innovation and create readiness.
 - For Vision Zero, this may begin with internal departmental meetings as well as meetings with potential stakeholders to consider whether there is interest in Vision Zero. Later in the process it would include identifying champions of Vision Zero, conducting a needs and asset assessment, securing local public official commitment, and convening diverse professionals and stakeholders to establish a coalition.
2. Installation Stage: acquires or repurposes the resources needed to effectively engage in new ways to work. At this time job descriptions may be rewritten, leadership changes may occur, and team members may work differently.
 - For Vision Zero, this includes developing and adopting a Vision Zero plan, hiring staff to focus on implementing Vision Zero strategies, dedicating funds to Vision Zero strategies, and *establishing* a Vision Zero performance management system (which includes both measurement of traffic-related crashes and deaths as well as planning ahead to respond to unforeseen changes).
3. Initial Implementation Stage: represents the time when practitioners first attempt to use the innovation. The changes may seem uncomfortable as newly learned skills are being practiced. Others have found that groups who use implementation drivers (practices that facilitate sustaining work towards the innovation) are more likely to succeed during this time.
 - For Vision Zero, this includes *implementing* a Vision Zero performance management system, implementing evidence-based safety procedures, sharing data and resources across Vision Zero coalition sectors, and establishing on-boarding procedures for new staff and cross-sector collaboration. For Vision Zero, implementation drivers may include adequate training of practitioners and support of leaders.
4. Full Implementation Stage: is achieved when at least 50% of the practitioners in an organization meet fidelity criteria on a given day. A general example of “fidelity criteria” would be to have half of the organization’s practitioners use an innovation.
 - For Vision Zero, this includes implementing more than half of the safety procedures outlined in the Vision Zero Plan, operating on-boarding procedures with new staff and cross-sectoral coalition members, and *maintaining* their performance management system.

Note: Some Vision Zero initiatives were at differing stages for their plan as compared to their projects. Thus, we split those apart when they differed.

Supplement 2. Selection of participants for in-depth interviews from US municipalities



Supplement 3: Recommendations by interviewees to foster Vision Zero from in-depth interviews with example quotes (n=12)

Theme and Description	Example Quotes
Data	
Need for more accurate, complete, and timely crash data	[W]e have a statewide database of crashes that kind of gets processed every, you know, every year, but that's a year or two behind. So the data we're working with that's kind of been cleaned and you know geocoded correctly and all that, is from [year] to [four years later]. That's our most recent data. And then our data coming out of our police department, is like, the georeferencing is terrible, if it's there at all. A lot of the data isn't great. One thing that I would be really interested in learning more about, how we improve is kind of the reporting, in sort of a technical term... we're struggling with the top contributing factors and how do we work with our police department to use that as a tool for data-driven work. I think for a long time, and I've heard this from other cities as well, that those crash reports, the sort of what's in the officer's head when they're filling out a crash report is, "How is this going to be handled in a court case?" Right? Which is very different from, "How are we going to make decisions?" So for example, we've been talking about speed. Excessive speed is really not given as a top contributing factor very often in crashes here. But when we've talked through crashes with officers, it's clear that, yes this driver—failure to yield is the reason that they hit the person, but if they'd hit the person at 25 miles an hour as opposed to 45 miles an hour, then we would have a very different outcome of this crash.
Lack of enforcement data	So, it's really hard to talk about what we do with enforcement, because we don't really understand what the trends are. So those are pieces that I'm thinking about a lot right now because its data I've been playing with.
Assistance on conducting analysis of crash reports	One thing that would be great is the data analysis has been challenging. I don't think we've come up with a great way to do data analysis, going through crash reports. It would be great if there was a national, almost like, piece of software you could program things into. We might use a consultant to support with that and to help us figure out a way to effectively process our crash reports. But that's definitely, it's been a heavy lift internally in sustaining it.
	So I think if there was guidance or tools on how to effectively use police crash reports, how to process that information and if it's, even the software or systems to do it, that would be certainly useful.
Lack of demographic data related to crashes	Demographic information can sometimes be difficult for us to get. We're going to pursue that but our crash reports don't necessarily say, you know we don't know necessarily know race or income of the person involved in the crash.

Better spatial data of infrastructure in the community	[O]lder systems have not done a great job at keeping track of things, so figuring out where there are sidewalks that are not passable for people who use wheelchairs for instance. So things like that it really at this point is a situation where either somebody complains or you have to undergo a pretty rigorous auditing of the literally going down sidewalks on every street where they exist. Our traffic engineers do at least know where sidewalks have been put in at one time so that's better than some things. For instance, we were trying to map out the storm sewer network years ago and ... we didn't even know what we had in some cases. I mean we knew some of the big things but we didn't even have a map of the whole network.
Management and Communication	
Improving procedures for management of their initiative	How cities have integrated Vision Zero throughout their city and county governments. Is it the DOT [Department of Transportation] that's leading it? Is it the Police Department? Who is connecting the agencies together? Or health department. How are they tracking—or are they. It kind of speaks to program management styles. What tools have they found successful in managing. Often times I feel like we're a little more antiquated in the way cities manage projects. If you go to other, let's say, maybe tech industries with, there's an organization—the project management institute ... kind of like the industry standard for how programs can be managed effectively. It's not like a one off. It's like looking at a whole organization. You have a program management office, they help determine resource leveling in terms of personnel and funding and the synergies between. Kind of a little more sophisticated way of managing programs and, in turn, projects. But I feel like cities are just now kind of hear some of that language, project charters, team charters. Yeah, standard project management words. I think the IT sector kind of led some of that.
Improving communication internally and externally	I guess figuring out how to communicate it with them - things that have been accepted by a lot of cities. I know everyone struggles with this.
	I think now we have a sample from other cities that we can look into. We want to improve the communication aspect but it's just a matter of finding the communication department because they're busy with COVID.
External and Internal Change	
How to make political change	I don't necessarily know how to craft research, but I know the challenges are always, even when you have the data, how do you get politicians to change laws to make things safer? Those can be kind of challenging sometimes.

Understanding how to change the perspective of some engineers	[F]or me the biggest challenge that I'm trying to figure out how to face is, how to move our engineering department in the direction of some of these smaller pilot or temporary or quick build type projects.
	But there really is this shifting tectonic plate as to what the traffic engineer values and that's where the state DOT [Department of Transportation] is still, has the head engineer. Right? And they're a group of engineers, as opposed to, and they're traffic engineers moving cars as opposed to transportation engineers who are problem solving and looking to move a variety of modes and means of transportation in a community... It's having a team of transportation engineers who see themselves as transportation engineers and not traffic engineers, as being fundamental because six years ago we had a couple of traffic engineers, old school guys that retired and moved on. And then a new group came in and they proudly present themselves as transportation engineers. And so I spent countless hours arguing with our former traffic engineers about what we needed to do. Now I find with our current transportation engineers more bouncing ideas off of each other and trying to say, "How can we do more, faster, with less?"
Integration of the initiative across the city	So trying to figure out how to integrate it across the city as this is part of what we do, it's not just another project or program was probably the biggest challenge. I think it made sense that people thought about it that way, I think because that's kind of, how gosh I don't know. How do I say this so that it makes sense? There are a few programs that make internally city-wide impacts, and they have strategic plans behind them. So it was hard at first to get people to see like this isn't just another thing to add to your plate because I think trying to get everybody at the table and on board that this is really going to shift things internally just hasn't—it's been done a select few times. I think, I mean people said that at meetings. When I was bringing folks to the table for meetings about Vision Zero, I was like, "Yeah this project—we can do this project, we're excited about it." There was enthusiasm but it was like, well this is like another thing to have a check mark on so it took a while for people in other departments to start seeing it as something that we're going to engrain as a part of how we approach traffic safety.
Understanding how to shift social norms	And I also really think with Vision Zero, you know there's so much to do with culture shift and how do you get that shift in culture. I see this culture shift as similar to, maybe somebody else explained it. I think maybe LA [Los Angeles] had some communications research where they said you know like, "30 some years ago, smoking was a lot more acceptable or tobacco was more acceptable that it was not. But we've have system-wide changes so you know movies, it's not popular to smoke in movies unless you're flashing back to a time more than 30 years ago." And companies have changed their policies where you can't smoke in a building and you can't even smoke within 25 feet of a building or whatever it is. And laws have changed so the social norms have changed. How do we change the social norms for transportation safety?

Best Practices	
Seeking information on other Vision Zero initiatives	I think there's a national website but I think when you look at it, nobody knows what Vision Zero is. When you look at the plans that have say, a work plan, but it just hard to understand. So I mean it wasn't until we saw a work plan form another city that we were able to understand what we really wanted to do I think that was part of the confusion because I guess a lot of cities are going to say, "Hey I want to be Vision Zero city." But those are reading the website are like "Okay what should I do?" and all those things. I think once we start talking to the other cities in [state] and they explained what they were doing and they were four years already doing Vision Zero. So we were able to explore their websites and see exactly what they were doing. That's how we related what to do. But I think more simple, sort of, more work plans or something like that would be really helping in a way. But I think we got it now.
	I mean, I'd be really interested to see how other people manage their Vision Zero programs.
	I'd be interesting to know from other cities what their staff capacity looked like for this and if we're in a similar boat or if other people were able to figure out dedicated staff that sort of thing.
Participating in a Vision Zero peer exchange	I mean obviously the bigger cities like [examples]. They have a staff just dedicated to that and we can see how they were implementing that. So with that we were able to convince the city council and others like they have a staff already just for Vision Zero so we need to set a budget and different things. It went good because we were able to see what the other cities were doing, because I know there was another city that didn't have a lot of progress and they've been there for a couple more years so we wanted to show the different backgrounds for city staffs so they can see.
External review of the initiative	But one thing that I think would add value to this going forward is to replicate what is already being done with the bike friendly cities and ped friendly cities programs of the evaluation, kind of certification of where you are on the continuum. Where we can get an impartial third party review of what we're doing and we could then have a sense of where are we from a safe—you know if you have that same framework for safe streets, you know, "These are the typical facets and your rating is kind of here, but when you aggregate all of these data points, you're borderline silver, gold."
Identify most important actions in plans to focus on	[I]n each of those action plans have 20 to 80 actions. Well, I want a reference document that takes me to the SOP [standard operating procedure] that, let's say [this city] uses for rapid response. I want that granularity. I don't want, because I still, if you have that catalogue that you have of, "Oh if you want to talk about equity, go to this plan."

	<p>Yeah. I think, you know, I use the term RND as "rip off and duplicate". And I use that to describe what would be really helpful across the board as we talk about, as you start to move from the very generalized goal setting and objectives and start to get granular into implementation and action, to have, and we, you know I started to do this with a document like I said, it's not publicly available. As I started to create this spreadsheet of each of these actions, I went and identified industry best practices for us to have as breadcrumbs together. You know, once we got these underway to have those as reference points for us to draw insights from. And so, I mean, it'd be great if there was a clearinghouse wherein, you kind of did that at the bigger level, but I'm talking about getting at that next level where you start providing [examples].</p>
Funding	
Monetary and staff needs	[F]rom a budgetary perspective we need more budget, just like anywhere.
	[S]taffing was a big need. Having budget related to it, our areas of need, because people will want to see movement – like any new program, of course, people are going to want to see movement on it, especially elected officials, they're going to want to see sort of the, where the rubber meets the road. They're going to want to see like what you're implementing, what, you know, we adopted this thing, how does it actually look, and what are you doing to do that thing that we said that we were going to do. So, so funding for that.
Resources on Specific Issues	
Equity information	And to have that guidance and then all of the other resources available about the importance of prioritizing equity and equitable outcomes, having conversations about the language that we use. That to me, was really helpful.
Safe systems information	I think the safe, the safe systems, more information about that would be really helpful, especially for our elected officials. Training for elected officials, and that includes like board and commissioners because often there's kind of citizen activists that come into these roles and they know, they only know what they know about transportation planning and safety from their experiences which is often, can be auto-related, and, and limited in scope. So, so there's definitely a need for training of elected officials, just to help them understand the philosophy of Vision Zero so they're not out there talking to the media about, you know, street safety and just are coming up with things that are just bananas.
	Yes. We are familiar with safe systems. I will say we're going to need more conversations and training as a collective on it because it is something that we actually prioritized because we work pretty closely with our local FHWA [Federal Highway Administration] representative.

Evaluation and performance monitoring	I need to know how I can sell it to my higher up. "Yeah we're doing well, but we can be doing more. And here are the ways and performance monitoring."
	But I bring that up in terms of evaluation, because I looked to them [other Vision Zero cities] to see what benchmarks they used and some of them had a benchmark for each action. And then some had general, "hey we're just going to look at these ten things". Like how did they land there? And how do I know where to land for [my city]? And I think that goes back to do the data component.
National Guidance	
Recommendations from a national entity to add credibility to their work	So certainly that national guidance on these are important things to look at. Particularly if its new. There's some tools, like pedestrian hybrid beacons, [and] we can't get internal consensus to use yet even though I know there's quite a bit of national data... we're hesitant to do new things I think. Maybe that's all DOT's [Department of Transportation]. I know there's a hesitance to doing new things so the more that we can have experts saying. "No no, this is a good thing." The easier it is for us to do it, to integrate it into a project.
Industry safety developments	Or finding ways to get big industry like vehicles to implement safety development you know like I'm sure the technology exists where this could be done, you know different types of safety things could be done but industry doesn't want to do that.

Supplement 4: Frequency and percent of characteristics among initiatives that paused or ended according to the web-based surveys (n=14)

	Overall	
	n=14	%
Location		
Census region:		
Midwest	4	28.6
Northeast	2	14.3
Pacific	3	21.4
South	5	35.7
West		0
Timeline		
Year Vision Zero began:		
2014	1	7.1
2015	1	7.1
2016	4	28.6
2017	4	28.6
2018	1	7.1
2019	2	14.3
2020	1	7.1
Champion		
Local public official commitment to Vision Zero secured (e.g., resolution, policy, or ordinance):		
Yes	7	50.0
No or not mentioned	7	50.0
Vision Zero initiative endorsed by a high-ranking local official (e.g., mayor, city council member):		
Yes	6	42.9
No or not mentioned	8	57.1
Vision		
Initiative has a vision:		
Yes	5	35.7
No	9	64.3
Date to achieve vision:		
2022	1	7.1
2025	1	7.1
2030	1	7.1
2040	1	7.1
No date for the vision	1	7.1

No vision	9	64.3
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Guiding Principles

Equity mentioned or incorporated:

Yes	3	21.4
No or not mentioned	11	78.6

Safe Systems-based approach mentioned or incorporated:

Yes	5	35.7
No or not mentioned	9	64.3

Stakeholder Involvement

Meetings documented on Vision Zero:

Yes within governmental agencies (local, regional, or state) and stakeholders in the community	2	14.3
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Yes within governmental agencies only (local, regional, state)	7	50.0
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No or not mentioned	5	35.7
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Involvement from each group (*each row represents "yes" and is not mutually exclusive*):

Law enforcement	7	50.0
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Transportation	6	42.9
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Public health	4	28.6
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Planning	5	35.7
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Mayor, city manager, or council member	2	14.3
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Non-profit organizations	4	28.6
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Engineering	4	28.6
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Vision Zero coalition to implement actions:

Yes - established	5	35.7
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Yes - proposed or in development	3	21.4
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No or not mentioned	6	42.9
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Community Engagement

Community engagement on Vision Zero before 2020:

Yes	3	21.4
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No or not mentioned	11	78.6
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Community engagement on Vision Zero in 2020:

Yes	0	0.0
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No or not mentioned	14	100.0
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Use of Data

Community stakeholders commit to gather, analyze, utilize, or share data to understand traffic safety issues and prioritize resources:

Yes	2	14.3
Maybe	5	35.7
No	7	50.0

Measurements or data shared across stakeholder groups or with the community:

Yes	3	21.4
No or not mentioned	11	78.6

Staff used data beyond traffic crashes to assess their Vision Zero progress:

Yes	1	7.1
No or not mentioned	13	92.9

Resources

Resources (e.g., funding, staffing) have been shared across stakeholder groups:

Yes	1	7.1
No or not mentioned	13	92.9

Plan

Vision Zero plan (in 2020):

Yes, completed	4	28.6
Yes, in development	2	14.3
No	8	57.1

Implementation

Vision Zero-related strategies have been implemented:

Yes	3	21.4
No or not mentioned	11	78.6

Performance Measures and Management

Has a process to provide regular updates or evaluation on progress towards performance measures and goals:

Yes	5	35.7
No or not mentioned	9	64.3

Provided updates or evaluation on progress towards performance measures and goals:

Yes	1	7.1
No or not mentioned	13	92.9

Documentation indicates progress towards the Vision Zero goal of zero traffic related serious injuries and deaths:

Yes	1	7.1
No or not mentioned	13	92.9

A Vision Zero performance management system has been implemented:

Yes	0	0.0
No or not mentioned	14	100.0

On-boarding procedures have been implemented into practice:

Yes	0	0.0
No or not mentioned	14	100.0
