



Infrastructure remediations through the Botnar Child Road Safety Challenge

May 2023



Author: Pratishtha Singh

Acknowledgments: Atsani Ariobowo, Carlos Pardo Velez, Cynthia Garibay Lopez, Dr Jagnoor Jagnoor, Kim Beng Lua, Dr Margie Peden

In most countries, pedestrians, cyclists, and other vulnerable road users share the road with motor vehicles, forcing them to negotiate high-speed moving traffic. Simple infrastructural provisions such as speed humps, footpaths, sign markings, and traffic lights can substantially decrease crashes and maximize pedestrian and driver safety. However, most urban areas lack such facilities, putting people at risk for mortality and morbidity. Children are particularly vulnerable, with road traffic injuries being the **leading killer** of children aged 15-17 years worldwide.

The Global status report on road safety 2018 found that only 92 countries (of which 49% are high-income countries) have implemented policies to promote walking and cycling. However, looking at these policies in isolation, they are unlikely to have much impact. It is imperative that interventions such as effective speed management and the provision of safe infrastructure for pedestrians and cyclists, are employed to effectively lessen the prevalence of road traffic injuries.



A new sidewalk can reduce the number of people hit walking along a road by



Save LIVES: a road safety technical package is an evidence-based inventory of priority interventions with a focus on: Speed management, Leadership, Infrastructure design and improvement, Vehicle safety standards, Enforcement of traffic laws and post-crash Survival. The “Infrastructure design and improvement” component maps how existing infrastructure should be improved by setting appropriate safety standards for all road users. It highlights specific solutions and best practices for ensuring that the road network is safe for all road users by:

1. Providing safe infrastructure for all road users
2. Putting in place bicycle and motorcycle lanes
3. Making the sides of roads safer
4. Designing safer intersections
5. Separating access roads from through-roads
6. Prioritizing people by putting in place vehicle free zones
7. Restricting traffic and speed in residential, commercial, and school zones
8. Providing better, safer routes for public transport.

Improving the top
10% highest-risk roads in
each country over
20 years
can prevent millions of deaths and serious injuries

A key focus of the [*Botnar Child Road Safety Challenge \(BCRSC\)*](#) has been to implement infrastructure remediations to reduce traffic crashes around schools, key junctions, and other important areas in cities. This case study maps how permanent and temporary engineering modifications were undertaken by three partner organizations under BCRSC, in compliance with the best practices documented in the Save LIVES package.

Promoting mobility and creating safer public spaces using tactical urbanism

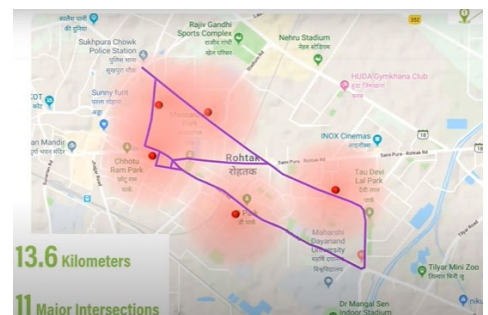
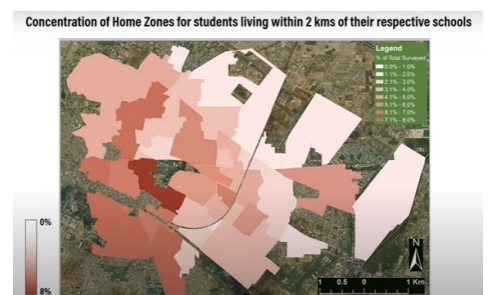
Rohtak city in India is an industrial city that has been developed along three National and two State Highways, creating isolated neighborhoods with poor inter-connectivity, resulting in a higher rate of road traffic crash fatalities than the country's average. In many instances, these highways must be crossed by children on their commute to school, forcing them to face extremely perilous conditions every day.

To remedy these challenges, the project 'Safer Commute for School Children' implemented by the [*India Resources Trust*](#) (IRT) (the Indian chapter of World Resources Institute) aimed to transform Rohtak into a city where children can travel safely on the road, either by foot, cycle or transit, irrespective of whether they are accompanied by an adult or on their own. The goal is to reduce the crash risk for children in Rohtak by influencing a citywide scale-up of safer road infrastructure and traffic management practices for children.

In line with SAVE Lives, IRT has undertaken detailed infrastructure safety assessments to identify and transform roads, intersections, and urban spaces for children and youth. This included:

- topographical surveys,
- land-use activity mapping, and
- traffic and transportation surveys.

In order to secure the city's support in adopting road safety interventions, IRT undertook [*tactical urbanism*](#) which involves using temporary installations to demarcate the proposed road geometry, using traffic cones, barricades, ropes, planter pots, paints, etc.



The tactical urbanism trials were conducted after IRT had presented the solutions to the officials from the city administration and traffic police. The preliminary drawings for the 10 intersections where trials were to be done, were submitted to the district administration and the police for them to study and approve. Once the approval was given, all of the trials were conducted overnight, using low cost and temporary materials such as plastic barricades and cones. These trials were envisaged to meet functional requirements, improve road safety for vulnerable road users, as well as be visually pleasing, and add to the public space experience. The spaces reclaimed for pedestrians were also painted to show clear demarcation between the carriageway and future footpath that would come up. The colours made the spaces more vibrant and helped them stand out from the carriageway.

These trials, which were in place for two to four weeks have been considered a success as it helped the traffic police in understanding that giving more space for vehicles does not necessarily mean that traffic flow will cease. In fact, all the trials across the city have shown the officials that reducing the carriageway and creating a uniform width has helped in better flow of vehicles and pedestrians.

The trials have also highlighted the problem of on- street parking on how it is one of the main causes of congestion and also makes the environment unsafe for all users. Through these interventions, officials could understand the realities on the ground and that road safety can be substantially improved using low-cost design and engineering interventions. In continuation to this, IRT has now advocated with the local government and other stakeholders to make these fixtures permanent.

Apart from using these temporary (movable) installations, IRT also engaged with local contractors to execute the simpler infrastructural modifications, such as installing signage, thermoplastic road markings, and speed humps to make the roads safer. Through these measures, IRT has created easily accessible and quality spaces for the city's residents.



Tau Devi Lal intersection before



Tau Devi Lal intersection after

Restricting speed around schools through infrastructural changes

Vietnam has experienced rapid motorization, leading to a surge in road traffic crashes, injuries, and deaths. In 2016, in Gia Lai province, there were 425 reported road traffic crashes that left 234 people dead and 494 more injured. Of the 234 people who died, 17 were children.

The Slow Zones, Safe Zones project was initiated by the [AIP Foundation](#), keeping in mind that a city fit for young people must have an infrastructure and culture that encourages road safety and mobility. This project used a multi-pronged approach to reduce road traffic crashes, injuries, and fatalities by making the road environment around 31 schools safer for young people, with innovative technologies and meaningful youth participation. This includes:

- Implementing low-cost, speed management road modifications around primary schools,
- Running public awareness campaigns around schools with modifications, and
- Speed enforcement, with support from the local police.

The road environment has been designed to be safer for students commuting to and from school, through a comprehensive set of interventions to improve road user behavior in school zones by enhancing road infrastructure, increasing public awareness, delivering education, and advocating for adoption of a legal standard of 'school zone definition' in Pleiku City, Gia Lai province.

The road infrastructure in Pleiku City and Vietnam generally does not prioritize bicycle safety. To ensure the safety of project participants as well as the community when cycling, AIP Foundation is advocating with Vietnam's government for the addition of permanent and temporary bicycle lanes on Pleiku roads, so that more people feel empowered and encouraged to choose bicycles as the alternative for their daily commute.



In line with best practices from the Save LIVES package, the project focuses on speed reduction and school zone safety through the construction of tailored school-zone modifications like speed bumps, road markings, speed reduction signs, and sidewalks. Through Slow Zones, Safe Zones, AIP Foundation undertook infrastructural improvements for traffic management around school areas within 250m from the school gate in each direction. This included:

- Renovating, expanding, and building 804,080 m² asphalt concrete road surface,
- Construction of 2,080 m² pavement, entrance, and a cement concrete yard
- Installing 136 road signs to depict information such as school area, parking area for parents and children, speed limit, slow down, stop, and intersections
- Painting 735.88 m² of road markings
- Installing 49 clusters of rumble strips
- Installing 19 pedestrian crossings
- Installing 146.17 m of steel railing to separate the footpath for students and the parking area for parents



Le Lai school before



Le Lai school after

Post these remediations, upon measuring the change through the *Star Ratings for School indicator*, the following changes were observed:

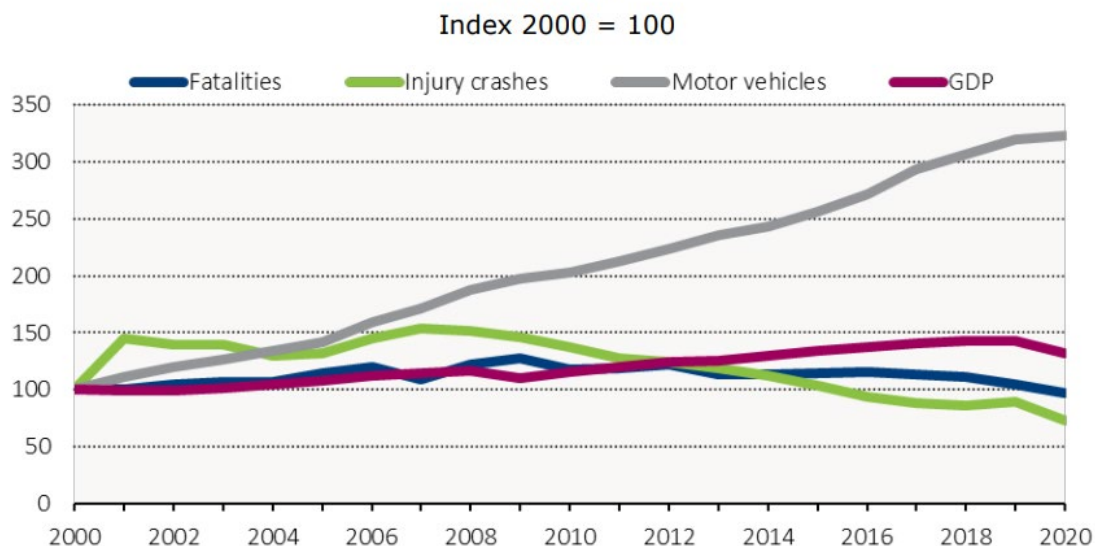


Through these initiatives of improving sidewalks, repairing pavement marking, traffic signs, and parking spaces, a clean and beautiful school environment has been created, and improved traffic management for when parents drop and pick up students. These modifications at school zones around Pleiku City are expected to have a life-saving impact on the students, parents, teachers, and the community that undertake travel to-and-from the school daily. Moreover, solutions for pavement marking and traffic signs contribute to enhancing driver awareness of the school's presence. These solutions have also been effective in reducing operational vehicle speed as the average speed for vehicles passing the school gate was reduced from 30km/hr to 28km/hr. Post-intervention survey findings also highlighted that overall student road crash rates reduced from 1.2% to 0.8% and crash rates around school zones decreased from 19.8% to just 2.9%. For all students across Pleiku City, these improvements have not only safeguarded them on their commute to school but also ensured that all students have safe and equal access to their education.

Improving infrastructure to make Colima a children safe city

The number of road deaths has continued to remain exceedingly high in Mexico, with over 16 people killed per 100,000 inhabitants. This is partly because Mexican cities are experiencing a process of rapid urbanization- representing great challenges but also great opportunities for the cities that require the strengthening of planning, redesigning and regeneration of safe public spaces and sustainable mobility to improve urban living conditions. Through the '[Making Colima a Children Safe City through Comprehensive Road Safety Policies](#),' the World Resources Institute (WRI), Mexico aims to protect children aged 4-17 years of age around school environments by reducing speed.

Evolution of road fatalities, injury crashes, motorisation and GDP in Mexico, 2000-20



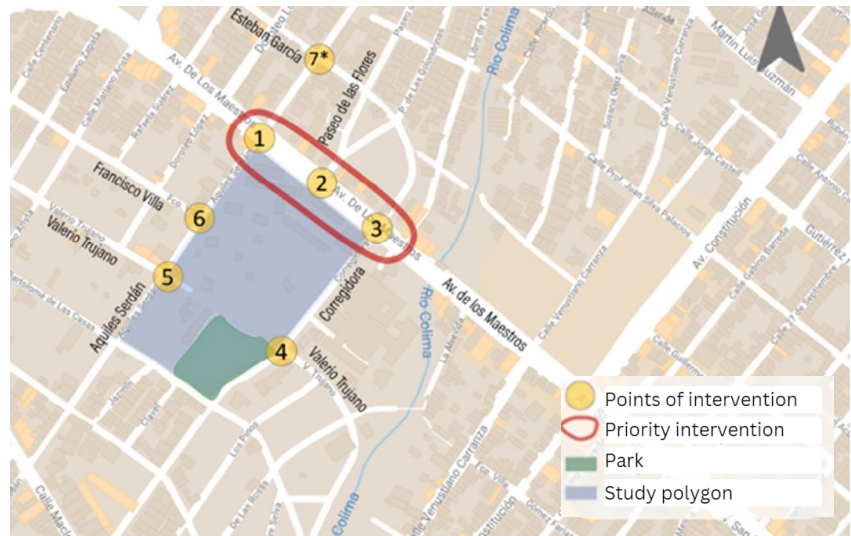
The main purpose of this project is to achieve speed reduction in Colima through safe infrastructure around schools, supported by updated speed limit regulations and stakeholder engagement, with an eye on enhancing speed enforcement efforts in the city.

To create safer spaces around schools, WRI carried out a thorough blackspots diagnosis and a road safety inspection, and based on its main results, a preliminary design of the transformation of the school environment was created. This design proposed changes to Avenida de los Maestros, the main avenue in front of the entrance of three schools, where the highest road risk was identified. It also had an impact on the totality of the school polygon where 6 out of 10 pedestrians commuting at rush hour were children, and no motorists respected the speed limit of 20 km/h (according to studies conducted in 2018). The redesign of the infrastructure was based on the feasibility and behavior of all road users identified in the road safety inspection. The redesign elements included were:

- Parking management and restrictions,
- Designated spaces for transit stop,
- Marking of all the crosswalks,
- Extended sidewalks on both sides of the main avenue,
- Curb extensions,
- A midblock crossing with colorful markings (to highlight the identified pedestrian desire lines),
- 345 plastic barriers to protect sidewalks, and
- 2 speed bumps along each of the sides of the main avenue

This tactical urbanism intervention was the first time that this kind of methodology was implemented in the State and Municipality of Colima. The event had more than 100 volunteers from 12 different institutions including state and municipal governmental level, student associations and civil society organizations.

The intervention redesigned 5 intersections and gave maintenance to the pedestrian corridor located in a public park near the school zone, gaining 20% of new safe space for pedestrians around the school environment.





The results of these temporary modifications show a:

REDUCTION OF:

16% in exceeding the speed limit in front of the school entrances/exits.

32% in average speed (from 37 km/h to 25 km/h)

32% in maximum speed (from 68 m/h to 46 km/h)



One of the main objectives of this temporal exercise was to reduce the average speed of motorists along the school zone and demonstrate how a change in infrastructure can achieve a reduction in speed. Once the results of this successful intervention were proved, WRI Mexico generated a permanent redesign of the infrastructure along the main corridor. The infrastructure elements incorporated in the final redesign included a raised pedestrian crossing at mid-street that incorporates drainage system, sidewalk extensions along the school area, a larger curb in all the road crossings, accessibility ramps and a new vertical and horizontal signaling in the three intersections along Avenida de los Maestro's corridor.

As a result of the permanent infrastructure intervention, ex-post analysis in site showed that speed reduction was achieved:

95% of motorists respect the speed limit of 20 km/h (only 5% are exceeding it)

62% of motorists transit in front of the school environment at less or equal to 30 km/h



19% Reduction in average speed (from 37 km/h to 30 km/h)

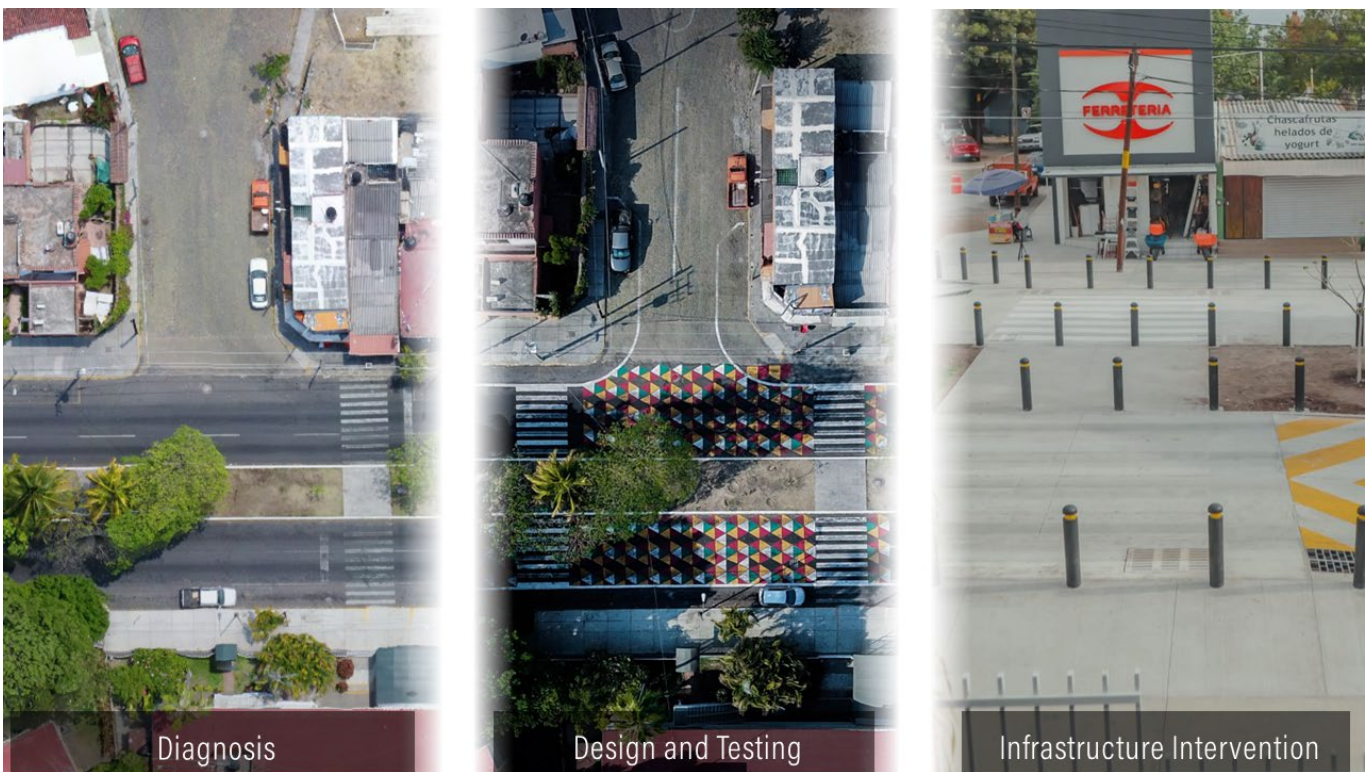
64% Potential reduction of fatalities



48% Potential reduction of severe injuries

16% Speed reduction of 85 percentile (from 43 m/h to 36 km/h)





Through these multi-step modifications- first through tactical urbanism and then permanent infrastructural changes, WRI showcased the importance of slowing down speeds in school areas, achieving a safer mobility for all road users, especially for pedestrians by providing a safer crossing and decreasing road risks.

Conclusion

Partner organizations under the BCRSC are attempting and succeeding at improving infrastructure around school zones and other key points in the city to provide safe spaces for children and youth. Our experience from the Challenge and existing literature indicates that inclusive and safe infrastructural remediations can help reduce the prevalence of death and disability arising from road crashes. As highlighted in the SAVE Lives package the work undertaken by BCRSC grantees, tactical urbanism and permanent engineering modifications are known good practices, showing promising results. Implementing such low-cost interventions has a huge potential to save lives and can easily be replicated in other cities around the world where the existing infrastructure is weak and unsafe. When these measures are accompanied with other proven methodologies such as raising awareness, advocacy and due enforcement, the impact is multiplied. By undertaking such initiatives, road traffic fatalities can be minimized, transit modes of walking and cycling are encouraged, and public transport is incentivized.



Infrastructure remediations through the Botnar Child Road Safety Challenge

May 2023

