

# THE EFFECT OF INFRASTRUCTURE AND EDUCATIONAL ROAD SAFETY INTERVENTIONS IN KHAYELITSHA, CAPE TOWN

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## ABSTRACT

Since 2009, the proportion of vehicle occupant fatalities in road crashes globally has decreased, while the proportion of pedestrians, cyclists, two- and three-wheelers killed in road crashes has increased by 8% (ITF, 2019; WHO, 2009; WHO, 2018).

Furthermore, road traffic fatalities are the leading cause of death for children and young adults (ages 5-29 years) globally (WHO, 2018). Statistics for South Africa's mid-year population estimates for 2018 indicate that approximately 19.7 million of the South African population are children (up to 18 years).

In Korea, a massive decrease in road fatalities for children under the age of 14 years was achieved through various infrastructure and policy interventions. Programmes to improve school zones were implemented, which included the installation of traffic safety equipment, such as safety signs and pedestrian traffic signals, the installation of sidewalks and speed bumps, as well as limiting the speed in the area to 30 km/h.

ChildSafe, an injury prevention unit based at the Red Cross War Memorial Children's Hospital, is a non-profit organisation that aims to reduce and prevent injuries of children through research, education, and recommendations to legislation. This paper describes a situational analysis, implemented measures, as well as measurable effects of road safety interventions in Khayelitsha.

## 1. INTRODUCTION

Road traffic crashes are a major cause of death and serious injury for South African children, especially those living in low-income communities. Child pedestrians are particularly vulnerable. For instance, data from the Road Traffic Management Corporation (RTMC) for 2019 shows that 21% of all pedestrian fatalities in South Africa involved children and young adults aged 19 years or younger (RTMC, 2019). Children residing in low-income communities are more at risk, due to various factors, such as inadequate road infrastructure, exposure to traffic, due to reliance on walking as a means of transport, and lack of supervision (Koekemoer et al, 2017). Interventions are therefore needed to address these risk factors. The Walking Safely to School project is one such intervention.

Rooted in the Safe System Approach (SSA), the Walking Safely to School project that is described in this paper, is a two-year (June 2021-May 2023) multi-stakeholder project funded by the FIA Foundation, with ChildSafe as the lead implementing partner. Other partners include the University of Cape Town, the Western Cape Government through its Departments of Education and Transport, the City of Cape Town Municipality, and the George Institute for Global Health (UK).

To address the vulnerability of children, a situational analysis in one of Cape Town's neighbourhoods, Khayelitsha, was conducted, followed by an innovative pilot project to protect school children, while walking to and from school. Combining infrastructure changes with road safety training and education for children, teachers, and the wider community, the project aims to create a safe school zone at the project site. This paper describes a situational analysis, implemented measures, as well as measurable effects of road safety interventions of this project.

## **2. PROFILE OF PROJECT SITE**

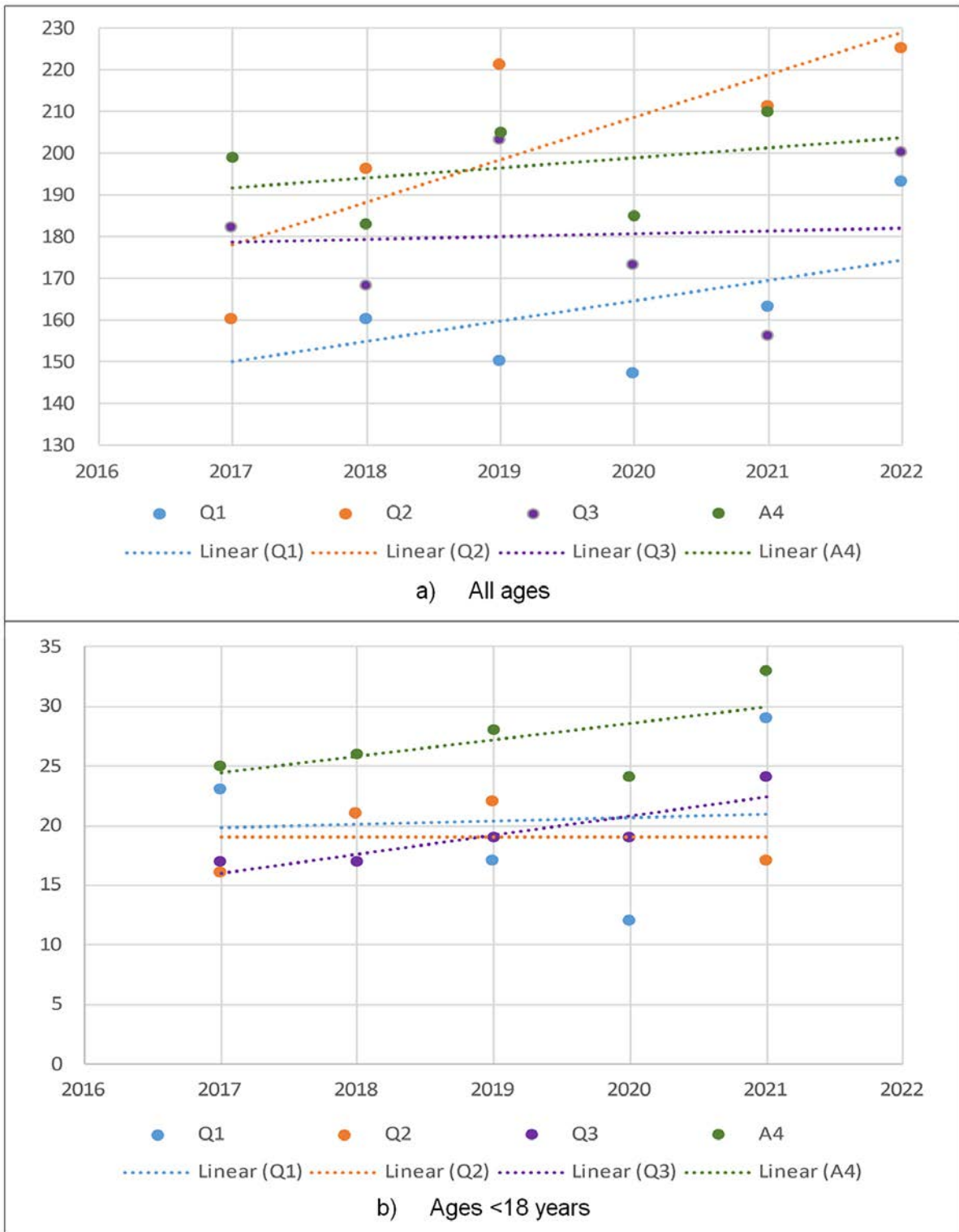
The project is being implemented in Khayelitsha, a sprawling township on the Cape Flats in Cape Town. As of 2020 the population of Khayelitsha was 451 616 persons (WCG Health, 2020). The population is however now likely to be much higher than this official figure, due to the rising number of informal dwellers in and around the township.

Walking remains the dominant mode of travel by learners in South Africa with figures from The National Household Travel Survey (NHTS) 2020 showing that 10.1 million learners walked all the way to their education institution. The number of learners who walked all the way represents 59,4% of all learners (Stats SA, 2020). This figure is even higher in lower income neighbourhoods like Khayelitsha. For instance, a baseline survey conducted at the project schools indicated that 90% of learners use walking as their main mode of school travel. Given such a high prevalence of walking, the burden of child traffic crashes is higher in such neighbourhoods, making it imperative to identify scholar pedestrian safety interventions in communities like Khayelitsha.

## **3. CURRENT PROBLEM**

Road fatality trends in the City of Cape Town have been increasing between 2017 to 2020 from 701 to 740 victims (reductions in 2020, due to Covid-19 lockdown restrictions are ignored in this analysis), an increase of 5.6%. The number of child victims (<18 years) also increased in this period from 81 to 103 victims, an increase of 27.2%. When analysing changes per calendar quarter, it appears that increases happen during specific periods of the year. When analysing road crash fatalities for all ages (Figures 1a), quarters one, two and four show a significant increase, while quarter three's increase is negligible. Analysing the child (<18 years) victims, quarters three and four show a significant increase (Figure 1b).

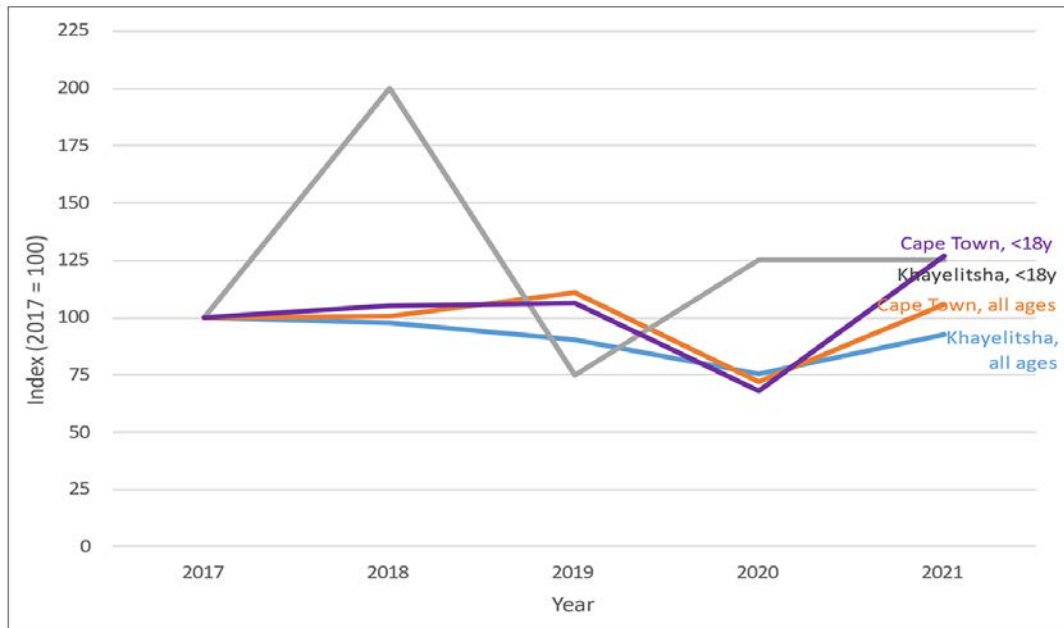
In the light of this study, the question arises if road fatalities in Khayelitsha show a similar trend. To be able to compare vastly different absolute numbers, the result for Cape Town and Khayelitsha have been converted to an index (2017 = 100), see Figure 2. When reviewing data for children in Khayelitsha, the reader needs to keep in mind that smaller samples will lead to alternating graphs, as is the case here.



Absolute - Source: CoCT data

**Figure 1: Road fatalities per quarter in Cape Town**

Fatalities for all ages in Khayelitsha, show an opposite trend to Cape Town. Between 2017 and 2021 fatalities decreased by 7.3%. However, fatalities amongst children in Khayelitsha show a similar trend to Cape Town. Fatalities amongst this age category increased by 25%, although they only account for 13.4% of all fatalities in the area. The increasing trend in child fatalities warrants the identification of further measures to protect this highly vulnerable group.

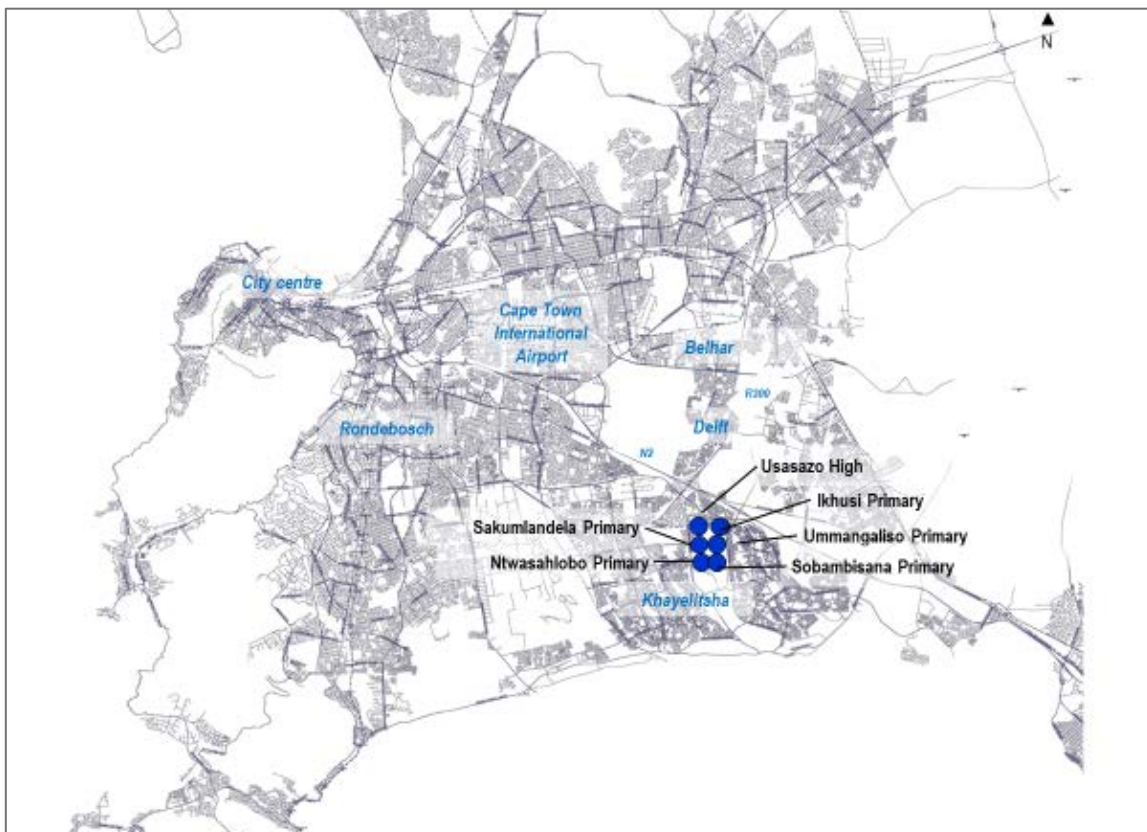


Index - Source: CoCT data

**Figure 2: Road fatalities in Cape Town and Khayelitsha per age category**

#### 4. INTERNATIONAL ROAD ASSESSMENT PROGRAMME

Assessing the child vulnerability in Khayelitsha, the need to create safer school zones became immediately apparent. There are six schools, including Ummangaliso, Ikhusi, Sobambisana, Sakumlandela, Ntwasahlobo elementary schools, and Usasazo High School adjacent to Bangiso Drive, which is also home to various residential premises (see Figure 3).



**Figure 3: Locality map of participating schools (Khayelitsha, Cape Town)**



A key infrastructure issue faced by children is the lack of sidewalks or the obstruction of sidewalks by residents. Firstly, residents have built their houses right on the edge of the road. This means sidewalks are too narrow and cannot be widened as there is simply no space to do so. On sections where there are sidewalks, these are taken up by informal businesses e.g., car wash businesses as well as informal traders. This then forces learners to walk on the roadway.

Figure 4 below shows some of the pedestrian infrastructure challenges in the project site.



There is no space on the left side in front of Ntwasahlobo Primary as houses are on the edge of the road

Sidewalks are used as vehicle parking space or for informal businesses forcing learners to walk on the road

**Figure 4: Pedestrian infrastructure challenges**

Between September and November 2021, a site inspection and desk top infrastructure assessment was conducted using the International Road Assessment Programme (iRAP) Star Ratings for Schools (SR4S) programme. Based on the parameters examined, Bangiso Drive received a 3-star rating (out of five). Thandazo Road (school route) also received a 3-star rating, while Pama Road was given a 2-star rating (Mpambukeli, 2021).

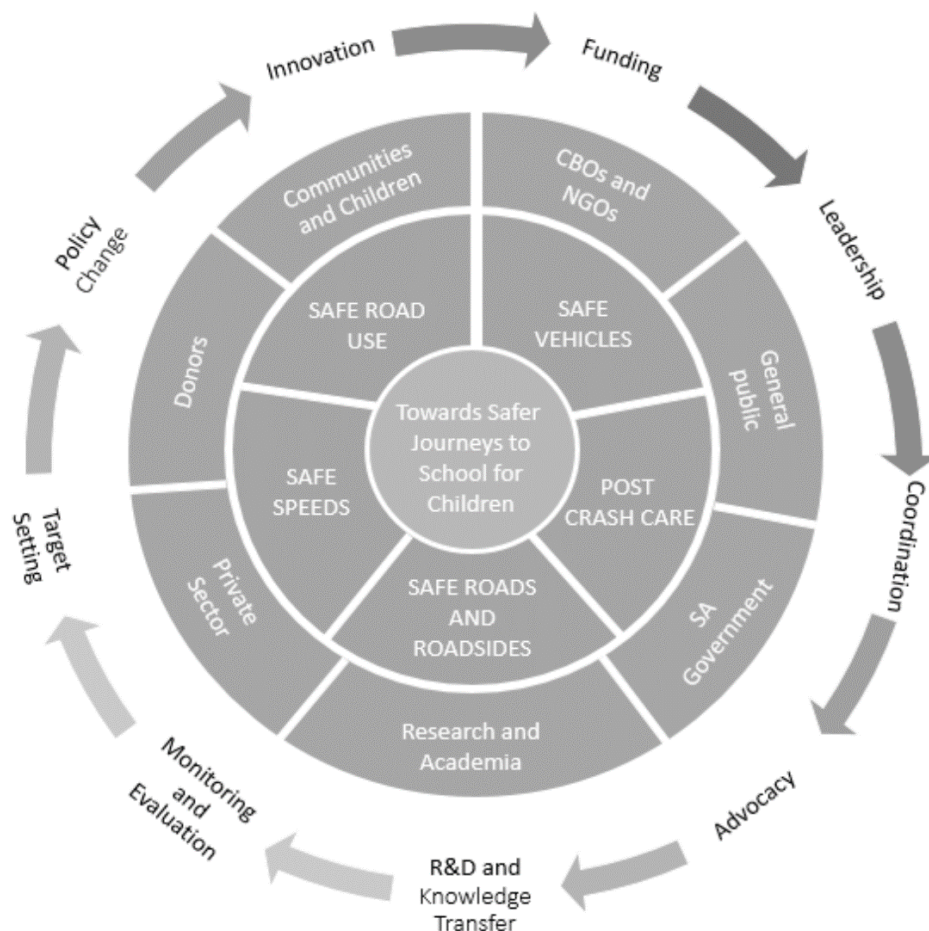
A 30 km/h design speed implementation is appropriate in school zones, considering the cognitive abilities of young school children. For drivers, a 30 km/h speed limit means an increase in the stopping sight distance, thus reducing the risk of collision. Enforcing a speed limit of 30 km/h in the school zone and assuming an operating speed of 35 km/h, for conservativeness, results in a 5-star school rating on Bangiso Drive (Mpambukeli, 2021).

## **5. THE INTERVENTION**

The current project supports the implementation of a multi-sectoral, multi-level approach to prevent child pedestrian injuries and aims to build safer school zones which can simultaneously address vulnerabilities of child pedestrians around project schools, while creating a model for implementation and expansion across the province and, eventually, the country. The project is rooted in the Safe Systems Approach, which according to ITF (2022) is an approach to road safety that takes as its starting point the position that there is no acceptable level of road deaths or serious injuries and acknowledges that while human error on the road is inevitable, death or serious injury resulting from a crash are not. The Safe Systems Approach (SSA) is based on an understanding that effective road-

injury prevention is achieved through the interdependence and multiplier effects of various policy measures and a well-balanced set of effective interventions (ITF, 2022). With this in mind, the current project comprises of various partners and addresses 4 of the 5 pillars of a Safe System namely: road user behaviour, safe speeds, safe roads and roadsides, and post crash care. The only pillar that is not addressed here, is the one dealing with safe vehicles. Due to its comprehensive nature in covering most aspects of the SSA, the project has been selected as one of 15 pilot projects that are taking part in the International Transport Forum (ITF) Working Group on Advancing the Safe System which is looking at how SSA can be strengthened in low and middle-income countries. The application of the approach in this project is summarised in the Figure 5.

The project is a pioneering approach to road safety, encompassing road infrastructure modifications and default 30 km/h speed limits in school zones to protect pupils on the route to and from school, combined with road safety training, education and awareness for children, teachers and the broader Khayelitsha community. As part of the collaboration, the Department of Transport & Public Works of the Western Cape Government is providing Junior Traffic Training Centres (JTCCs) at each of the five participating primary schools. JTTCs are child-friendly traffic training facilities. The aim of these training facilities is to teach primary school learners about road safety in a play environment, without exposing them to the dangers of real traffic situations. Progress on these different activities covering education, engineering, community and stakeholder engagement, as well as evaluation, is presented in the next section.



**Figure 5: Graphic illustration of how the SSA is being applied in the project**

## 5.1 Road Safety Education

This project component targets among others: educators, learners and school volunteers. In this regard, educator road safety training workshops have been conducted to help educators teach road safety education more effectively with 65 educators attending the workshops that were held in March and May 2023. This was followed by the distribution of road safety education learner booklets to all learners (Grade 1-7) at the participating primary schools. A total of 4 855 road safety booklets were distributed. Each primary school also received a road safety kit containing various road signs. Besides road safety education in the classroom, site-based learner group road safety sessions were conducted (see Table 1).

The idea is to have JTTCs at each primary school where road safety education is reinforced after the road safety education lessons in the classroom. To date, one JTTC has been opened (Sakumlandela Primary School on 26 July 2022). The JTTCs at the remaining four primary schools are planned to be launched in 2023. Furthermore, 11 school volunteers, drawn from all project schools, received road safety awareness and first aid training in May 2022.

**Table 1: Sample Reached during group road safety education sessions**

Name of School	Date of Session	Number of Learners Reached	Number of Teachers Reached
Ikhusi PS	20/04/2022	864	23
Ntwasahlobo PS	21/04/2022	946	23
Sobambisana PS	22/04/2022	1 102	30
Ummangaliso PS	25/04/2022	1 148	32
Sakumlandela PS	26/04/2022	931	34
Total		4 991	142

An extension of road safety education is awareness events with participating schools taking part in international awareness events, such as International Walk to School Day (held every first Wednesday of October), as well as the United Nations Global Road Safety Week. In this regard, an International Walk to School Day event was held on 21 October 2022. This was followed by a street sport tournament on Bangiso Drive on the same day. At the writing of this paper, plans were underway to take part in the 7<sup>th</sup> United Nations Global Road Safety Week in May 2023.

## 5.2 Engineering

Based on the star rating recommendations, a detailed school zone road safety assessment was conducted around the project schools by engineers from the Urban Mobility Directorate of the City of Cape Town. The recommendations provided included retrofitting the school zone with different measures. The recommended modifications were subsequently implemented between June and November 2022, and these include raised intersections, speed humps, road markings and signage (see Figure 6).



The modifications were co-funded by ChildSafe, City of Cape Town and Triple C Maintenance Services CC. At the writing of this paper, additional modifications, including the resurfacing of Bangiso Drive, are planned to take place in early 2023.

### 5.3 Engagement

There are two parts to this component, namely community and stakeholder engagement. On a community level, engagements have been held with the Khayelitsha Development Forum and the Community Policing Forum to get their buy-in. Parents have been engaged via parents' meetings held at the project schools to raise awareness on the issue of child pedestrian safety. Over 500 parents were directly engaged in 2022.



Intersection of Bangiso Drive and Lelala Crescent before modifications



Raised Intersection of Bangiso Drive and Lelala Crescent after modifications



Original Usasazo High school entrance



Modified Usasazo High school entrance

**Figure 6: Before and after pictures of modifications at selected sites**

Stakeholder engagement is another crucial part of the project, considering that the project is multi-partner in nature. In this regard, stakeholder meetings are held on a quarterly basis. The stakeholder meetings serve two purposes, namely: 1) give project updates to partners and stakeholders; and 2) identify project risks/challenges at an early stage and discuss how to mitigate those risks.



## 5.4 Evaluation

A key component of this project is Monitoring and Evaluation (M&E) of the project. The lead partner in this regard is The George Institute for Global Health (UK). Activities under this component include Star Ratings for Schools (SR4S) assessments, as described previously, photovoice research, as well as Knowledge, Attitude and Practices (KAP) surveys. Each of these activities has a baseline and post intervention component. Post-intervention assessments will be conducted at the sites where environmental modifications were implemented to see if there would have been any improvement in either the star rating or the score for each site. The post-intervention SR4S assessments are planned to take place from February 2023, i.e., after the completion of outstanding environmental modifications.

The second activity under M&E is the Mobility and KAP surveys. In this regard, a baseline survey (n=444) was conducted in April 2022, as well as a post intervention survey (n=418). The survey questionnaire covered aspects ranging from learner travel behaviour, knowledge about road safety, including road signs, as well as attitudes towards road safety (more details regarding this activity are provided in the next section). The last activity under M&E is photovoice research. Photovoice is a visual research methodology that puts cameras into the participants' (in this case learners') hands to help them to document, reflect upon, and communicate issues of concern. The main goal of the photovoice research in this project is to capture the reality of the pedestrian environment in which children walk in their journey to and from school. The baseline and photovoice research activities (n=20) were conducted in December 2021 and November 2022, respectively.

## 5.5 Detailed Example of an M&E Activity: Mobility and KAP Survey

The surveys that were conducted elicited responses on self-reported behaviour, attitudes, and knowledge of learners from selected classes. Three classes were selected for the survey at each school (one class from each grade: 3, 4 and 5). These were selected with a follow up post intervention survey in mind. The same learners were surveyed using the same instrument in the post-intervention survey. The instrument was a digital format (<https://form.jotform.com/capespca/childsafe>) questionnaire. The questionnaire comprised of 31 questions divided into the following sections:

- Section 1: General learner demographics covering e.g., grade, age, and sex;
- Section 2: Mobility questions covering travel mode to and from school and who travelled with scholars on the journey to and from school;
- Section 3: Knowledge, attitudes and practice including questions prior to road safety educations, prior knowledge about road traffic signs etc.; and
- Section 4: General questions.

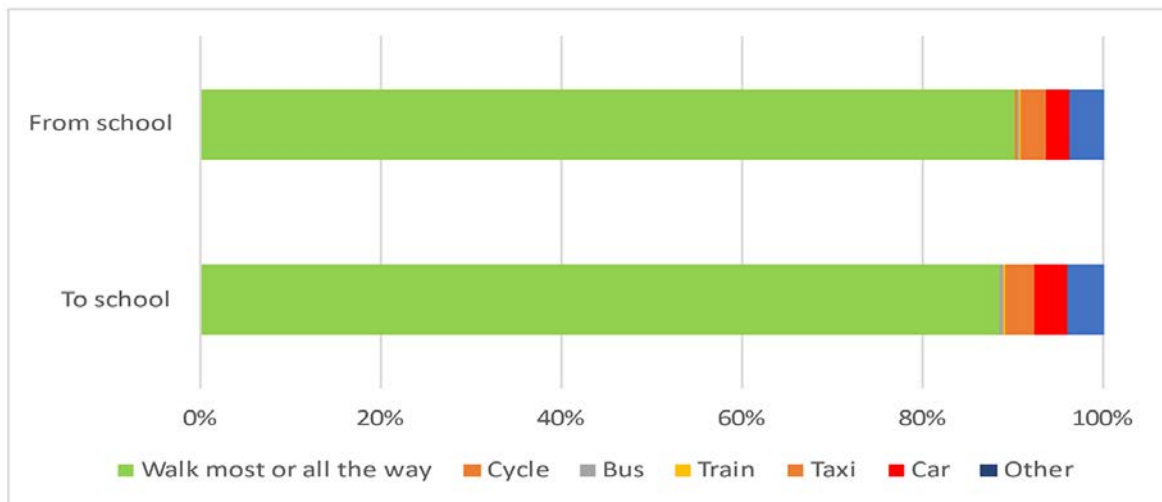
Parental consent was obtained prior to the survey. Consent forms were sent to parents one week before the start date of the survey. Signed parental consent letters were returned to school during the same week. Learners whose parents either did not consent or did not return the consent forms were excluded from the survey.

## **6. SELECTED RESULTS FROM THE BASELINE SURVEY**

As mentioned, a total of 444 learners took part in the survey. There was an almost equal gender split, i.e., 48% female and 52% male respondents. The distribution of respondents

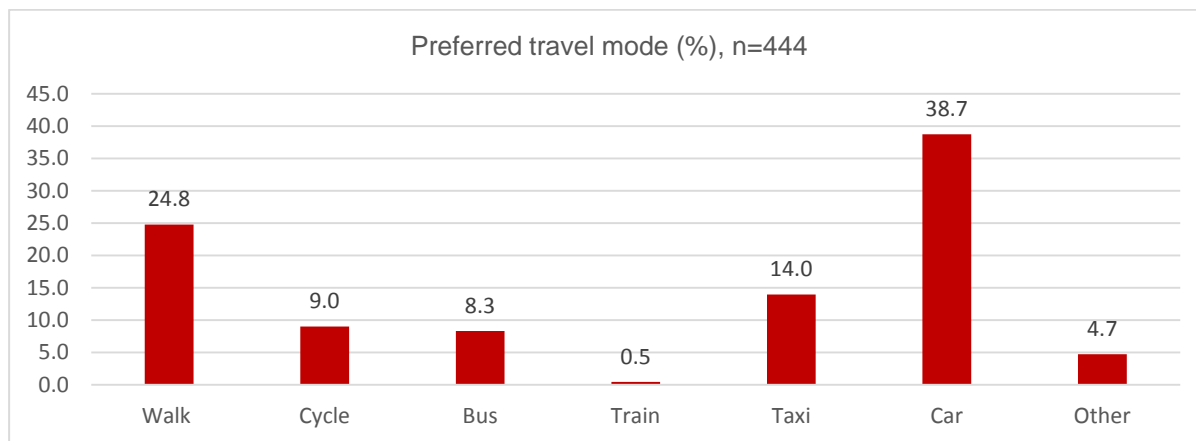
over the targeted grades was also similar, with 32% of respondents attending grade 3, 33% grade 4 and 35% grade 5.

Walking is the main mode of transport to the surveyed schools with 88.5% of learners walking to school and 90.1% walking home from school. The use of car and minibus taxi are the second and third most important modes (see Figure 7).



**Figure 7: Learners' mode of transport to and from school**

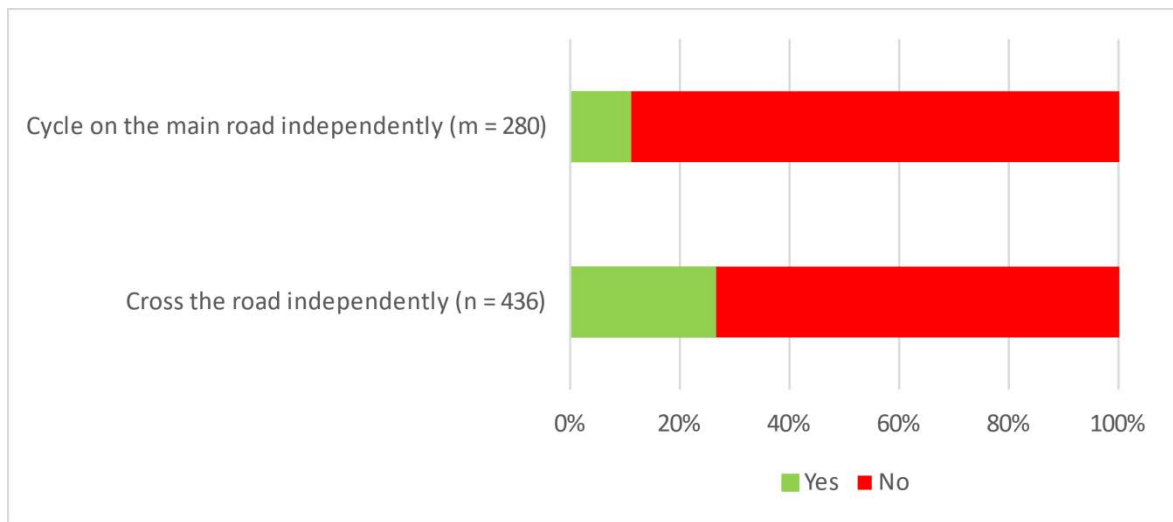
When learners were asked what mode of transport they favour, preferences are not in line with what was witnessed in practice (see Figure 8).



**Figure 8: Learners' preferred mode of school travel**

Most learners prefer to be dropped at school by car (38.7%), followed by walking to school (24.8%). A total of 14.0% of learners would like to travel to and from school by minibus taxi, while 8.3% prefer the bus and a mere 0.5% prefer the train. Of interest is that 9.0% of learners would like to cycle to school.

Analysing the opportunities for children to travel to school independently, using non-motorised transport modes, the data reveals that, of the students that do/may walk or cycle to school, 73.4% of learners are not allowed to cross the road by themselves, while 88.9% are not allowed to cycle on the main road. While, from a road safety point of view, the attitude of parents is understandable, these results clearly hamper the possibilities for learners to use non-motorised transport on their way to and from school independently.



**Figure 9: Parents' attitude towards independent travel by learners**

Two survey results were found to be rather worrying, although the caveat is that data is based on self-reported behaviour. Firstly, the learners were asked if they had been involved in a road traffic crash over the past six months. A staggering 10% of learners indicated that they had been. Secondly, learners were asked if they had received any road safety education prior to the survey intervention by our survey team. A total of 44% indicated not having received any road safety training while another 2% could not remember any training. The latter finding suggests that road safety education is, currently, not prioritised by the educators, parents, or the community.

## 7. CONCLUSION

Road crashes remain a major concern in the South African context. This is also the case in Cape Town, where overall road fatalities have increased by +5.6% between 2017 and 2021. More severe road fatality increases have been witnessed amongst children (population up to 18 years) in Cape Town, where +27.2% additional victims were recorded in the same period. In Khayelitsha, the case study described in this paper, child fatality increases are similar (+25%) to Cape Town, while overall fatalities in the area decreased (-7.3%). While the project is informed by the SSA, being a pilot project, it is on a very small scale (only 6 schools) and a relatively short duration (two years). As a result, aspects of the Safe Systems Approach will be difficult to measure. For instance, while the project aims to change road user behaviour (safe road use component, see Figure 5), this cannot be measured via the surveys with learners included in this project. The project also advocates for a default 30km/h speed limit around the school zone. However, this is difficult to achieve unless this measure is adopted and endorsed by the city. Furthermore, the project focus is on pedestrians. This means that one key aspect of the SSA, namely safe vehicles, is missing. The project, however, provides an opportunity to showcase how the SSA can be implemented in the context of a low-income country. Lessons learnt from this pilot will be useful in scaling the safe school zone model to a city-wide level and, hopefully, eventually to a national level.

An assessment of school areas in Khayelitsha's Bangiso Drive revealed that neither the road, nor the routes towards the schools, were conducive to child pedestrians. Ratings of 2-stars and 3-stars (out of five) were given based on the current infrastructure situation, using the International Road Assessment Programme's Star Rating for Schools assessment method. Photovoice research capturing learner's pedestrian environment

realities supports the need for urgent infrastructure interventions. It was established that the implementation of a 30 km/h school zone could increase the rating to 5-stars.

In the second phase of this project, actual infrastructure modifications were accompanied by learner and teacher training. Almost 5 000 learners and 150 teachers engaged in education sessions, while 4 855 road safety booklets were distributed. The formal training was supported by events, as international experiences reveal improved results when doing so.

Initial results from the baseline survey, including an almost even gender split, as well as distribution over the three involved grades (grades 3, 4 and 5) show that non-motorised transport, specifically walking, is the main mode of transport to and from school, although many learners would rather use the car or various modes of public transport. Furthermore, a noteworthy percentage (9%) of learners would love to cycle to school.

Parents are clearly worried about the safety of their children on their trip to and from school. Most learners are not allowed to cycle on major roads independently, nor cross roads by themselves. Just over a quarter of children are allowed to cross the road independently, while a mere 7% of learners are allowed to cycle on main roads.

The parents have a reason to be concerned about road safety as 10% of learners indicate that they have been involved in a road crash over the past six months, while a total of 46% of respondents indicated that they have not received any road safety education. Based on these statistics, it is recommended that road safety education should not only happen through initiatives, such as the project described in this paper, but also become an integral part of the curriculum.

As this project is ongoing, the overall impacts have not been established yet. All before, during and after data will be analysed, as well as road crash and fatality statistics. The authors foresee a second paper providing a comprehensive description of findings.

## **8. ACKNOWLEDGEMENTS**

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## **9. REFERENCES**

ITF. 2019. Road Safety – Annual Report 2019. International Transport Forum. OECD/ITF. Paris (F).

ITF. 2022. The Safe System Approach in Action, Research Report, International Transport Forum. OECD Publishing, Paris.



Koekemoer, K, Van Gesselleena, M, Van Niekerk, A, Govender, R & Van As, AB. 2017. Child Pedestrian Safety Knowledge - Behaviour and Road Injury in Cape Town, South Africa. *Accident Analysis and Prevention*, 99 (2017) pp 202-209.

Mpambukeli, S. 2021. An Investigation into Traffic Calming in School Zones – the Khayelitsha Case. Thesis. University of Cape Town.

RTMC. 2019. State of Road Safety Report January-December 2019. Road Traffic Management Corporation, Pretoria.

Stats SA. 2020. National Households Travel Survey 2020: Statistical release P0320. Statistics South Africa. Pretoria.

WCG Health. 2020. Western Cape Government Health Dept Circular H 102/2020.

WHO. 2009. Global Status Report on Road Safety – Time for Action. World Health Organisation. Geneva (CH). ISBN 978 92 4 1563840.

WHO. 2018. Global Status Report on Road Safety – 2018. World Health Organisation. Geneva (CH). ISBN 978-92-4-156568-4.