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The politics of road safety in Bogotá

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Case study

March 2018

This project was generously supported by:



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This document contains preliminary research, analysis, findings and recommendations. It is being circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on the emerging issue of the political economy analysis of road safety.

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Cover photo: TransMilenio buses, part of Bogotá's bus rapid transit system, travel down lanes separated from regular motorised traffic © Claudio Olivares Medina, 2012.

About this case study

This study explores the factors behind the significant road safety advances that were made in Bogotá between 1995 and 2006, and underlying challenges to addressing road safety that has since resulted in a plateau in traffic fatalities. It also explores opportunities that exist to overcome these challenges, all from the perspective of political economy.

This case study is part of a broader project that analyses the political economy of urban road safety issues, undertaken by the Overseas Development Institute (ODI) and the World Resources Institute (WRI), and funded by the FIA Foundation. It accompanies: a theoretical background paper (Wales, 2017); two other case studies on Nairobi, Kenya, and Mumbai, India; and a synthesis report.

The political economy of road safety

Political economy is a discipline with a long tradition in the social sciences. As an analytical approach, it seeks to understand the underlying reasons why things work the way they do and to identify the incentives and constraints impacting the behaviour of actors in a relevant system (Rocha Menocal, 2014). Characteristics of a political economy approach include:

- a concern with the role of formal and informal ‘rules of the game’.
- an analysis of power and the processes of contestation and bargaining between economic and political elites.
- a focus on the interests of different groups.
- an analysis of how these interests impact development outcomes, at times to the detriment of broader development objectives.

In general, there has been a tendency within policy-making circles to treat road safety as a technical issue. Exploring road safety from a political economy perspective constitutes an emerging field of study which seeks to understand when, how and why road safety emerges as an issue of public concern and how reform efforts can be most effectively supported taking those dynamics into account. The most recent *Global Report on Road Safety* includes some key aspects related to the political economy of road safety such as political saliency and resource allocation. The report also emphasises the importance of having traffic safety on the political agenda as a manner to mobilise resources and public awareness on road safety issues (WHO, 2015).

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Acronyms

Av.	Avenida
BRT	bus rapid transit
FPV	Fondo de Prevención Vial
JICA	Japanese International Development Agency
NQS	Norte-Quito-Sur
ODI	Overseas Development Institute
SITP	Sistema Integrado de Transporte Público
SOAT	Seguro Obligatorio de Accidentes de Tránsito
UTMP	Urban Transport Master Plan
WRI	World Resources Institute

Methodology

The research methodology included a combination of literature review, analysis of road safety data for the city, and a qualitative data analysis of interviews with 14 key actors from the public and private sectors with a decision-making level experience in the national, regional and local government levels, and the insurance sector, during the last 20 years. The qualitative data analysis examined seven factors related to road safety across all participants. It identified three emerging themes: (1) education, safety and behavior; (2) infrastructure and sustainable mobility; and (3) enforcement.

To complement the literature showing safety impacts from phase 1 and 2 of the BRT system, the authors conducted an analysis of the collisions and fatalities from phase 3, by comparing data for BRT trunk corridors and a selection of non-BRT arterial roads. The data was processed by identifying the collisions that took place within a buffer of 35 meters from the axis of BRT corridors (treatment) and main arterial roads (controls) and controlled for the length of each corridor. The data offers the opportunity to observe the influence of infrastructure investments such as BRT on road safety outcomes.

Executive summary

Bogotá is the capital and financial centre of Colombia. It has a population of 8 million people. Between 1996 and 2006, the city of Bogotá reduced its traffic fatality rate by more than 60%. Since then it has remained constant – an achievement given the climbing fatality rate nationally.

The 1996–2006 drop in fatalities most profoundly affected motor vehicle occupants, likely related to a combination of education, infrastructure and enforcement policies and programmes with road safety indicators as part of their implementation.

There is still a great need for attention to the safety of vulnerable road users, who are affected by difficult conditions in terms of road safety: there are approximately 15 million trips a day in Bogotá, with most people walking or travelling by bus, and an increasing number travelling by motorcycle.

Approaches to road safety in Bogotá

Bogotá's transformation, including improved road safety, has been closely linked to the prevailing mayoral leadership and vision. In 1991, Colombia adopted a National Constitution that decentralised many policy responsibilities to local governments, including land use planning – a move that further empowered the recently created position of elected city mayor.

This case study finds that changes in road safety over time can be linked to five key phases in the administration of Bogotá. Although individual mayors cannot hold consecutive terms, the continuity of public policies, alliances between mayors and the repeat election of previous mayors have contributed to a consistency of approach between administrations, which has allowed road safety gains to extend beyond individual administrations.

Road safety initially became a key public policy issue as a result of the local government response to the elevated levels of homicides in the city. In addressing the high violent death rate, they realised that a high proportion of fatalities in the city were caused by road traffic collisions, and so began '... a protection of life campaign ... completely focused on road safety' (personal communication, March 2017, Bogotá).

This precipitated a number of policies, programmes and approaches that have contributed to improved road safety. They include: the development of Citizenship Culture that emphasised the value of human life, a shift from understanding traffic fatalities as a personal responsibility to

a public health issue, changes in local government structure, fiscal reorganisation schemes, institutional reforms, educational campaigns, urban planning and design for sustainable mobility, and significant changes on enforcement procedures including national and local regulations.

This study's qualitative data analysis revealed three emerging themes under which the approaches towards road safety can be grouped:

1. civic education, safety and behavioural programmes
2. infrastructure and sustainable mobility
3. enforcement.

No single approach has improved Bogotá's road safety in isolation: interviewees and our qualitative analysis strongly pointed to the *combination* and interlinking of approaches as the reason for the city's drastic reduction in fatality rates, and critically the maintenance of these lowered rates over time.

The impacts of Bogotá's TransMilenio bus rapid transit (BRT) system on road safety

The implementation of the BRT system in Bogotá has been closely linked to overall improvements in road safety in the city both in the literature and by experts interviewed for this case study. Before the development of the BRT system, bus transport in Bogotá was characterised by high 'interaction effects' (incidents due to the mixing of buses with other traffic), aggressive driving by competitive drivers, and dangerous pedestrian crossing areas. Buses were stuck in congestion and service levels were poor. Creating a BRT system with a dedicated operations agency and exclusive bus lanes was a response to public demand for better transport and was one of the recommendations of the city's 1996 mobility plan, which had recently been created under the guidance of the Japanese International Development Agency (JICA).

The literature finds that the changes in operations and infrastructure introduced by phase 1 and 2 of the BRT had positive impacts on road safety outcomes after over 80 km of BRT lanes were implemented between 2001 and 2006. An analysis of the impacts of phase 3 of the BRT system (launched 2012) for this study found a reduction in collisions and fatalities in the corridors of this phase, although high variations meant the data was not conclusive (this may relate to the fact that phase 3 has only 19 km of bus lane in total).

Strategies for road safety

The case of Bogotá demonstrates that road safety can be improved in a relatively brief period given the integration of institutional reform, educational campaigns, provision of infrastructure, promotion of sustainable mobility, regulation at different scales, enforcement and continuity across administrations. This case study identifies several key factors that underlie the improvement in road safety experienced in Bogotá since 1995.

Changes in the legal and institutional framework at both the city and national level laid the foundation for changes in other areas. Nationally, a road safety fund – which, as a public–private cross collaboration remains stable over time – has been in existence since the 1990s. More recently, a national agency was established, and new safety regulations approved. These regulations were subsequently better enforced at the city level due to a reform of the traffic police in Bogotá as well as the institutional reform of the local government. Financial reform at the city level provided greater security for funding infrastructure projects, while new departments for managing mobility and the BRT system provided for better planning of transport and safety.

An increased emphasis from the city government on education and civic responsibility empowered people to demand safer behaviour from one another when using the roads, and improved awareness of traffic regulations and key risks. Bus and bicycling infrastructure reforms improved safety for users of these modes and reduced car use, which in turn increased safety for all road users.

Challenges and unintended impacts of Bogotá's road safety strategies

Although the road safety gains in Bogotá are impressive, challenges remain to further reduce fatalities and serious injuries, and to avoid unintended negative impacts, some of which have already occurred and are identified in this case study:

- Recently the national Fondo de Prevención Vial (FPV), formerly funded and partially managed by private sector insurance companies, has been integrated into the national government. This transfer process suggests that public and private sectors are still defining their roles in terms of managing, funding and implementing educational campaigns designed and promoted by this fund.
- In terms of infrastructure, initial efforts to create bicycle infrastructure took space from pedestrians along sidewalks, who are also vulnerable road users, creating conflict and reducing comfort and safety. Pedestrian bridges over some BRT corridors also segregated non-motorised transport. This had unexpected consequences for pedestrian behaviour, with people choosing to cross at street level without suitable infrastructure (due to increasing travel times for pedestrians, and personal

safety risks due to people being isolated from street level and therefore more vulnerable to mugging or other violent crimes).

- The success of BRT investments and slow rate of expansion after 2006 has resulted in highly congested buses and overworked drivers, both of which increase risk and reduce the appeal of this transport option. Finally, a new approach to the BRT system's operation in the form of partial integration with mixed traffic at key connection points between trunk corridors may reduce the need for passengers to switch buses, but could also increase the risk of BRT buses being involved in traffic collisions at intersections of mixed traffic lanes.

Lessons learned from Bogotá

Although progress in Bogotá shows a significant reduction in road fatalities between 1996 and 2006, and a generally stable fatality rate since then, there are many improvements still to be made. Important lessons are already emerging from efforts over the past 20 years:

1. **National reforms can support city level change.** The capacity for Bogotá to rapidly improve road safety was facilitated by changes in the regulatory framework at the national level, especially the decentralisation process that transferred responsibilities to local governments, the approval of road safety regulations and the collaboration between agencies at different government levels on enforcement procedures.
2. **A combination of technocratic and democratic approaches to public policies can generate desired outcomes such as the successful reduction of fatalities.** Reforms at the city level helped generate an institutional and financial framework that was conducive to improving road safety. The implementation of educational campaigns in combination with infrastructure investments helped to influence people's behaviour and facilitated the enforcement of national and local regulations on road safety.
3. **International agencies have also had a significant impact on road safety in Bogotá.** JICA helped the city to develop an Urban Transport Master Plan. World Bank funding contributed to the BRT project after successful implementation by the local government, and more recently Bloomberg Philanthropies is supporting road safety management and planning.
4. **Linking the problem to broader issues to which the public can relate may support public policy responses to road safety.** In Bogotá, the concept of road safety as a public policy issue emerged in the 1990s as a response to public demand to address the high death rates in the city. The mayor and local government officials began to consider violence, including traffic fatalities, as a public health issue.
5. **Improved public transportation from a sustainable mobility approach can have a significant impact on road safety for all modes.** The organisation of public transport

services by introducing the BRT system has had a positive impact on road safety indicators due to improvements on infrastructure and operational services.

6. The provision of non-motorised transport infrastructure.

In Bogotá, where cycle lanes were built on top of sidewalks, dangerous and unintended conflicts between pedestrians and cyclists were generated. More recently, ‘road diet’ measures – whereby space for non-motorised transport is co-opted from motorised transport – has made the segregation of cyclists and pedestrians

possible, with room for motor vehicle lanes taken and used to create cycle lanes. Cyclists and pedestrians have different movement and safety needs that must be addressed through dedicated design and infrastructure.

- 7. While fatalities have dropped among car occupants, they are rising among cyclists and motorcyclists, and require special attention.** This demonstrates the necessity for an approach that is targeted to particularly high-risk groups, and that is also adaptive to changing travel and mode patterns over time.

1 Introduction

Bogotá is the capital and largest city in Colombia with a population of nearly 8 million. It represents 25% of the national economy and provides 18.9% of national employment. The city has 1,421 kilometres (km) per road lane of main arterial roads and 2,063 km per road lane of secondary roads. Since the approval of the Urban Master Plan in 2000, the city has built 187 km of bike paths and nine BRT trunk corridors totalling 103 km (SDP, 2017a). Approximately 15 million trips are made every day in Bogotá, with most people walking or travelling by bus (Figure 2). Around 190,000 vehicles commute into Bogotá from surrounding municipalities daily (Secretaria Distrital de Movilidad, 2015; BogotaComoVamos, 2016).

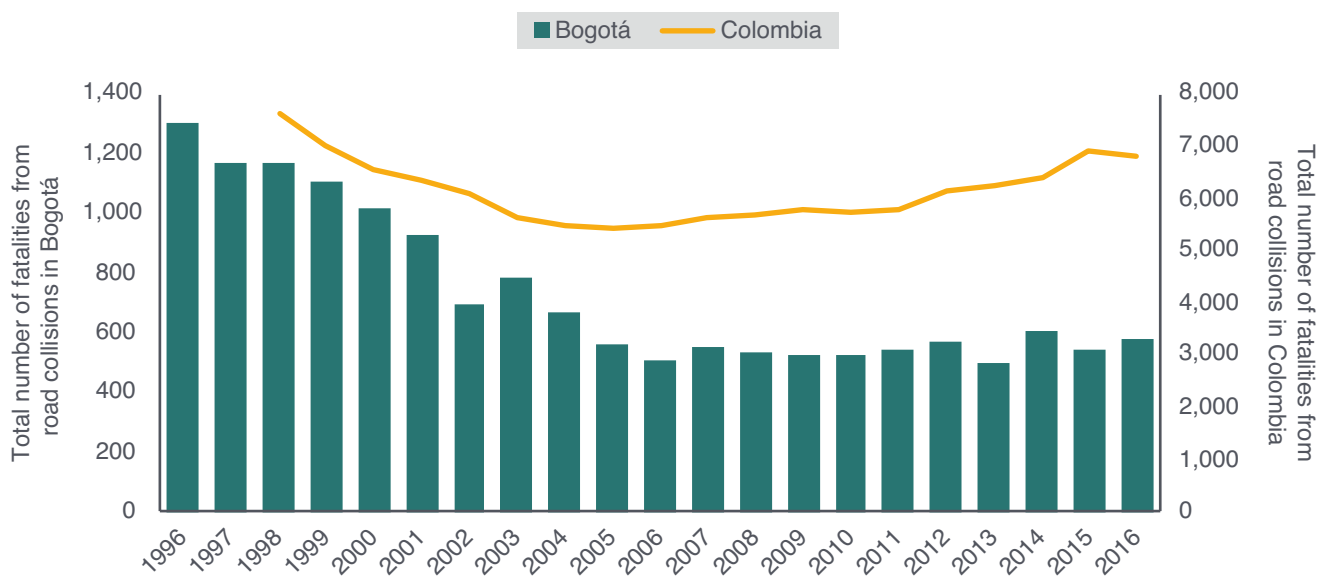
Between 1996 and 2006, numbers of traffic fatalities in Bogotá steadily declined. Since then, the annual rate has remained relatively stable (between 511 fatalities in 2006, and 577 in 2016) while the national rate (after almost a decade of decline) has been rising since 2005. Traffic fatalities in Bogotá are also well below those of other Latin American cities: Bogotá's fatality rate was 7.2 in 2016 (having dropped from 22.3 in 1996) while 2015 saw traffic fatality rates of 26.3 in Guadalajara and 16.0 in Monterrey (Mexico); 22.5 in Belo Horizonte, 20.9 in Brasilia and 20 in Curitiba (Brazil); and 10.4 in Montevideo (Uruguay) (WRI, 2016). This study identified and describes the policies and processes that contributed to this achievement,

from a political economy perspective (see 'The political economy of road safety' on page 3).

Bogotá experienced a decrease of 27.6% in the total number of road collisions between 2007 and 2009, followed by relative stability between 2010 and 2015 (Figure 3). The decrease in fatalities (Figure 1) is consistent with the decrease in total number of road collisions in Bogotá (which dropped by 27.6% between 2007 and 2009 and remaining relatively stable – Figure 3) and may relate to enforcement of drink-driving laws, among other factors. Between 2007 and 2008, the number and rate of injuries caused by road traffic collisions also dropped, by 28.4%, which may be attributed to the enforcement of vehicle occupant safety laws, such as seatbelt use, among other factors.

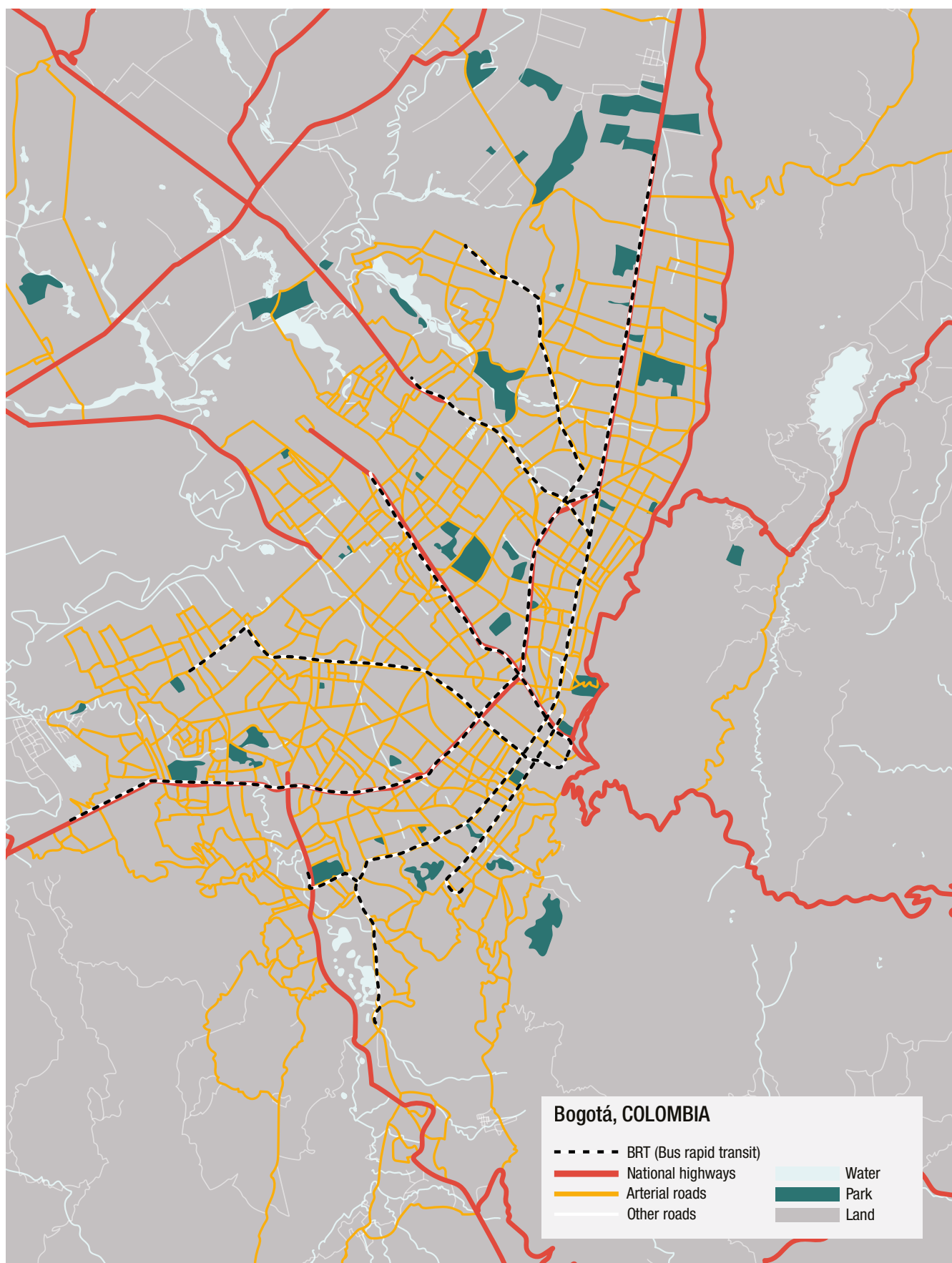
These reductions in fatalities in Bogotá coincide with the mayoral terms of Antanas Mockus (two terms), Enrique Peñalosa and Luis Eduardo Garzón. These terms were characterised by institutional and legal reforms, the design and implementation of 'Citizenship Culture' policies, and the promotion and development of sustainable transport policies such as the bus rapid transport (BRT) system and provision of non-motorised transport infrastructure. Pedestrians consistently account for the greatest proportion of victims in Bogotá over time (Figures 4 and 5). Drivers are the only road users who experienced fewer fatalities over

Figure 1 Number of fatalities from road collisions in Bogotá and Colombia, 1996–2016



Source: Medicina-Legal, 1999–2015; El Tiempo, 2017; WRI, 2017.

Figure 2 Major roads and BRT lines in Bogotá

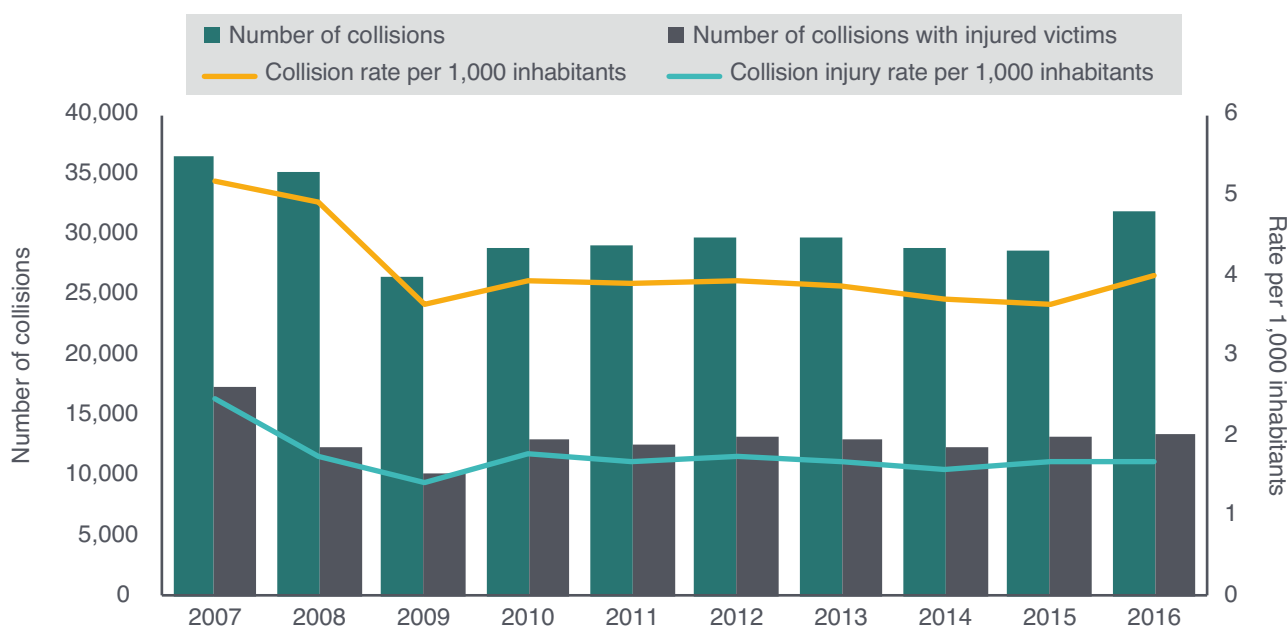


Source: ODI, 2018, adapted from Google Maps.

time. The share of motor vehicle occupant fatalities dropped dramatically between 2007 and 2008, which could explain much of the overall reduction in fatalities. Vulnerable users – pedestrians, cyclists and, to the greatest extreme, motorcyclists – are killed at disproportionately high rates compared to their overall mode share, while people using public transport are at minimal risk of fatality (Figure 6). One explanation is the rapid growth of motorcyclists in the

city and the emerging conflicts between cyclists and other road users, especially due to conflicts for the use of road space. The current administration is addressing the provision of segregated infrastructure for cyclists through road diet and construction of bike paths measures. The data regarding the most vulnerable road users shows increasing fatalities among motorcyclists and cyclists between 2007 and 2016 and roughly constant fatalities among pedestrians.

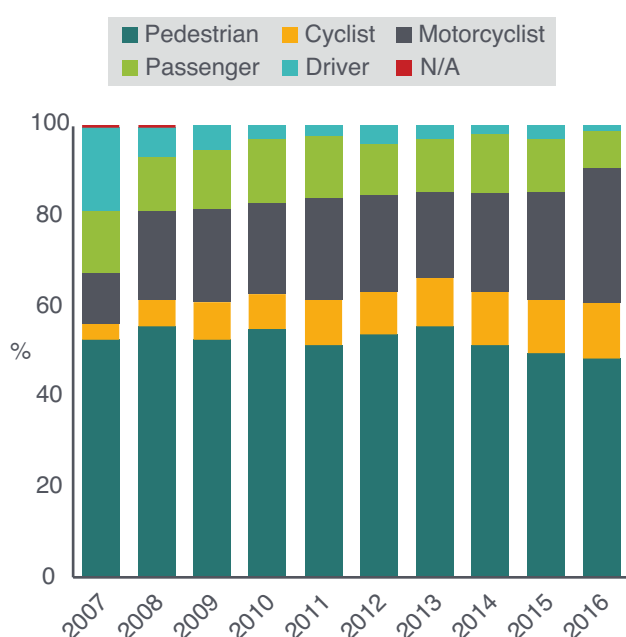
Figure 3 Total number of collisions, and total number and rate of collisions with injured victims, 2007–2016



Note: the dip in 2009 could relate to the consolidation of BRT phases 1 and 2 as well as the construction of phase 3.

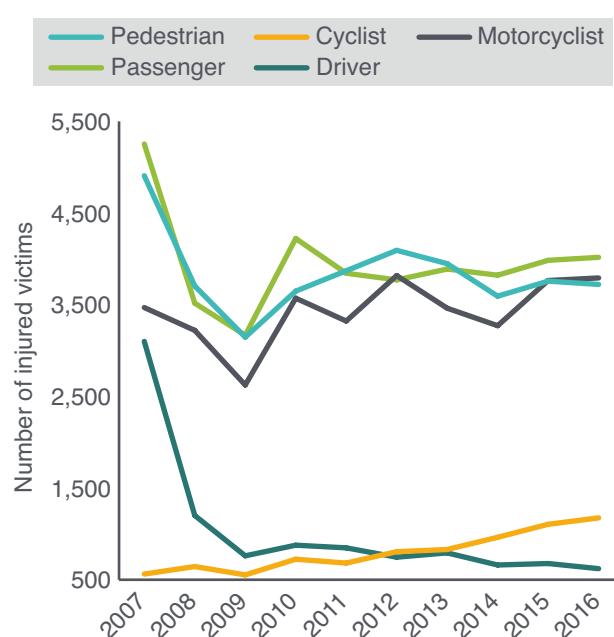
Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure 4 Distribution of fatalities from road collisions by road-user type, 2007–2016



Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure 5 Road collisions involving injured victims by road-user type, 2007–2016



Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

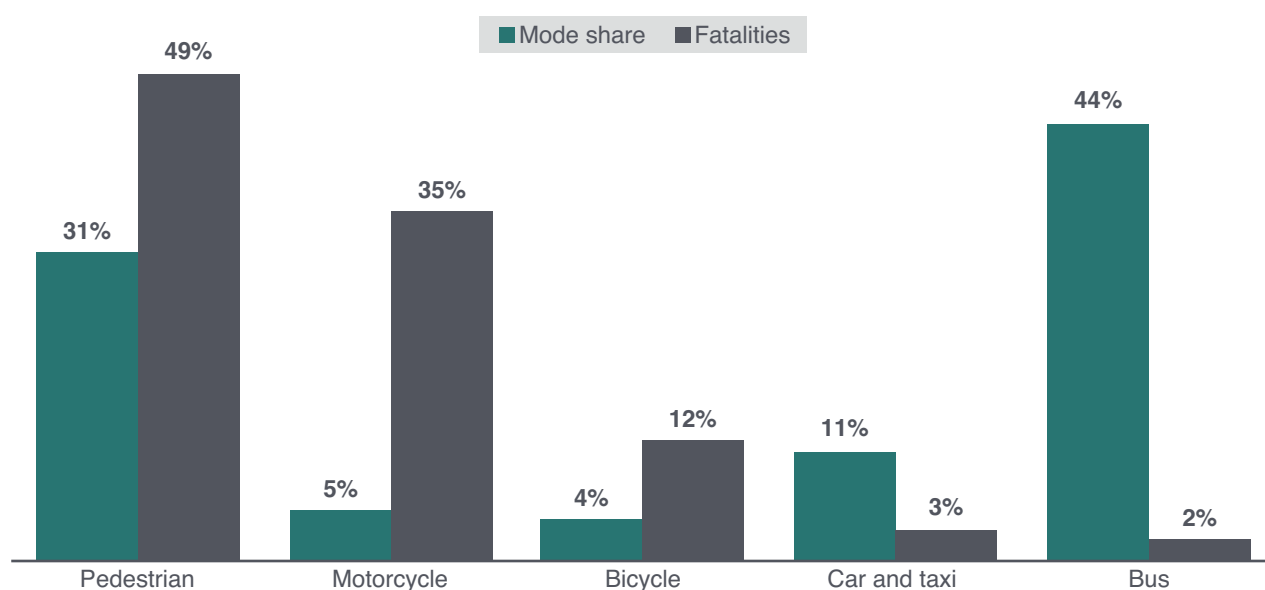
In terms of gender, 80% of traffic fatalities in Bogotá are men (Figure 7). While vulnerable users make up over 90% of fatalities for each gender, a higher proportion of bicycle and motorcycle fatalities are men, and a higher proportion of pedestrian fatalities are women. This is likely related to the overall higher rates of men riding bicycles and motorbikes: men make up 79% and 81% of trips by these modes, respectively.

The highest risk age group for traffic fatalities amongst both men and women is 20–30 years, with the next highest

risk groups being men aged 30 to 40 years and women aged 60 to 70 years (Figure 8).

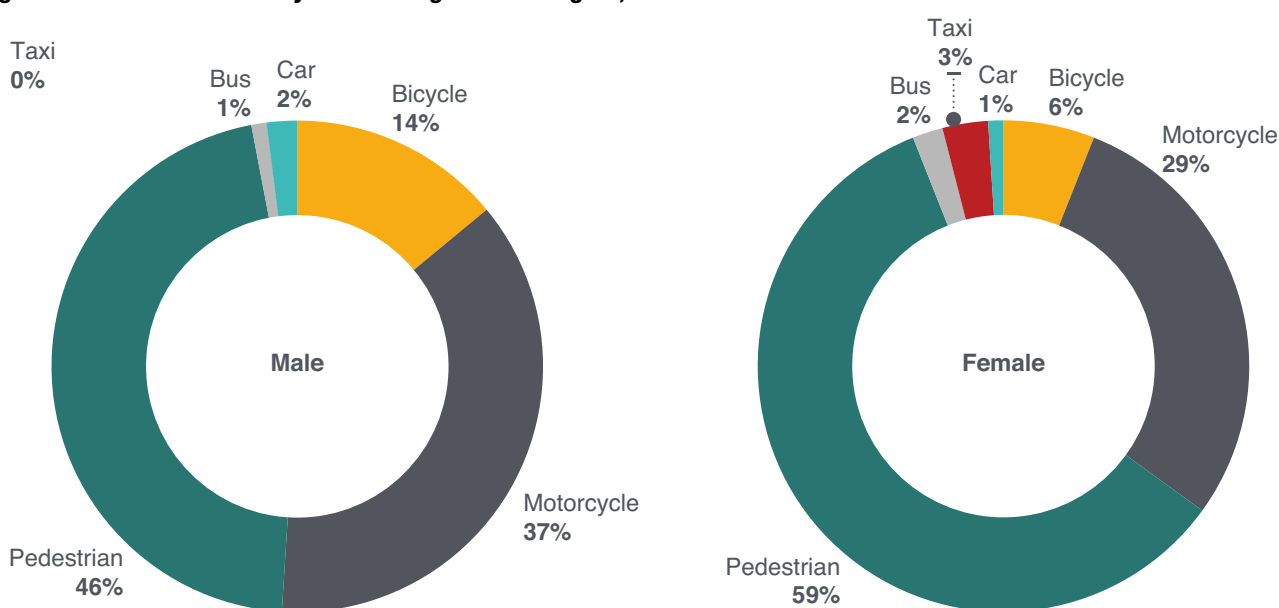
Although road collisions are concentrated in the city central business district – which is the main destination of most trips in Bogotá – the spatial analysis of collision data also found that road collisions are more severe (in terms of both fatalities and injuries) in the south of the city, which is characterised by a lower socioeconomic profile and less well-developed infrastructure.

Figure 6 Fatalities by mode in relation to overall mode share in Bogotá, 2016



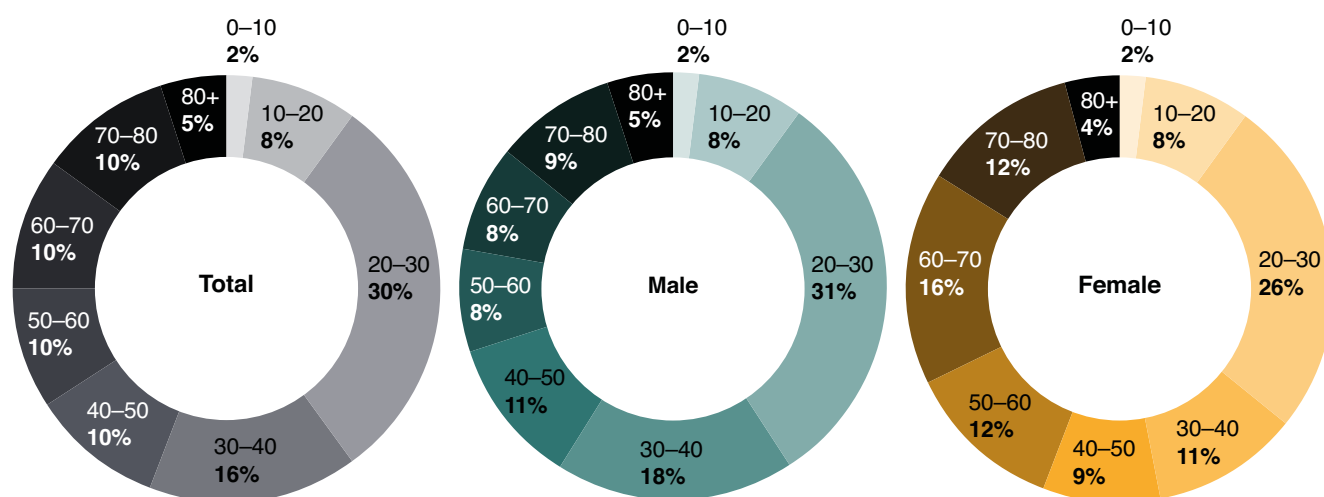
Source: Secretaria de Movilidad, 2016 (data processed by Segundo López).

Figure 7 Traffic fatalities by mode and gender in Bogotá, 2016



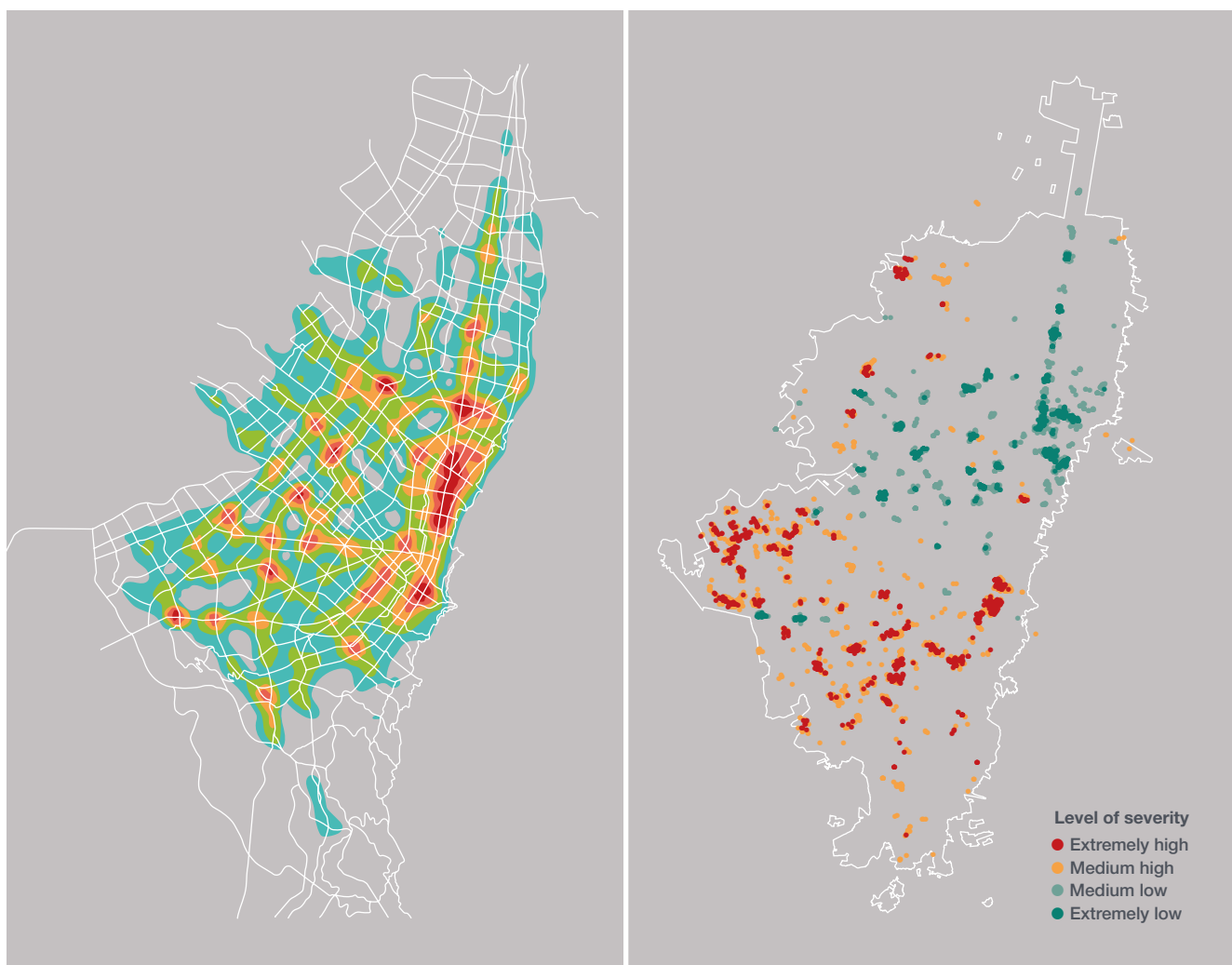
Source: Secretaria de Movilidad, 2016 (data processed by Segundo López).

Figure 8 Traffic fatalities by age and gender in Bogotá, 2016



Source: Secretaria de Movilidad, 2016 (data processed by Segundo López).

Figure 9 Heat map showing road collisions and crash severity in Bogotá, 2016



Note (right-hand map): Dark red and dark green at 99% level of significance. Light red and light green at 95% level of significance.

Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

2 Approaches to road safety in Bogotá

Bogotá has undergone significant transformation over the last few decades. This transformation has included substantially improved road safety, which has been closely linked to mayoral leadership and vision: between 1992 and 2006, mayoral administrations were responsible for key changes in Bogotá that led to a dramatic drop in traffic fatalities (Figure 10; Box 1).

Road safety became a key public policy issue under Mayor Mockus's first administration (1995–1997). Bogotá was experiencing high levels of public violence and Mockus was under significant civil society pressure to reduce the city's high fatality rate that was in part, but not exclusively, related to crime, drug trafficking and internal conflict. In addressing this high death rate, his cabinet realised that a high proportion of fatalities in the city were caused by road traffic collisions.

As a result of the local government response to the elevated levels of homicides in the city, '... a protection of life campaign took off ... completely focused on road safety' (personal communication, March 2017, Bogotá).

Mockus was a proponent of the principle that life is sacred. A former university professor, he developed a theory of 'Citizenship Culture' based on his academic work. During his administration, the principle that life is sacred became a cornerstone of this approach (section 2.2: education). This influenced the approach of this administration towards road safety. Through street-level public education campaigns citizens were encouraged to become part of a mutual enforcement process, by expecting their fellow road users to behave respectfully to one another and to follow the road traffic rules.

Box 1 Key changes in the legal and institutional framework that have affected road safety

1991	Constitutional change for decentralisation empowers an elected mayor in Bogotá
1992	Mayor Castro reforms local property tax processes, securing income for Bogotá
1993	National Road Safety Fund (Fondo de Prevención Vial) and Council established
1995	JICA formulates Urban Transport Master Plan
1995	Mayor Mockus transfers responsibility for enforcement and road traffic control from the Blue Police agency to the Metropolitan Police Department
1995	Mayor Mockus sells bonds in the Bogotá Electric company, securing income for Bogotá
1999	General Transport and Ground Transportation Law including the Seguro Obligatorio de Accidentes de Tránsito (SOAT)
2000	Mayor Peñalosa establishes TransMilenio S.A. to manage the BRT system
2000	Regulation and implementation of the SOAT
2002	National Road Traffic Code issued, Law 769, including regulations and enforcement procedures for seatbelt use and drunk-driving
2004	Requirement of seatbelt according to the National Road Code
2006	Mayor Garzón creates the Mobility Department, formerly the Department of Traffic and Transport, and established a Road Safety Division
2013	Reform to national road traffic law in increased fines and took zero tolerance to alcohol
2013	Creation of the National Road Safety Agency (NRSA), Law 1702, which requires cities to have a road safety action plan

In addition to the changes in public actions and expectations fostered by the Citizenship Culture approach, improvements in road safety in Bogotá were made possible by a series of additional policies, programmes and approaches, going back to the 1991 Constitution, which decentralised certain responsibilities to local governments, mostly fiscal policy, land use planning processes and enforcement.

Based on this study's qualitative data analysis, these can be grouped under three closely interconnected themes – education, safety and behavioural programmes; infrastructure; and enforcement. No single approach has improved Bogotá's road safety: interviewees and our qualitative analysis strongly pointed to the *combination* and interlinking of approaches as the reason for the city's drastic reduction in fatality rates, and critically the maintenance of these lowered rates over time (section 2.5).

Cutting across these different approaches are several key legal and institutional changes that have affected road safety in Bogotá (Box 1). These are broadly related to decentralisation, fiscal stability, and independence and accountability, and are explored in section 2.1. However, it is important to

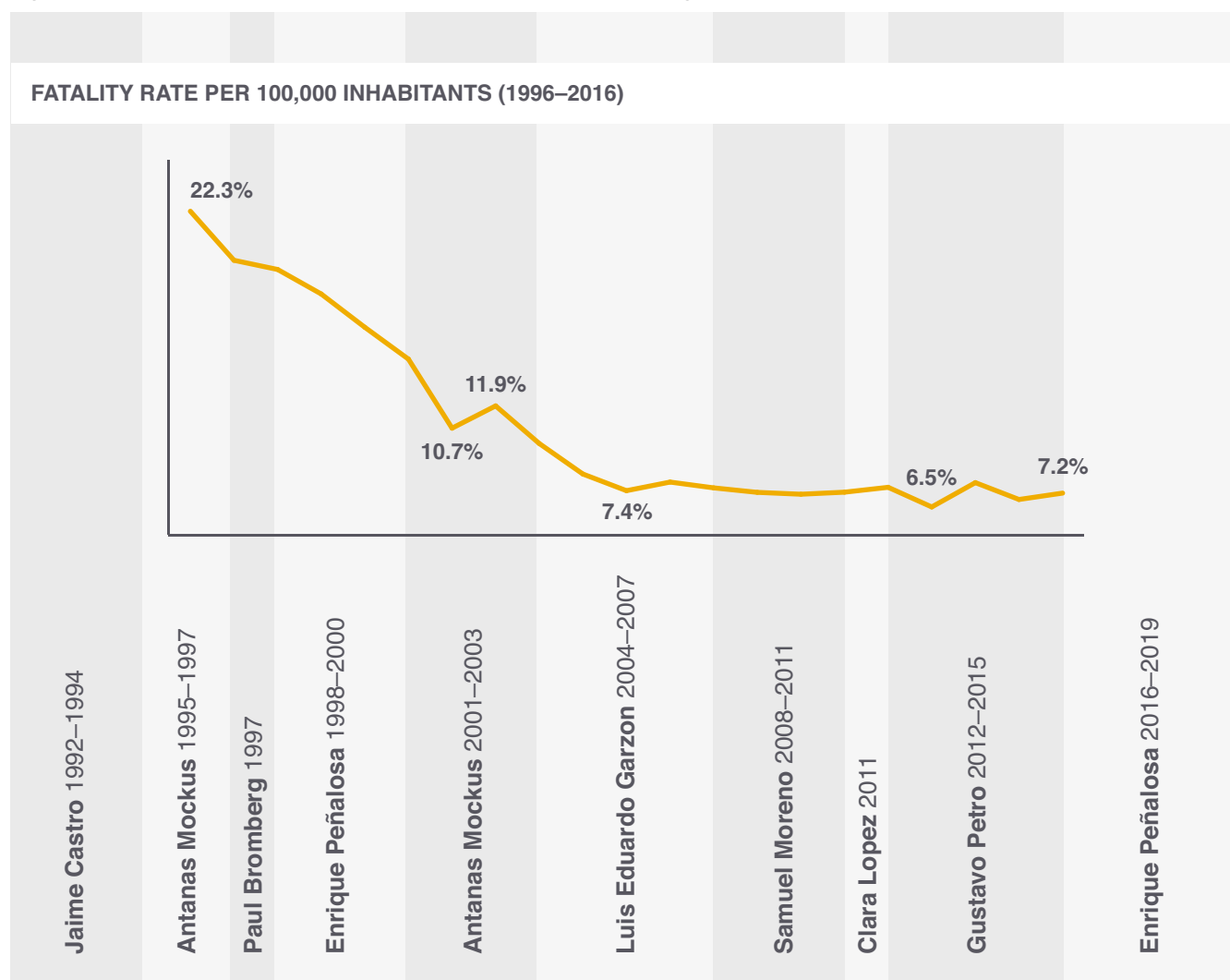
understand that they are in themselves interlinked, and also underpin each of the three emerging themes explaining road safety outcomes in Bogotá. For example, fiscal stability is clearly an enabling factor for all three approaches, especially for improving infrastructure, while accountability has contributed to fiscal stability and improved enforcement.

2.1 Changes in the legal and institutional framework

2.1.1 City level

Through a series of policies, programmes and approaches, mayoral administrations between 1992 and 2006 were responsible for a transformation in Bogotá that led to a dramatic drop in traffic fatalities (Figure 10). Mayor Peñalosa, whose second term began in 2016, now has an ambitious plan to build on and consolidate the successes in improving road safety. At the end of 2017 an integrated 'Vision Zero' based road safety strategy was formally adopted by the city. But this would not have been possible

Figure 10 Traffic fatality rates and mayoral administrations in Bogotá, 1992–2016



Source: qualitative data analysis using data from Medicina-Legal, 1999–2015; El Tiempo, 2017; WRI, 2017.

without key evolutions to the city's governance structures and approaches.

Colombia's 1991 Constitution decentralised certain responsibilities to local governments, including land use planning, and provided a new framework for city mayors, who were further empowered by resultant changes on local policy issues. City mayors during Bogotá's 'transformation' period (1995–2003) – namely Mockus and Peñalosa – were also independent candidates, and this enabled administrations to make other institutional changes, free of party political ties (see, for example, our subsequent discussion of the city traffic police reforms in this section).

At the city level, a strong base to support future mobility and road safety changes was established by Mayor Castro (1992–1994), who focused heavily on securing revenue for the city by implementing a fiscal reform and instilling public faith in institutions. By improving the city's financial security, this helped to secure the availability of funds to be spent on educational, infrastructure and enforcement programmes that influenced road safety outcomes. Mayor Mockus (1995–1997) continued to establish financial security for the city and improved the public willingness to pay taxes. He also implemented pedagogical measures, such as asking property owners to self-assess their property values for property tax purposes – measures that began to work due to the transparency and accountability of his administration – and sold bonds in the Bogotá Energy Company (A. Gilbert and Garces, 2008).

In his first term, Mockus also established a government model in which the relationship between the executive and the legislative powers was not mediated by clientelism. Under his administration, public faith in government was further restored and, combined with his improvements to property tax collection and Castro's fiscal policies, this allowed the administration to generate further revenue. This in turn helped finance sustainable mobility infrastructure projects – particularly in the Peñalosa's first-term administration and Mockus's second-term administration (section 2.3: infrastructure).

Another key institutional change under Mockus's administration was his reform of the city traffic police in 1995. Concerned about the inefficiencies and corruption, and based on his autonomy as an independent city mayor, Mockus's cabinet was able to transfer traffic enforcement responsibility from the Blue Road Traffic Police to the Metropolitan Police Department (the Blue Road Traffic Police was abolished by this reform). The change was helped by the increasing capacity of the National Police, with whom the mayoral administration secured an interinstitutional cooperation agreement to implement the changes. This agreement is still in place, with enforcement responsibility shared between the Secretaría de Movilidad and the Metropolitan Police. The National Police had a higher level of approval among the population, given their success in addressing security and crime issues by the end of the 1990s. When the local government traffic agents who were associated with corruption were replaced by those from an independent, metropolitan-oriented

organisation, efficiency and public perception of enforcement improved (section 2.4: enforcement).

As well as improving finance for infrastructure and public faith in government and enforcement, independence and accountability also helped to improve the continuity of infrastructure projects, especially those focused on sustainable mobility (section 2.3: infrastructure; Figure 11). Administrations could formulate and implement policies independent of party political ties, and cabinet staff during the three mayoral periods remained stable (mostly between Mockus's first term, Peñalosa's first term, and Mockus's second term) – including the heads of some of the city's key public-sector agencies. In fact, Mockus maintained half of Peñalosa's cabinet at the beginning of his second administration.

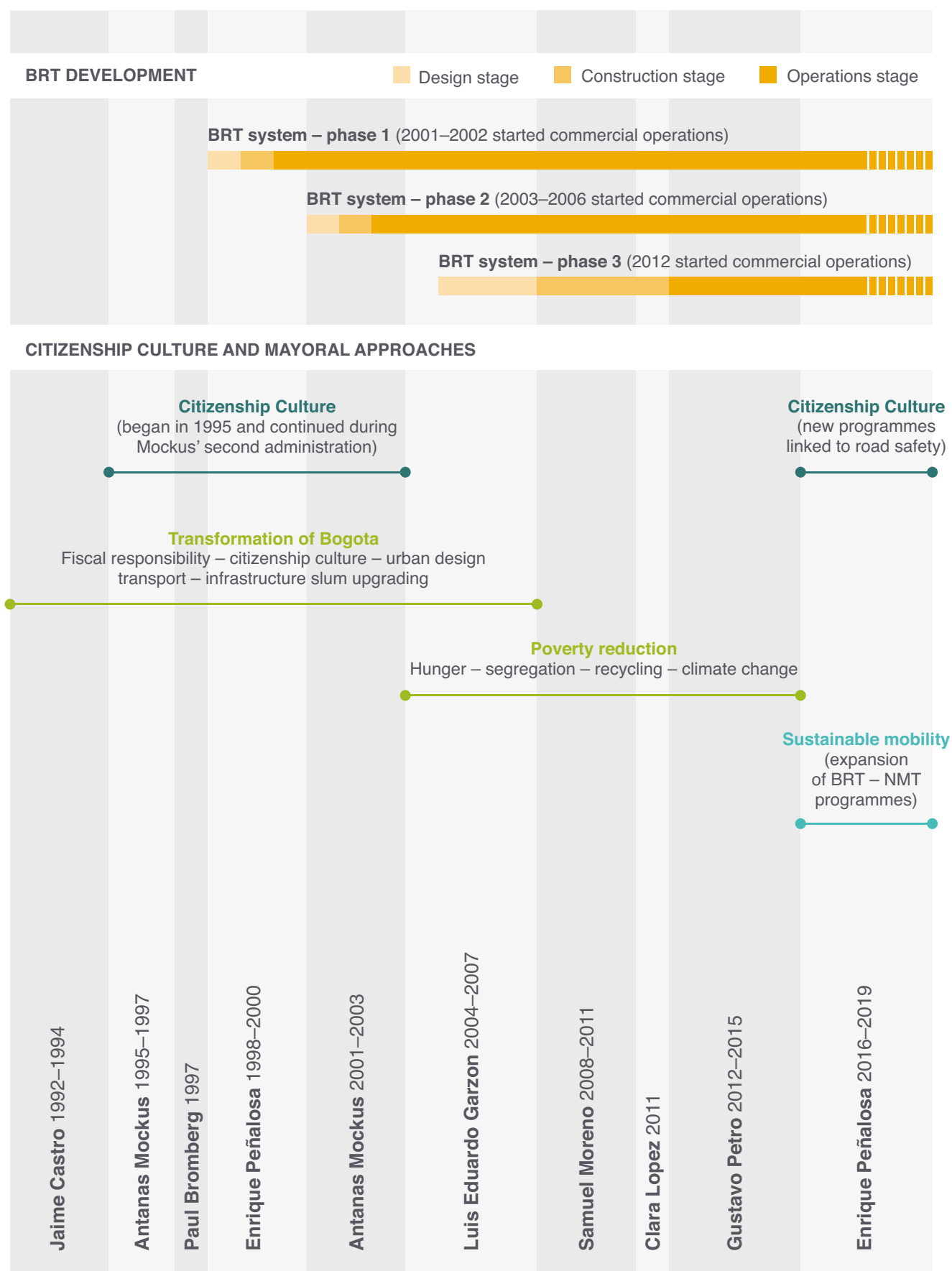
Peñalosa's first administration (1998–2000) combined Mockus's educational and behavioural approach with a focus on infrastructure for sustainable mobility. During the first Peñalosa administration, the bus rapid transit (BRT) system was designed and implemented, mostly the first stage of the system. Also, a transformation of the public space took place, with the improvement of sidewalks, the construction of bike paths and the construction of public facilities in lower income neighbourhoods.

The Citizenship Culture approach continued during Mockus's second term – which saw fatality rates drop dramatically in three out of the four years – and the subsequent three mayoral terms. This is the result of the combination of the education theme (section 2.2) and the infrastructure theme (section 2.3) identified in the qualitative data analysis, but also with the complement of the enforcement theme that began with the transfer of the enforcement responsibility to the Metropolitan Police during the first Mockus administration. Bogotá's transformation suggests that the combination of education, infrastructure and enforcement measures helped the city to reduce the fatality rate associated to road collisions.

The election of Luis Eduardo Garzón as the first city mayor from a left-wing political party signified a shift in policies due to his background as a successful union leader. His priority was poverty reduction at the beginning of his administration. During his administration, policies related to the expansion of the BRT system continued as well as the promotion of educational campaigns and enforcement measures that helped to maintain the fatality rate on road collisions below 10 per 100,000 inhabitants. Garzón also promoted citizen participation in violence prevention, including road collisions, and the involvement of community-based organisations. This was possible through the administrative reform he implemented, through which the Mobility Department was created. New organisational arrangements facilitated the distribution of responsibilities among several actors, for instance, the enforcement process constituted a shared responsibility between the Mobility Department and the Metropolitan Police Department.

The other two mayoral successors, Moreno and Petro, also left-wing politicians, continued the implementation of policies focused on poverty reduction with the addition of environmental issues, mostly in the Petro administration,

Figure 11 Key periods of mayoral leadership in Bogotá



Source: developed by the authors based qualitative analysis of key informant interviews; and on Berney, 2010; Alan Gilbert, 2006; Silva, Pérez, Ruiz and Martín, 2009.

but the expansion of the BRT system continued only to 19.5 km of phase 3 of the system. The pace of expansion of bike paths also slowed during these administrations. The left-wing governments focused on achieving a higher level of citizenship participation at the local level, mostly at the urban district government level, where the local city mayors appointed urban mobility managers in order to address local problems faced by citizens in their neighbourhoods.

Peñalosa's second administration (2016–) now seeks to combine the infrastructure-focused policy measures implemented during his first term with the more behaviour-oriented, Citizenship Culture measures implemented during the two Mockus administrations. At the same time, Peñalosa's second administration is also promoting enforcement measures with investments in technology and the improvement of the traffic light systems in the city in order to organise and manage the traffic flow with high-end technology measures (section 2.4: enforcement).

Another important milestone was the creation of the Mobility Department in 2006 and the inclusion of a road safety division. The creation of the Mobility Department was part of a major institutional reform conducted at the city level during the administration of Mayor Garzón. This occurred as part of a local government reform in which the main agencies and departments of the capital district were reorganised. The institutional reform in Bogotá responded to changes taking place in the city in terms of social and environmental issues. The reform created new departments as well as increasing the scope of previous departments. Thus, the Traffic and Transport Department became the Mobility Department where the focus was not only transportation planning but also the mobility of people from a comprehensive perspective, in line with international changes taking place on the transportation sector (sections 2.2, 2.3, 2.4).

2.1.2 National level

At a national level, efforts to address road safety began in the 1980s with the introduction of a new regulatory framework. Later in the 1990s, the FPV – which was funded by the private sector, mostly insurance companies – implemented several educational programmes. Given their direct financial interest in reducing traffic fatalities and injuries, these companies were motivated to be involved, and promoted several road safety campaigns through the institutional mechanism of the FPV. National management of road safety was further improved by the 2002 National Road Traffic Code (approved by Congress), and by amendments relating to the enforcement of seatbelt use as well as the reduction of tolerance and increase of fines for drink-driving.

In 2013, the national government created the National Road Safety Agency to design and implement policies at the national level as well as to provide guidelines to cities on road safety. The Agency also took control of the FPV, previously managed by the private sector with funding from the insurance companies. It also supports cities in relation to their road safety plans. The creation of the National

Road Safety Agency was one of a number of changes that took place in part as a result of the worldwide Decade of Action for Road Safety (2011–2020) proclaimed by the UN, as well as being influenced by multilateral agencies who were promoting such national-level institutional reforms in several countries throughout the region.

2.2 Education, safety and behaviour programme

The decentralisation process established by Colombia's National Constitution in 1991 determined that education and safety campaigns should be implemented through channels at the national and local levels. Public-sector institutions were mainly responsible for education campaigns that sought to increase the level of knowledge and awareness of road users (and future road users). The effectiveness of these programmes has also relied on private sector actors and civil society involvement. Over the years, there have been many different interpretations and applications of road safety education in Bogotá.

2.2.1 Civic responsibility

From a road safety perspective, the collection of policies known as 'Citizenship Culture' developed under Mayor Mockus, involved developing the capacity of members of the public to regulate each other on the use of urban space, particularly roads, a process often referred to as 'mutual regulation'. Mockus decided to integrate the 'Citizenship Culture' policy as a transversal approach across all policies during his two administrations. The principle of *life is sacred* became pivotal, and led his administration to focus on road safety as part of the strong interest in reducing the city's fatality rate. In cabinet meetings, representatives had to report on progress in relation to this principle and demonstrate how their respective departments were working towards reducing fatalities.

The first Mockus administration implemented innovative policies, programmes and projects that aimed to change people's behaviour in public spaces – for example, by increasing public awareness of the importance of following traffic regulations (Silva et al., 2009). Citizenship Culture policies encouraged and empowered people to have higher expectations of one another. The shift involved the public by empowering them to socially regulate those who were breaking the rules – an approach that was especially encouraged for road users.

Under Citizenship Culture and the '... protection of life campaign ...' (personal communication, March 2017, Bogotá), were a number of programmes, including:

- a 'black stars' programme, whereby the shape of a body was drawn on the pavement to mark the location of a road traffic fatality
- mimes performed at intersections to remind road users of safe-crossing rules and behaviour

- red cards (thumbs-up/thumbs-down) were used by road users to point out where people were breaking road traffic rules.

Other programmes under Citizenship Culture policies also had unanticipated side benefits for road safety. For instance, earlier closing hours for nightclubs that aimed to reduce violence and murder, also reduced drink-driving.

Citizenship Culture policies operated mainly within an informal institutional framework. They fostered a sense of social control by increasing the sense of civic spirit and responsibility, and represent an innovative approach to road-safety-oriented educational campaigns in Bogotá. During this period of ‘Citizenship Culture’, the traffic fatality rate fell steeply. The Citizenship Culture approach continued during Mockus’s second term – which saw fatality rates drop dramatically in three out of the four years – and during the subsequent three mayoral terms.

But views are mixed on whether the Citizenship Culture programmes were pedagogical experiments or policies with specific and measurable impacts on road safety. Some participants interviewed thought that educational campaigns are useful only *if* the infrastructure is available to facilitate safe behaviour – for example, adequate sidewalks, clearly defined road crossings and sufficient room for high volumes of pedestrians. Other participants thought that the infrastructure is itself the most powerful manner by which to modify people’s behaviour. Another view was that that educational campaigns come *first* and are *complemented* by infrastructure measures such as mass transit provision and the improvement of non-motorised transport infrastructure. They believe that educational campaigns can really influence people’s behaviour and expectations on road safety issues. This is certainly an interesting debate that, in Bogotá’s case has influenced the promotion of policies and programmes from both education and infrastructure approaches that aimed to change people’s behaviour, with different degrees of prioritisation, depending on the inclination of the staff members in charge within each administration.

2.2.2 Focus on risk awareness

During the second Mockus administration (2001–2003), the National Road Traffic Code was issued by the National Congress. Under this law, programmes aimed at changing behaviour found a more formal channel in traditional approaches such as training courses and educational campaigns. This Law, 769, 2002, assigned enforcement and education responsibilities to local governments, who implemented the campaigns in coordination with education institutions.

The FPV and the Urban Transport and Traffic Department began the implementation of educational campaigns at schools and training for road users, especially drivers. In contrast to the Citizenship Culture approach, which sought to change behaviour through social pressure, these programmes sought to increase *awareness of risk* – for instance, informing road users about the impacts of a traffic collision depending on the speed of travel or irresponsible behaviour regarding traffic rules.

In 2006, the responsibility for conducting these educational campaigns was transferred to the Mobility Department (formerly the Department of Traffic and Transport) after the institutional reform by Mayor Garzón. The requirement for educational campaigns was complemented by the issuance of Law 1503 by the National Congress in 2011, which sought to foster the education and training of road users. The Mobility Department continued with educational campaigns based on this more formal approach during the administrations of Mayor Moreno (2008–2011), Lopez (2011) and Petro (2012–2015). These policies aimed to influence the educational process of children and young people in accordance with the national regulations.

The FPV also played a role in education. This FPV conducted educational campaigns to support the Local Transportation Authority (first Traffic and Transport, then Mobility), and supported driver-safety courses that road users who had been cited for traffic violations could take in exchange for a discount on their fine. These campaigns complemented enforcement actions by the police (section 2.4: enforcement), and are attributed to successful behaviour changes such as an increase in seatbelt-use in the city, following traffic rules at intersections and adhering to speed restrictions. Some interviewees expressed scepticism regarding the FPV’s performance since its transfer to the newly created National Road Safety Agency in 2013. Some participants suggested the proactive role of the Road Safety Fund has slightly declined because of this shift out of the control of the private sector, and positive changes remain to be seen.

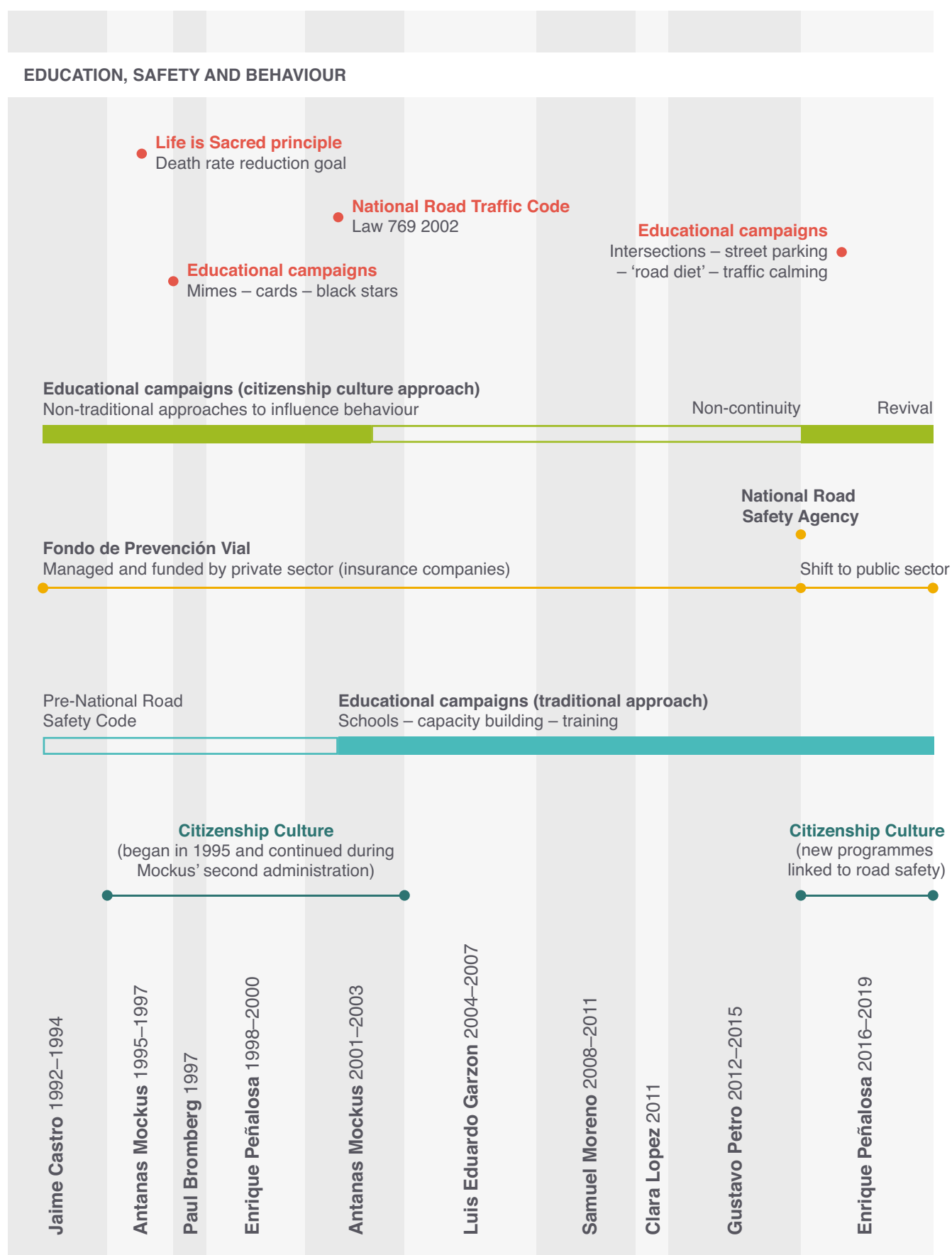
2.3 Sustainable mobility and infrastructure programmes

2.3.1 Implementation

Bogotá’s sustainable mobility programme encompasses the TransMilenio bus rapid transit (BRT) system and non-motorised transport infrastructure (Figure 13). It originated with the Urban Transport Master Plan (UTMP), which was formulated by the Japanese International Cooperation Agency (JICA) in 1995, under Mayor Mockus, and became the main transportation planning instrument for Bogotá at the end of the 1990s and the beginning of the 21st century. The plan, which was developed by Japanese experts with assistance from local transportation and urban planners, included the promotion of sustainable transport solutions such as heavy rail (subway, metro and commuter rail) and exclusive bus lanes to reduce travel times and increase the number of public transport users. Some interviewees suggested that the formulation of the UTMP was one of the first times that transportation and urban planners worked together towards a common goal in the city.

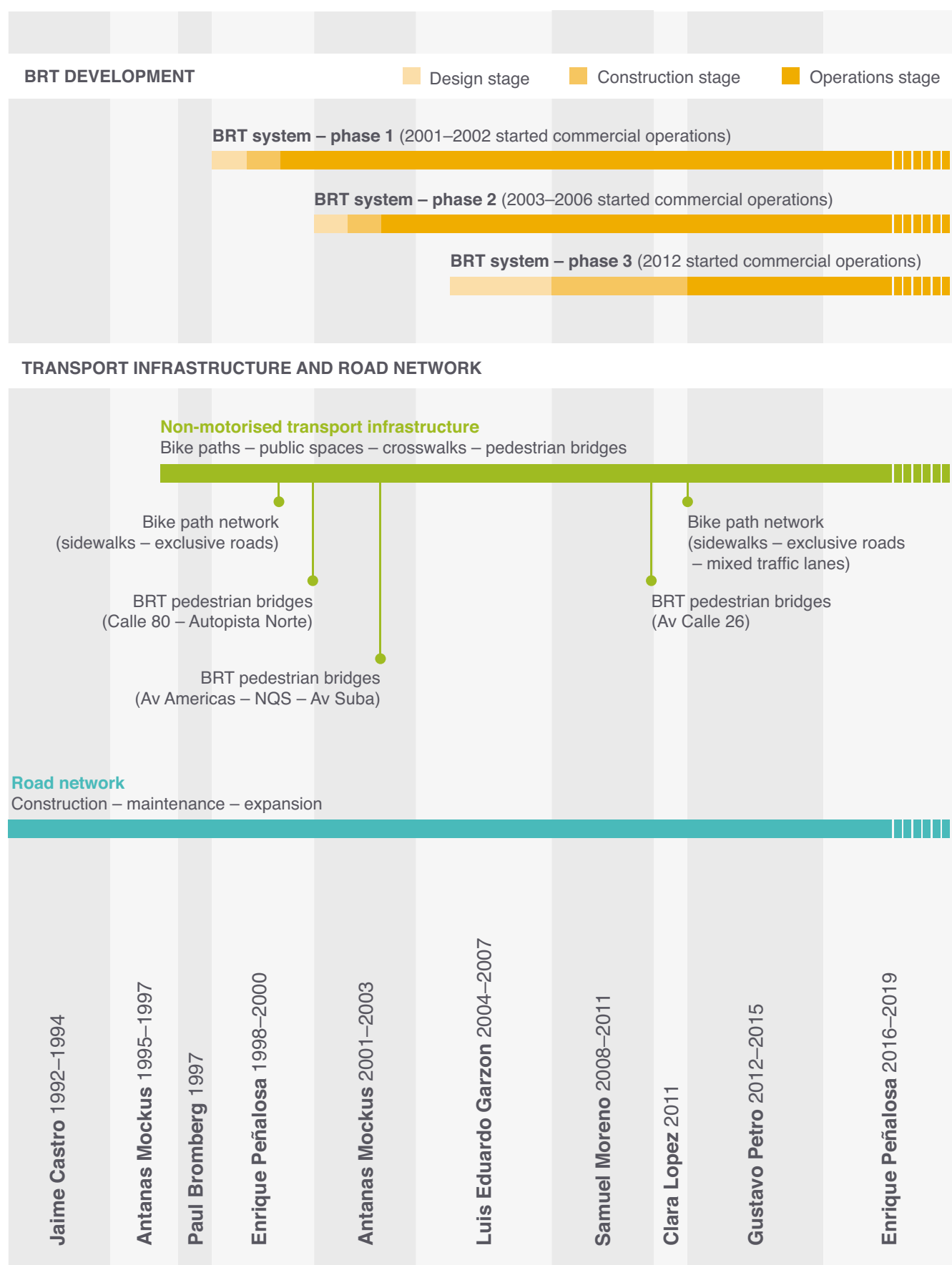
Implementation of the UTMP began under the first Mockus administration, which focused on exclusive lanes for buses along main arterial roads, improving the operational services of buses, and on road construction and maintenance. The Mockus administration distanced itself from the heavy rail project promoted by the National Government, given

Figure 12 Education, safety and behaviour approaches over time



Source: authors' own qualitative data analysis.

Figure 13 Infrastructure and sustainable mobility approach over time



Source: authors' own qualitative data analysis.

its high costs. (Later, in 1999, an earthquake in the Coffee Region in 1999 shifted National Government priorities and left the heavy rail project without enough resources from the national level side to be fully funded and implemented.)

All subsequent mayoral administrations continued to implement the BRT project and expand the non-motorised transport infrastructure to some degree – continuity that had been established by the first Mockus administration (section 2.1). The election of Mockus and Peñalosa as independent mayors supported this continuity because cabinet members were appointed based on their technical expertise rather than their political connections with the city council.

In 1998, after the end of Mockus's first mayoral term, Enrique Peñalosa was elected as mayor of Bogotá with an ambitious agenda for promoting sustainable transport solutions to address congestion and travel times. He continued to implement the UTMP via the development of the BRT system, known as TransMilenio, with support from the national government and technical assistance from the World Bank, especially along the Av. Calle 80 BRT corridor. His administration combined Mockus's educational and behavioural approach with a focus on infrastructure for sustainable mobility. But the earlier formulation and completion of the Plan provided a solid ground from a technical point of view regarding the policies, programmes and projects needed in Bogotá. Peñalosa had also inherited an administration with the fiscal and technical resources needed to implement such an ambitious infrastructure project (section 2.1).

During his first term, Peñalosa's administration implemented phase 1 (34.2 km) of the TransMilenio bus rapid transit (BRT) system (Vergel-Tovar, 2016) (Chapter 3). The first Peñalosa administration also promoted the construction of non-mobilised transport infrastructure, including the largest investment in bicycle lanes in the history of the city (Figure 12), and the reclamation and improvement of sidewalks, which previously served as parking areas for private vehicles in several areas of the city. Other developments included road improvement, and implementation of transportation demand-management strategies such as the restriction of private vehicles based on license plate numbers. Pedestrian infrastructure was incorporated into street designs through the creation of the first public-space division in the city planning department. The administration also developed urban design manuals. These efforts helped transform the city and people's behaviour on the streets (Berney, 2010).

The second Mockus administration (2001–2003) combined its earlier Citizenship Culture-led approach with Peñalosa's infrastructure and sustainable mobility goals, expanding the design and scope of the second and third phases of the BRT system. The second phase added 49.3 km of corridors to the system, with 55 BRT stations, and applied a complete-street design that included exclusive bus lanes, mixed traffic lanes, sidewalks and cycle lanes.

This phase included a wider intervention area in terms of the road section, reaching the street façade and even some

private properties along the new corridors. During phase 1, this kind of intervention applied only along sections of Av. Calle 80, while the approach of phase 2 was much more extensive, included whole road sections and acquired some properties along some corridors. As such, the process of land acquisition for this second phase involved discussion between transportation and urban planners. It also involved resettlement processes with residents following guidelines and procedures established by multilateral organisations, as had been the case – though on a smaller scale – in phase 1. The political economy of the urban space when making room for mass transit and non-motorised transport infrastructure is an issue further discussed in the qualitative data analysis. This administration also had a clear focus on increasing the availability of public space in the city. Except for one year, traffic fatality rates continued to drop rapidly during this period.

Despite general continuity, however, progress in the implementation of the BRT slowed down due to political pressure regarding specific corridors and conflicting priorities for implementation of heavy rail. Even though the provision of non-motorised transport infrastructure continued during the three terms of left-wing governments and the BRT project reached its third phase, the BRT system did not achieve the rate of expansion that was expected based on the design of the project in 2000. When finally implemented, phase 3 added only 19.5 km to the system, which has led capacity challenges and limited the ongoing impact of expanding infrastructure on road safety.

The current Peñalosa administration is moving forward with the expansion of the BRT project by including new trunk corridors along Avenida (Av.) 68, Av. Boyaca and Av. Carrera 7. It also seeks to revive the heavy rail project through the design and construction of an elevated first line of the project. The expansion of non-mobilised transport infrastructure also constitutes a key goal of this administration.

2.3.2 Infrastructure's role in behavioural change

The role infrastructure plays in the behaviour of road users is another important aspect of road safety. For instance, measures such as increasing the size of cross-walks to improve urban space and safety, beyond the parameters in commonly used engineering manuals:

We increased the cross-walks – the traditional cross-walk has 8 meters, and here is where the discussions began. I am an engineer and I proposed to make them 15 meters wide ... in this way, it invites the pedestrian in a positive way ... we took the 7th avenue and we made it full of broad and big cross-walks (personal communication, March 2017, Bogotá)

Several interviewees strongly supported sustainable mobility programmes on the basis that infrastructure could more effectively influence the behaviour of road users than education alone (see also 2.2: education). One interviewee stated:

An effective way to condition people's behaviour is related to how the infrastructure is built and the enforcement by the police to make people follow rules, not by education. (personal communication, March 2017, Bogotá)

2.4 Enforcement programmes

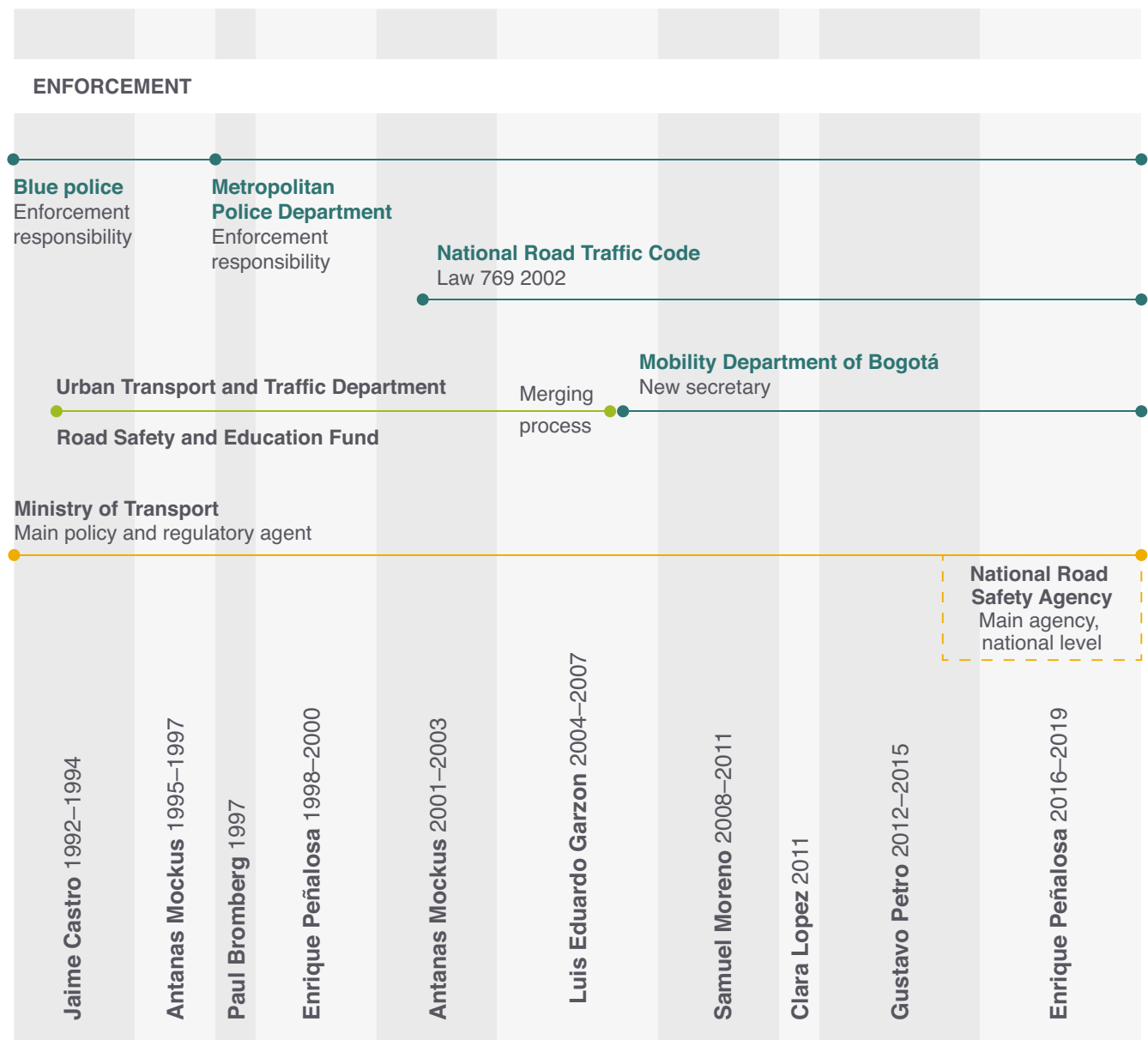
Enforcement of traffic regulations in Bogotá was improved when responsibility was transferred from the Blue Road Traffic Police to the Metropolitan Police during the first Mockus administration (Figure 14). The local government traffic agents were well known for corrupt practices, including taking bribes during enforcement operations, and when they were replaced by enforcers from an independent,

metropolitan-oriented organisation, both efficiency and public perception of enforcement improved (section 2.1).

Police enforcement in Bogota is complemented by informal institutions – that is, social expectations and pressure – first encouraged under Citizenship Culture policies (section 2.2: education). The combination of these two approaches – informal institutions and police control – evolved into the cooperation scheme that currently exists between the Mobility Department and the Metropolitan Police to coordinate on campaigns that aim to influence the behaviour of road users. For example, enforcement campaigns use financial incentives such as the reduction of traffic violation fines if offenders take driver safety courses at the Mobility Department.

Technology has also played a role in enforcement, with the provision of cameras at key intersections, the use of

Figure 14 Enforcement and control approach over time



Source: authors' own qualitative data analysis.

applications that inform drivers about the location of these cameras, the control of speed by the police using devices that take pictures of licence plates, and the use of devices by police officers to generate a fine via the system which is linked to driver licence numbers.

2.5 Integration of approaches

In terms of the relationship between education and enforcement, several participants mentioned that fines are usually more effective in changing behaviour, and gave the example of seatbelt use and drink-driving enforcement. This is related to the enforcement capacity of the local authority and use of technologies to support this task by the public sector and the effectiveness of applying fines.

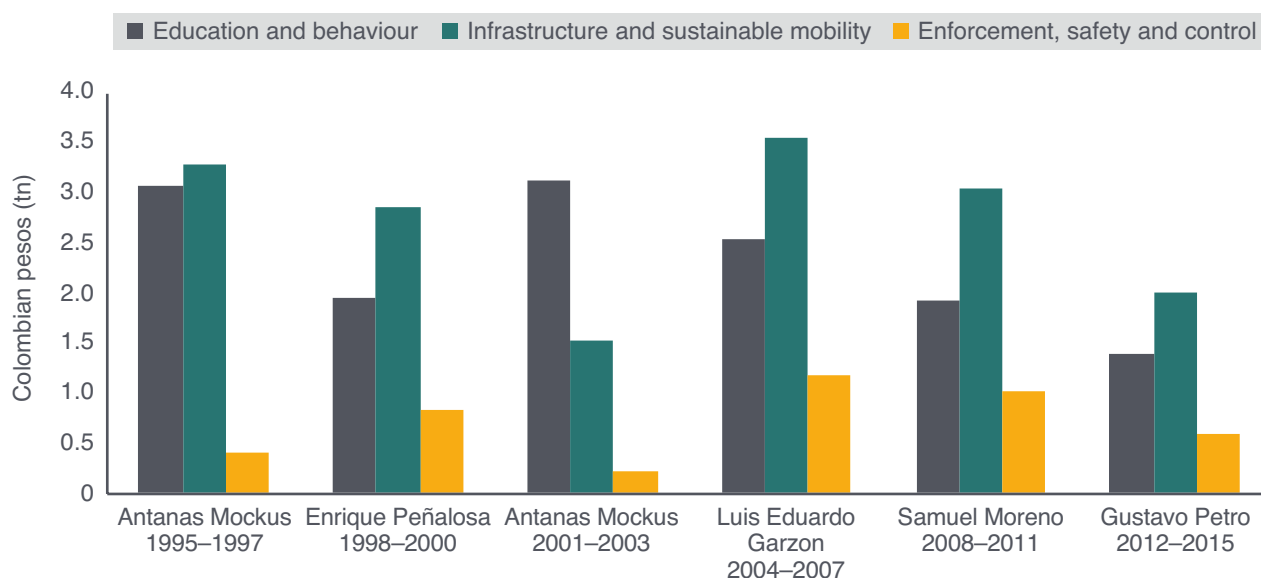
Several participants suggested a combination of Citizenship Culture policies and enforcement measures have had impacts on road safety behaviour and outcomes. Some suggested that the results included improved self-control, mutual control (between road users) and enforcement by local authorities, especially the police. An example of mutual control between road users was highlighted by a participant when referring to the *ciclovía* in Bogotá, whereby teenagers are trained to guide traffic:

And road users obey these young people ... there may be friction from time to time, but few; people in general permit to be regulated willingly (personal communication, March 2017, Bogotá).

Mayor Peñalosa began his second administration in 2016. The new administration has formulated a robust sustainable mobility and road safety agenda which is currently under design and implementation. The administration aims to reduce fatalities by implementing infrastructure measures such as traffic calming, and formulating and developing studies on specific road safety issues, such as motorcycle safety. In addition to the expansion of the BRT system, the intention is to implement an elevated heavy rail system, as opposed to the underground subway project promoted by Mayor Petro. The heavy rail project is still in the design phase and is therefore not analysed in this case study.

The Peñalosa administration has set major goals for the construction, maintenance and conservation of non-motorised transport infrastructure, which, along with transport demand-management policies, are part of an agenda that seeks to revive Citizenship Culture policies to transform road users' behaviour. The administration is also working on adopting the 'Vision Zero' approach to road safety, which shifts responsibility from road users to system designers (decision-makers, engineers, designers, planners, etc.) and states that no death or serious injury is acceptable on the roads (Larsson, Dekker and Tingvall, 2010). The introduction of the Vision Zero approach in Bogotá is currently taking place with the support of international organizations and donors. One of the key approaches to incorporating the Vision Zero principles is the formulation of a Road Safety Plan, which was formally adopted in December 2017. This could be the tipping point that engages a coordinated approach to road safety on the part of the public sector.

Figure 15 Distribution of funding allocation under successive administrations



Note: Based on the review of each administration's development plan and public reports on investments made by each administration. The total funding allocation was identified by reviewing the reports from the local government and public agencies looking at the implementation of the government plan for the entire mayoral period. Thus, the numbers refer to the total funding allocation for the entire mayoral administration period. The review was conducted by identifying those investments related to road safety based on the three approaches identified in the qualitative analysis. Source: SDP, 1997a; 1997b; 1997c; 2001a; 2001b; 2001c; 2003a; 2003b; 2003c; 2007; 2008a; 2008b; 2011a; 2011b; 2011c; 2015; 2016; 2017b; 2017c; 2017d.

3 The impacts of Bogotá's TransMilenio BRT system on road safety

3.1 Bus transport in Bogotá before BRT

Before the development of the BRT system, bus transport in Bogotá was characterised by high 'interaction effects' – incidents due to the mixing of buses with other traffic – as well as aggressive driving by competing drivers and dangerous pedestrian-crossing areas. Services levels were poor, with buses often stuck in congestion. The vehicles themselves were also much smaller than the current, newer models, which meant carrying fewer passengers per bus, and more buses to meet demand. This in turn meant greater distances travelled overall, and thus generally higher levels of risk.

The BRT system was conceived from suggestions set out in the JICA's Urban Master Plan, which recommended providing exclusive lanes for buses as part of an integrated public transport system of the city (JICA, 1996). The BRT project was influenced by the experience of Curitiba (Brazil) and Quito (Ecuador), but made some improvements, including larger stations, additional lanes next to them for surpasses, and feeder routes at the end of the trunk corridors (Ardila, 2004). The BRT system constitutes a surface, mass-transit system that would change these parameters, taking room from mixed traffic lanes and giving priority to buses along arterial roads. With plans for buses with higher capacities, segregated bus lanes, fixed routes and stations, and improved pedestrian access to stations, the BRT would mean significant changes to Bogotá's urban infrastructure, which could have considerable influence on traffic, road user behaviour and ultimately on road safety.

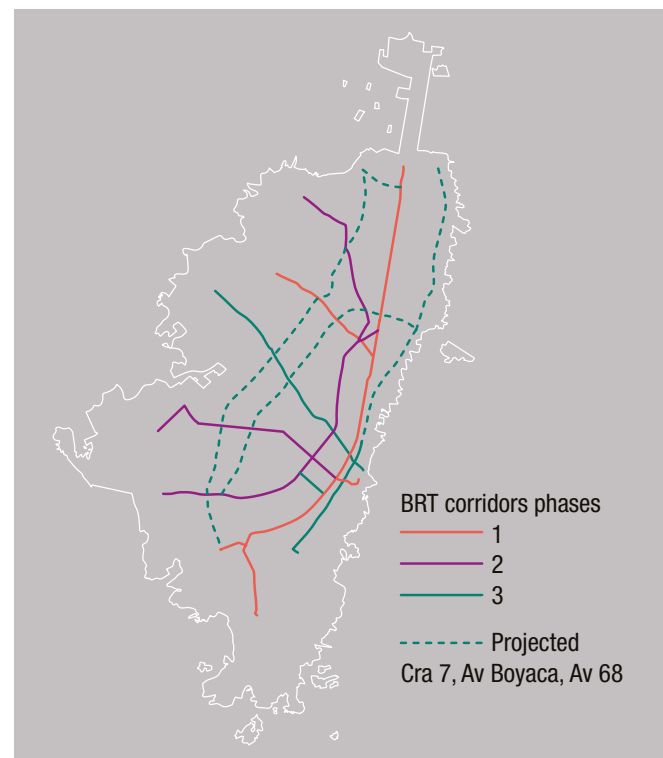
When interviewed for this study, experts that had been involved in the design and implementation of BRT phase 1 said that they had expected the operation of this mass transit system to reduce both travel times and collisions, especially along the busy Av. Caracas. When, after its implementation, they began to receive reports of reductions in collision numbers, they began to collect data to monitor the system's road safety impacts, and thus road safety performance was included in the BRT agency's mandate.

The BRT was expanded into a phase 2 and phase 3, which involved reoriented toward the 'complete-street'

approach piloted along Av. Calle 80 during phase 1. This meant making changes to wider street design, not only to bus lanes, and included exclusive lanes for BRT buses, mixed traffic lanes parallel to the corridor, and the addition of bike paths to sidewalks along the arterial roads, further increasing the opportunity to influence road safety. The approach was costlier, and subject to discussion at national and local levels, but was supported by Mockus's second administration (Vergel-Tovar, 2016).

Table 1 summarises the three phases of the BRT system and Figure 16 shows the location of the BRT corridors in Bogotá.

Figure 16 BRT trunk corridors: phases 1, 2, 3, and 4 (projected)



Source: TransMilenio SA (2016) Geoprocessing by Vergel-Tovar.

Table 1 Three-phase expansion of Bogotá's BRT system (trunk corridors)

BRT Corridor	Length (km)	Number of stations	Start date (operations)
BRT system – phase 1			
Calle 80	10.1	12	January 2001
Av. Caracas	11.9	14	January 2001 August 2001 ⁱ February 2002 ⁱⁱ
Autopista Norte	10.3	15	August 2001 ⁱ
Av. Jiménez	1.9	3	June 2002
Subtotal phase 1	34.2	44	
BRT system – phase 2			
Av. Americas – Av. Calle 13	13.0	16	November 2003 ⁱⁱⁱ June 2004 ^{iv}
Av. NQS Central	10.6	11	February 2005
Av. NQS South	12.7	15	April 2006
Av. Suba	13.0	13	April 2006
Subtotal phase 2	49.3	55	
BRT system – phase 3			
Av. Calle 26	12.2	13	June 2012 ^v October 2012 ^{vi}
Av. Carrera 10	7.3	9	October 2012
Subtotal phase 3	19.5	22	
Total all phases	103.0	121	

Notes: ⁱ Expansion of Phase 1 with the opening of BRT Terminals Usme and Portal Norte; ⁱⁱ Opening of BRT Terminal Tunnel; ⁱⁱⁱ Started operations until BRT station Banderas; ^{iv} Opening of BRT Terminal Portal Americas – full operation started; ^v Started operations with some BRT station and the BRT Terminal El Dorado; ^{vi} Full operation started.

Source: Global BRT Data, 2017; EMBARQ, 2009; TransMilenio SA.

3.2 Significant reductions in collisions and fatalities

The operational and infrastructure changes introduced during the first two phases of the BRT have had significant, positive impacts on road safety outcomes. Such were the improvements observed in Bogotá, an EMBARQ study recommended that safety outcomes be included in cost-benefit estimations of BRT projects. Data analysis from several studies shows significant reductions in collisions and fatalities over time after their implementation (from 2000 onwards), which could be attributed to the BRT system (Figure 16; EMBARQ, 2009; Andes and BID, 2011; Carrigan et al., 2013). Fatalities on the corridors reduced by 38% after phase 1 and 41% after phase 2 (Bedoya, 2010), with a subsequent study finding that, on Av. Caracas¹ specifically, fatalities fell by 48% (Duduta et al., 2014).

In 2012, one study suggested that the positive changes in road safety along two of the BRT corridors – Av. NQS and Av. Caracas – were a result of improvements to infrastructure and institutional arrangements, and the reorganisation of public transportation in the city. Removal of competition between bus drivers also resulted in safer practices and better

working conditions (Bocarejo, Velasquez, Díaz and Tafur, 2012). As well as preservation of life, studies suggest there have also been economic benefits. In 2013, a global BRT study found that a reduction in the number of collisions in Bogotá was one of the benefits of phase 1 and phase 2 of the BRT system and, by 2012, it had saved the city \$288 million (Carrigan, King, Velasquez, Raifman and Duduta, 2013).

In our analysis of collision data for BRT trunk corridors and a selection of non-BRT arterial roads (see Methodology; see also Figure 17), we found a similar drop in collisions and fatalities in BRT trunk corridors between 2007 (before construction began) and 2016 (four years after implementation), though high variations meant this data was not conclusive.

BRT trunk corridors Calle 26 and Carrera 10 experienced a significant reduction in collisions in 2009, which coincides with the beginning of the BRT construction process (Figure 18). Once operational in 2012, there was also a reduction in the number of collisions, but the indicator suggests a stronger reduction pattern along Av. Carrera 10 over time. After the BRT trunk corridor Av. Calle 26 began operation, this corridor experienced a 36% reduction in collisions (246 collisions less) between 2007 and 2013. BRT trunk corridor Av.

1 Although phase 1 didn't start operating *commercially* until 2001, it was operational in 2000.

Carrera 10 experienced a similar drop of 40% (239 less) over the same period.

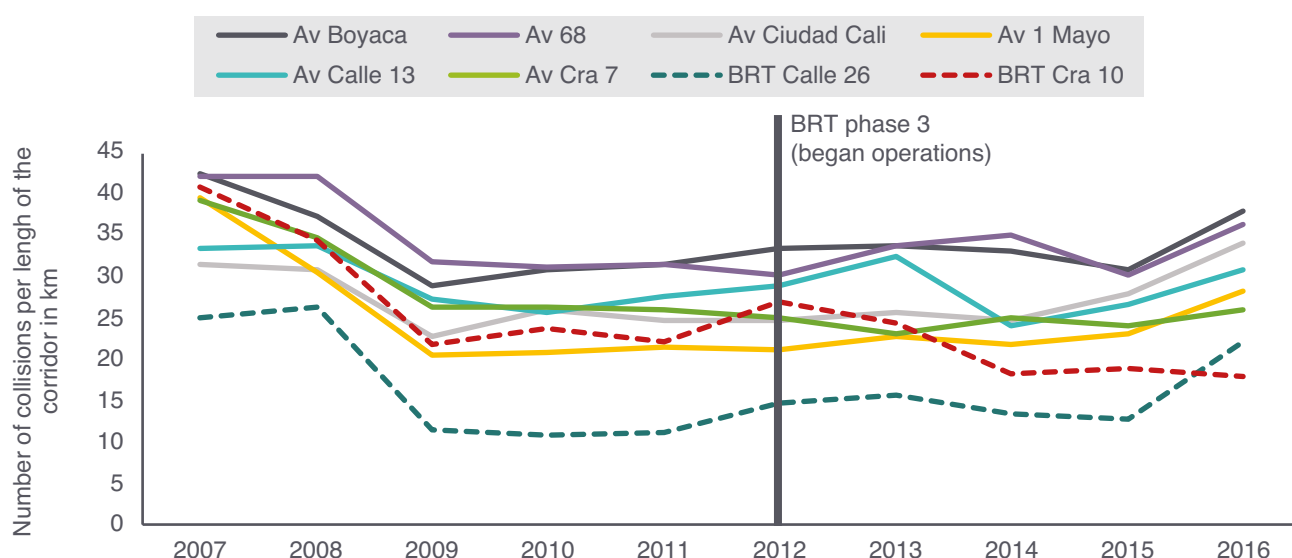
In terms of fatalities from road traffic collisions (Figure 17), our analysis suggests there has been a reduction in the pattern along the BRT trunk corridor Av. Carrera 10 of 56% between 2007 and 2016. Along both BRT trunk corridors, the number of pedestrian fatalities also fell. However, the data is not conclusive given the high variation of this indicator over time for arterial roads as well as BRT trunk corridors.

3.3 Wider impacts of the BRT in Bogotá

Road safety can be improved both by reducing risk — protecting people while they walk, bike or access public transport — and reducing the level of risk exposure by decreasing the number of vehicle kilometres travelled:

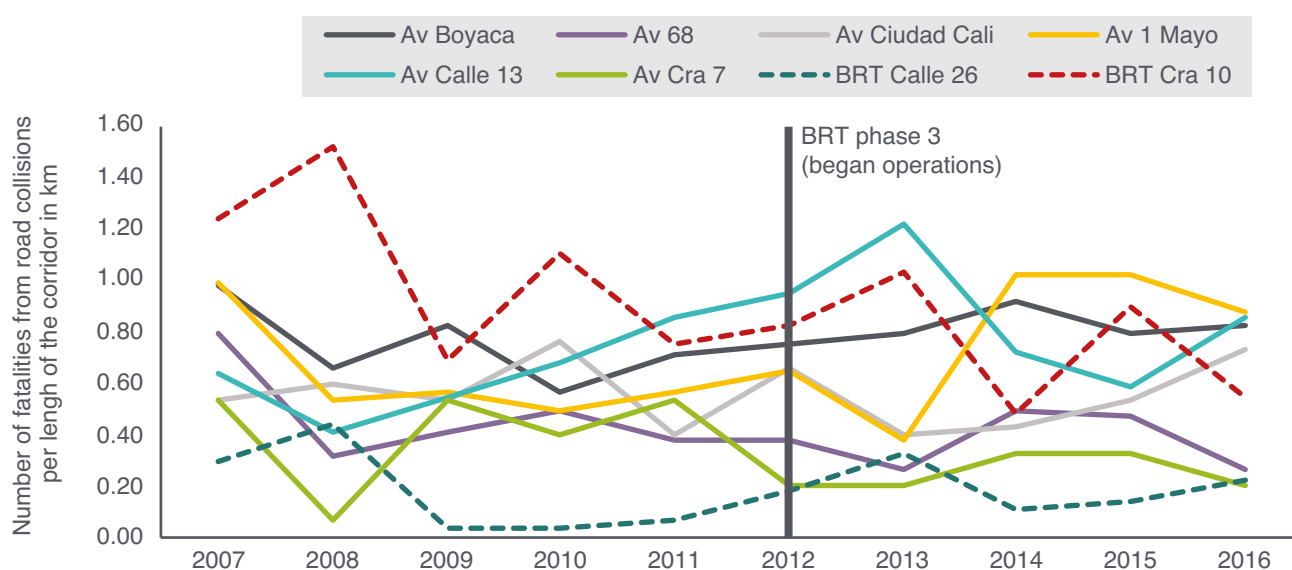
If we are working on reducing exposure, increasing public transport and non-motorized transport travel

Figure 17 Total number of collisions on BRT (phase 3) corridors and non-BRT arterial roads, 2007–2016



Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure 18 Total number of road collision fatalities on BRT (phase 3) corridors and non-BRT arterial roads, 2007–2016



Note: controlled for length (buffer of 35 metres).

Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

*instead of travel in private cars and motorcycles
would reduce the number of vehicles per kilometre
(personal communication, February 2017, Bogotá)*

For this reason, the overall safety impacts of Bogotá's BRT are likely to be much greater than the corridor-specific

impacts identified in this study. Interviewed participants noted that the implementation of 83.5 km of BRT in phases 1 and 2 coincide with the period of significant reduction in traffic fatalities for the whole of Bogotá, while the period in which BRT stalled (with only 19.5 km implemented) saw plateauing numbers of fatalities.

4 Challenges and unintended impacts of road safety strategies

Bogotá's progress on road safety has not been without challenges. Despite mayoral commitment on citizen participation and violence (and fatality) prevention, infrastructure expansion experienced some setbacks.

Traffic-related fatalities, which had declined dramatically under the Peñalosa and two Mockus administrations (1995–2003), continued to decline under Mayor Garzón (2004–2007). But from 2006, the fatality rate stopped its rapid decline and remained relatively stable throughout the subsequent mayoral administrations of Moreno (2008–2011) and Petro (2012–2015) (Figure 10). In the same manner as the strategies for improvement, the challenges for road safety are 'nested' within three main themes of education, infrastructure and enforcement, and are similarly a result of relationships *between* the themes, as well as the overarching theme of institutional coordination, reform and the legal framework.

4.1 Legal and institutional framework

4.1.1 Political pressures and corruption

Traffic-related fatalities continued to decline under Mayor Garzón (2004–2007) (Figure 10), who planned two new trunk corridors under the BRT project (Av. Calle 26 and Av. Carrera 10). But towards the end of Garzón's term, the BRT corridor along 7th Avenue was not approved for construction, due to public and political pressure, even though the adjoining BRT corridor along Av. Carrera 10 was approved (Mojica and Gomez-Ibanez, 2007). The two other lines that were planned were not constructed until after his administration.

Left-wing administrations continued with Samuel Moreno (2008–2011), but he was removed from office in 2010 due to a corruption scandal that sent him to jail. Clara López was appointed to complete his term as city mayor in 2011. However, the corruption scandal also delayed phase 3 of the BRT trunk corridors. Gustavo Petro (2012–2015) was then elected with an ambitious agenda on sustainable transport, poverty reduction, climate change mitigation and adaptation measures, and addressing socio-spatial segregation. Phase 3 of the BRT was completed

during his term, although overall his administration invested less in infrastructure and education and more in enforcement programmes especially those related to improve citizenship participation at the local level.

4.1.2 Working towards an integrated mobility system

During his campaign, Moreno promoted a heavy rail metro project, which took a predominant role in the urban mobility sector during his administration. This distanced him from previous mayoral administrations which were more focused on BRT. The focus on BRT was reduced and the administration set goals only for operations and the expansion of three stations.

In 2012, Gustavo Petro took office with a plan linked to environmental issues. He also set goals on the development of agreements with local districts and communities regarding urban mobility. During his administration, phase 3 of the BRT system began operations. The BRT trunk corridors Av. Calle 26 and Av. Carrera 10 became fully operational in the last quarter of 2012 (Hidalgo and King, 2014). These two corridors added 19.5 km to the BRT trunk network including 22 stations. However, this administration faced the challenge of continuing the BRT system network according to the plan designed during the Peñalosa administration in 2000, while also making a decision regarding the ongoing development of the heavy rail project started during the Moreno administration (Bassett, 2013: 22). The fatality rate was variable during this period but experienced a slight drop overall (Figure 10).

4.2 Education and behaviour

4.2.1 Shift in the FPV

The Fondo de Prevención Vial was formerly managed and funded by the private sector, specifically, the National Association of Insurance Companies. With the creation of the National Road Safety Agency in 2013, the national government transferred the fund to the public sector. Several interviewees suggested that this change created unexpected challenges in terms of education campaigns. Public-sector agencies in Bogotá used to request funding to

implement educational road safety campaigns. Now that the fund is managed and supported by the public sector, some interviewees felt that this has put financial constraints on education programmes. The National Association of Insurance Companies is not yet clear about its new role in relation to the fund or road safety campaigns.

4.3 Infrastructure and sustainable mobility

4.3.1 Conflicts over space for pedestrians and cyclists

The provision of infrastructure for non-motorised transport users included the construction of bicycle lanes to facilitate cycling as a safe and practical transport option. Initially, because bicycle mode share was so low, and taking space away from cars was very politically unpopular, bicycle lanes were constructed on sidewalks, reducing space for pedestrians. As the number of people cycling increased, cyclists were placed in conflict and competition with people walking. This has now been recognised as an issue and, since the last mayoral administration (Mayor Petro), there has been a shift to taking away road space from private vehicles along main arterial roads to create bicycle lanes (known as ‘road diet’). The current administration is promoting the continued construction of bicycle lanes as part of road infrastructure.

4.3.2 Negative outcomes of pedestrian bridge infrastructure

Sustainable mobility infrastructure includes the provision of exclusive traffic lanes for the BRT and improved access for pedestrians to BRT stations, which has meant the use of segregated elevated pedestrian bridges on some corridors. Some interviewees suggested that the bridges have led to increased speeds along some BRT corridors. And although the bridges were intended to protect pedestrians, the additional walking distance and perception of risk to personal safety has been a deterrent to their use. Some pedestrians instead take risks by crossing arterial roads at street level even though level crossing infrastructure is not provided.

Where possible, pedestrians are given priority through crosswalks at road level, which is preferable for both pedestrian safety and accessibility. This approach has been used in the design of new phases of the BRT system such as Av. Carrera 10, where pedestrians can cross and access stations at street level. However, along corridors such as Av. Calle 26, the road section necessitates the use of pedestrian bridges to access BRT stations.

4.3.3 Rising pressure on BRT drivers

Increasing demands on the BRT system have led to operational challenges. According to some interviewees,

higher ridership levels have led managers to find ways to hire bus drivers for extra hours. Research suggests that bus drivers may choose to work extra hours as part of their employment agreement, which represents a road safety challenge for the operation of the BRT system given the potential increase in risk-taking behaviour by overtired bus drivers, as well as delayed reaction times.

4.3.4 Risks associated with the integration of BRT buses and mixed traffic

The implementation of phases 2 and 3 of the BRT system led to a discussion among planners regarding the extent to which BRT buses should share road space in mixed traffic lanes. Since it began in 2012, phase 3 of the BRT has adopted a combined approach, with buses being mostly segregated in exclusive lanes but also using the mixed traffic lanes to connect between corridors, in order to reduce the number of transfers a passenger must make between routes. The shift to a less rigid BRT operation by facilitating the circulation of buses along some mixed traffic lanes to connect different BRT corridors is an issue that emerged among some interviewees. They suggested this may have the unintended impact of increasing the risk exposure of BRT buses.

4.4 Enforcement and control

4.4.1 Increased capacity and resource needs

The development and implementation of the reduced-fines-for-training system have been an effective way to change road users’ behaviour, but the system has had the unintended consequence of increasing the Mobility Department’s human resource needs. More staff are required to run the driver safety courses and to pursue non-payment of fines. The fines and the training programme require complex institutional coordination between the Mobility Secretary (Secretaria de Movilidad) and the Metropolitan Police Department – a challenge that has not yet been resolved.

The National Road Traffic Code (Codigo Nacional de Transito), issued in 2002, focuses on enforcement and penalties at the expense of prevention measures and infrastructure design. Some interviewees suggested that the Code needs updating, and various efforts to do so have failed to date.

4.4.2 Rapid changes, new challenges

The capacity of the public sector is challenged by the rapid pace of motorisation and the increasing number of motorcycles and bicycles on Bogotá’s road network. Traditional enforcement of road traffic regulations and control measures are not always responsive to the needs of the growing number of users of these modes.

5 Key actors in the implementation of road safety measures

5.1 Overview

Public sector actors dominate the implementation of policies and programmes (Figure 19). The National Road Traffic Code issued by Congress determines the regulatory framework, which is primarily focused on enforcement. The Code assigns responsibility to the Ministry of Transport for developing the National Road Safety Plan and all input materials for educational campaigns that should be conducted by local road traffic authorities. The Code assigns responsibility to local authorities for conducting those educational campaigns.

The National Planning Department and the Ministry of Transport formulate and implement national urban transport policies. These two agencies also provide funding and support to local governments for the provision of transportation infrastructure. They influence local regulations, policies, and programs in the transport sector, mostly in terms of design and implementation of mass transit systems (such as BRT) for large cities and integrated urban transport systems for intermediate cities.

The National Agency for Road Safety, created in 2013 as part of the Ministry of Transport, is the national authority for road safety. It conducts the planning and management of road safety issues nationwide and is responsible for implementing the National Plan on Road Safety that was formulated by the Ministry of Transport. It also administers the FPV, formerly managed by the private sector through the National Association of Insurance Companies.

At the local level, the City Mayor of Bogotá is the main decision-maker in terms of road safety and mobility policies. The transport authority in Bogotá is the Mobility Department, which has responsibility for formulating and implementing road safety policies and programmes. TransMilenio coordinates the operation of the BRT system, while the Urban Development Institute provides the infrastructure and coordinates the maintenance of roads in the city. The Metropolitan Police Department (under the authority of the National Police Department) coordinates with the Mobility Department on traffic enforcement

and education as part of an interinstitutional cooperation agreement. The Mobility Department oversees public transport operators following national and local regulations.

5.2 Synergies between actors

In this study we identify five of the most influential synergies between actors for road safety outcomes in Bogotá.

5.2.1 City mayor–city council: policies, projects and monitoring

At the local level, the city mayor decides policies related to road safety while the city council approves planning instruments, such as the Development Plan. The relationship between the two depends largely on the mayor's political allegiance. Where the mayor was elected as an independent candidate (as were Mockus, Peñalosa and, to some extent, Petro) the relationship has focused more on specific policies and projects. Where, on the other hand, the mayor was elected as a representative of a political party (the case with Garzón, Moreno and partially Peñalosa's second administration) the relationship has been mediated by the representation of political parties in the local government cabinet.

As an independent mayor without any political affiliation, Mockus depoliticised the relationship with the city council by not treating the appointment of members of his administration as part of an exchange of favours with city council members. Instead, policies and projects became the priority for the local government, rather than political favours. Appointments were made based on technical expertise. This was a major shift in politics in Bogotá and gave Mockus more freedom. It was this relationship that provided the foundation for Mockus to abolish the Blue Road Traffic Police – well known for high levels of corruption including accepting bribes during enforcement operation – and transfer responsibility for enforcement and road traffic control to the Metropolitan Police Department (section 2.1: institutions; section 2.4: enforcement).

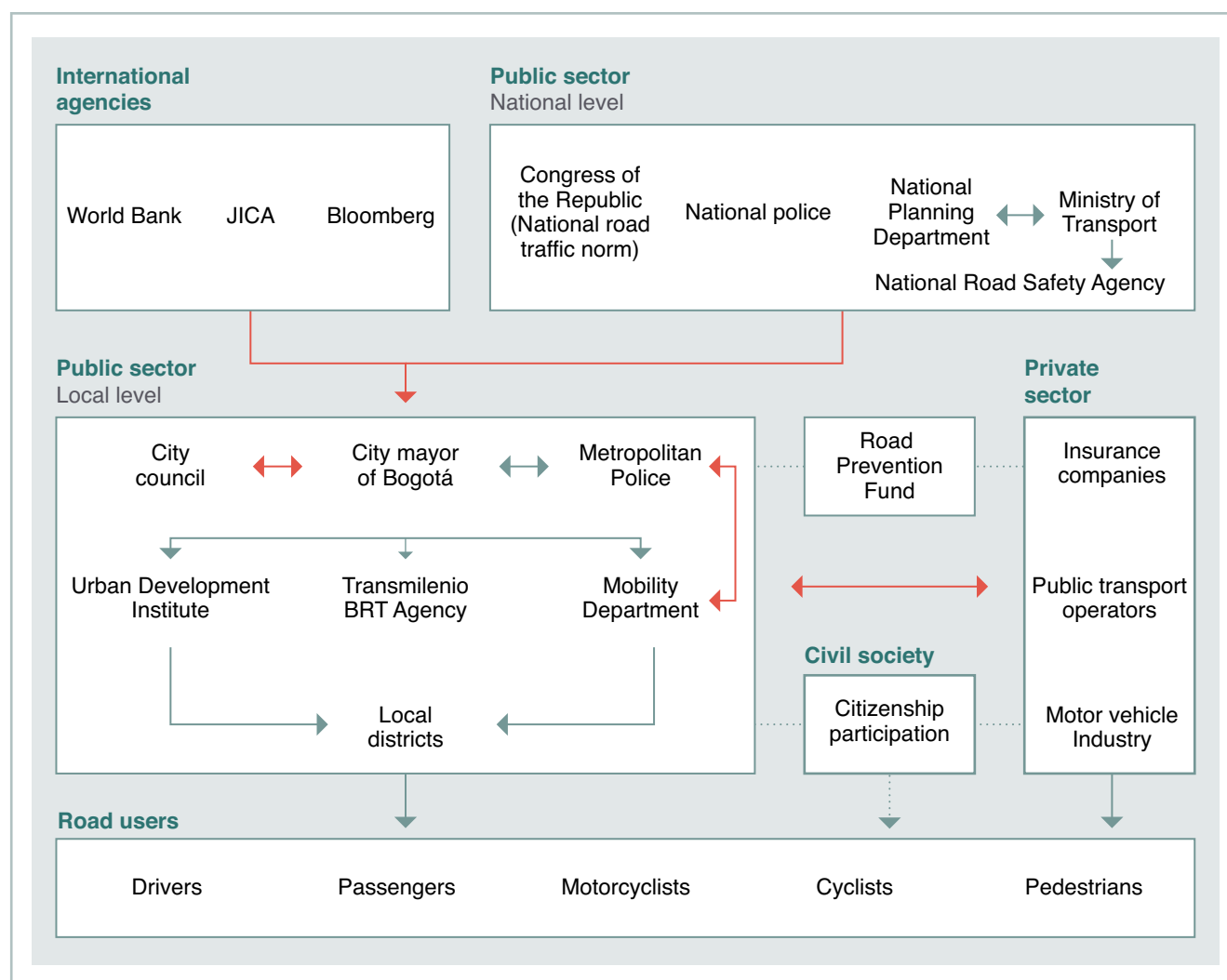
Funding is another key dynamic characterising the relationship between the city mayor and the city council. During the period of independent city mayors, the city council approved important financing decisions. For example, they approved the process of the sale of shares in the Bogotá Energy Company by the first Mockus administration – a move that subsequently provided an important source of funding for the first Peñalosa administration (A. Gilbert and Garces, 2008). This function is critical, because it meant that some programmes and projects could be approved and funded without the need for resources from the National Government. As such, the BRT project was initially funded by the city, and funding was also made available for non-motorised transport infrastructure projects, which were part of the public infrastructure consolidation plan implemented by Mockus and Peñalosa.

5.2.2 Mobility Department–Metropolitan Police: enforcement and road traffic control

The Mobility Department is the main authority in the city for policy formulation, programmes and implementation. It coordinates enforcement issues with the Metropolitan Police Department. Before the Mobility Department was created, this coordination role was played by two agencies: the Urban Transport and Traffic Department coordinated the formulation and monitoring of transport policies in the city; and the FPV oversaw fund allocation and implementation of policies and programmes.

The relationship between the current Mobility Department and the Metropolitan Police is based on a cooperation scheme between two public sector agencies, the former at the local level and the latter at the regional level. According to several participants in the semi-structured interviews, this relationship has worked well

Figure 19 National and local actors influencing road safety in Bogotá



Note: Based on the qualitative data analysis of semi-structured interviews. Lines and arrows suggest the direction of the influence in the relationship between actors. Dotted lines suggest the relationship is not current (for example, in the case of the insurance companies and the FPV). Red arrows highlight the relationships that were identified in this report as most critical in terms of synergies related to road safety outcomes.

given the division of tasks between both public agencies. The Metropolitan Police also allocates resources to municipalities within the urban agglomeration of Bogotá, as it is a regional authority beyond the city limits of Bogotá.

This relationship formalises enforcement efforts and road traffic control in the city. The Metropolitan Police Department oversees road traffic monitoring and legal assistance in the case of collisions. They also collect data on infractions, issue sanctions and submit this information to the Mobility Department. The Mobility Department is responsible for ensuring that penalty fees are paid by road traffic offenders. This function also includes managing their training-for-fine-reduction initiative (section 2.2: education; section 2.4: enforcement).

5.2.3 Local government–international organisations: technical assistance and funding

International agencies have played a significant role in road safety outcomes in Bogotá. The first was the Japanese International Cooperation Agency (JICA), which formulated the Urban Transport Master Plan for Bogotá in 1995. This became the city's primary urban transport planning document, and its development facilitated a meeting between Bogotá's urban transport experts to discuss the proposals. Mayor Mockus adopted the plan to promote the implementation of exclusive lanes for buses along main arterial roads, which constituted the origin of the BRT system.

The World Bank became involved as a key funder for implementation of the Urban Transport Master Plan and an Urban Services Project. It also provided technical assistance, which included the development of a vision for the role that infrastructure could play in road safety outcomes – particularly the organisation of urban transport services in the city. The Urban Transport Master Plan's implementation was focused around the BRT project in Bogotá as part of the sustainable mobility policy, which began to take into account road safety indicators as positive outcomes of reorganising urban transport and providing infrastructure for mass transit and non-motorised transport road users.

More recently, the international agency Bloomberg Philanthropies has been providing technical assistance, capacity-building support and funding to Bogotá as part of the Bloomberg Initiative for Global Road Safety. The Initiative (in which WRI is a partner) supports the city in road safety efforts such as managing vehicle speeds, improving street and intersection designs, and formulating a Vision Zero Plan in conjunction with the Road Safety Plan formulated at the national and local levels.

5.2.4 National government–local government: decentralisation and infrastructure investments

The autonomy devolved to Bogotá in the decentralisation framework provided by the National Constitution of 1991

has added tension to the relationship between national and local government. With regards to transport, a heavy rail project has been part of the national government agenda since the 1990s. In contrast, the Mockus administrations and the first Peñalosa administration favoured mass transit solutions that were less expensive. These administrations therefore supported the BRT project and took funding from international agencies such as the World Bank.

But this tension notwithstanding, the national government took the Bogotá BRT project as the reference point for its National Urban Transport Policy, which seeks to promote mass transit projects with BRT features in large cities and metropolitan areas nationwide. The implementation of the BRT project established a paradigm in which both levels of government promoted the project as a mass transit solution suitable for the city. However, the scope of the BRT system has been the subject of debate. In phase 2 and 3, the local government decided to broaden the scheme. In some areas, the BRT was expanded to a complete-street approach that included the provision of non-motorised transport infrastructure and improved mixed traffic lanes.

But while the city saw an opportunity to simultaneously improve all infrastructure along main arterial roads that were the subject of BRT investments, national government initially interpreted its funding responsibility as related to mass transit investments only, not urban infrastructure provision, and suggested the project's financial scope be redefined. This was later discussed among national and local administration representatives who, after some debate and in part due to pressure from Mockus, approved the change. This was reinterpreted and funded by the government after some debate, largely due to strong pressure and political will from Mockus.

5.2.5 Civil society and private sector involvement

The emergence of community involvement and participation began with the election of the left-leaning Mayor Garzón, whose Development Plan focused on urban poverty and the reduction of urban inequality. Several urban mobility issues were discussed at the district level with local offices. The Garzón administration included community-based organisations in the implementation of policies including road safety educational campaigns. This bottom-up approach continued with the left-wing governments of Moreno and Petro, with more community involvement in the implementation of campaigns at the district and neighbourhood levels. For instance, each district in the city began to implement the role of the mobility manager at the level of the local mayoral unit. This role aimed to facilitate the interaction between the community and the mobility department of the city at the neighbourhood level to address issues related to urban transport and mobility.

6 Lessons learned

Although challenges remain, the case of Bogotá demonstrates that road safety can be improved in a relatively brief period, given the right combination of institutional reform and continuity across local administrations, educational campaigns, provision of infrastructure and sustainable mobility, and regulation and enforcement. Seven important lessons can be learned from Bogotá's experience in improving road safety:

- 1. National reforms can support city-level change.** The capacity for Bogotá to rapidly improve road safety was facilitated by changes in the regulatory framework at the national level: constitutional reforms that provided for the direct election of a city mayor by the people of Bogotá, devolution of road safety education responsibilities to the city, and the establishment of a National Road Safety Code and National Road Safety Agency. This is important because in the context of the reduction of the fatality rate between the 1990s and the beginning of the 2000s, the city mayors were independent candidates, without political attachments, which gave them the autonomy needed to implement reforms that contributed to the reduction of fatality rates.
- 2. A combination of technocratic and democratic approaches to public policies can generate desired outcomes such as the successful reduction of fatalities.** Following the empowerment of the elected city mayor, reforms at the city level helped generate an institutional framework that was conducive to improving road safety. This included a shift in the relationship between the mayor and the city councillors, secure funding for infrastructure through tax reforms and bond sales, high level international donor and multilateral agency involvement, changing enforcement responsibility from local traffic agents to the Metropolitan Police, reorganisation of public transport in the city around a BRT system, the introduction of bicycle infrastructure, and reorientation of the Department of Traffic and Transport to the Department for Mobility, with a dedicated road safety section.
- 3. International agencies have also had a significant impact on road safety in Bogotá.** This began when JICA helped the city to develop an Urban Transport Master Plan, and has continued with World Bank funding for the BRT and current support from Bloomberg Philanthropies to develop road safety management and action plans.
- 4. Linking the problem to broader issues to which the public can relate can drive public policy responses to road safety.** In Bogotá, the concept of road safety as a public policy issue emerged in the 1990s as part of the response to public demand for authorities to address the city's high homicide rates. The mayor and local government officials began to consider violence as a public health issue and included traffic fatalities as part of their discussion and approach. This is how the Citizenship Culture principle that 'life is sacred' emerged, and became the policy framework that guided public engagement programmes to address road safety issues.
- 5. Improved public transportation can have a significant impact on road safety for all modes.** The organisation of public transport services with the introduction of the BRT system has had a positive impact on road safety indicators due to improvements in the operational services. Initially, it provided a safe, public transport alternative to private vehicles, but now faces challenges as expansion of BRT corridors has stalled and demand has continued to increase, reducing the quality of the system provision.
- 6. Pedestrians and cyclists need distinct infrastructure.** The provision and improvements of non-motorised infrastructure have been related to an increase of more sustainable transport travel patterns, but in some cases space has been taken from away from other road users, creating conflicts between pedestrians and cyclists. Cyclists and pedestrians have different movement and safety needs, which must be addressed through dedicated design and infrastructure.
- 7. Road safety approaches are needed that target particularly high-risk groups, and are adaptive to changing travel and mode patterns over time.** While fatalities have dropped among car occupants, they are rising among cyclists and motorcyclists and require special attention. Along with pedestrian fatalities, cyclist and motorcyclist fatalities are disproportionate to the number of people making use of these modes of transport. This demonstrates the need for road safety strategies and actions to target the specific safety needs of vulnerable road users. Furthermore, to maintain road safety gains over time, interventions must be maintained, and improvements in infrastructure continued.

6.1 Recommendations for further research

This case study contributes to the emerging field of political economy in the urban transport sector, specifically on road safety issues. This section presents several recommendations for further research opportunities regarding the study of road safety and the political economy of urban transport from the perspective of urban space issues, allocation of road space for all road users and the power relationships between institutions and key actors:

1. **Gender.** This case study found that the gender perspective on road safety is an emerging issue regarding road safety outcomes and public policy design for urban transport. Interviewees suggested that gender is becoming a priority in the policy agenda. Research could investigate the differences in road safety outcomes on transportation modes by gender. Further studies could consider if – and how – gender is considered in the formulation and implementation of public and identify opportunities for improvement.
2. **Socioeconomic impacts.** Our analysis found that more severe crashes take place in poorer areas of Bogotá, which have less well-developed infrastructure, and that injuries and fatalities are concentrated among people walking and riding bicycles and motorcycles, who also tend to be from lower income groups than car occupants. Further research on the relationship between socioeconomic status and traffic fatalities could help inform future political and technical action on road safety.
3. **Drivers of investment and prioritisation.** This case study identified the level of investment by each mayoral administration by organising the different programmes and projects for each emerging theme identified in the qualitative data analysis. Based on this data, we recommend conducting further research on the political process within each administration to disaggregate the dynamics within and across administrations. Further studies could look at the evolution of road safety indicators, prioritisation within and across administrations regarding road safety indicators, and changes over time according to the investment levels identified in this study.
4. **Sustainability.** Policies and programmes implemented across administrations in conjunction with national regulations influenced road user behaviour and fatalities. The maintenance of a stable fatality rate in Bogotá, and perhaps even its further reduction, face challenges. The political economy of road space in terms of segregation of road users has shown issues such as the conflict between non-motorised and motorised transport users. In addition, the sustainability of these changes on road users' safety is threatened by increasing motorisation, especially of motorcycles. We therefore recommend further research into the sustainability of the measures implemented, the study of new indicators in addition to the number of traffic victims and further exploration of the distribution of urban space between road users.
5. **Mass transit investments.** The case of the expansion of the BRT system and the long-term process regarding the design and implementation of a heavy rail network in the city is deserving of a dedicated case study. We recommend the development of a second phase of the Harvard case study regarding the 'Battle of Avenue Septima' from a political economy perspective by including the discussions and differences across administrations towards the design and implementation of the heavy rail project. We also recommend including the dynamics related to the level of involvement and tensions between the national and local government regarding this type of infrastructure investment as part of the political economy analysis of mass transit investments in Bogotá.
6. **Built environment.** One key finding from this case study is the differences in interviewees' perceptions of the influence of infrastructure investments in urban transport on road user behaviour. Further studies could look at the influence of the built environment on road collisions. We recommend a study to calculate probabilities of road collisions and the fatalities or serious injuries based on the data generated in Bogotá, to test hypotheses suggested by participants in terms on how the infrastructure and built environment attributes might influence road safety outcomes.
7. **Technology.** The introduction of modern technologies for traffic enforcement should also be investigated. Also, the evolution of modern technologies in vehicles is an important aspect related to safety, especially in the case of motorcycles. We recommend conducting further studies looking the influence of new enforcement technologies on road users and the police in terms of effectiveness. We also recommend further studies looking at the impacts of new regulations on vehicle technologies aiming to reduce the risk exposure of road users on a road collision.
8. **Transit network.** The introduction of the BRT system formalised much of the bus network and reduced dangerous competition between drivers. We recommend conducting a comparative analysis between the formal transit system – which includes the BRT and the city's blue buses that are part of the formal Sistema Integrado de Transporte Público (SITP) system – and the 'semi-formal' transit system, which is known as 'SITP Provisional', to examine the political economy of the formalisation of semi-formal conventional buses in the city and the dynamics between the public and private sectors on this process. Furthering the understanding of how vested interests were overcome to improve and formalise the system could inform how this could be achieved on a broader scale throughout the transport system.
9. **The Fondo de Prevención Vial.** This has played a significant role in road safety education for Bogotá. This fund, which was initially financed and managed by the private sector, has now been integrated into the national government structure, but uncertainty remains about the implications of this. Further research to understand both why this change was made, and to monitor its impact on road safety in the future would be useful information for people working on road safety in Bogotá.

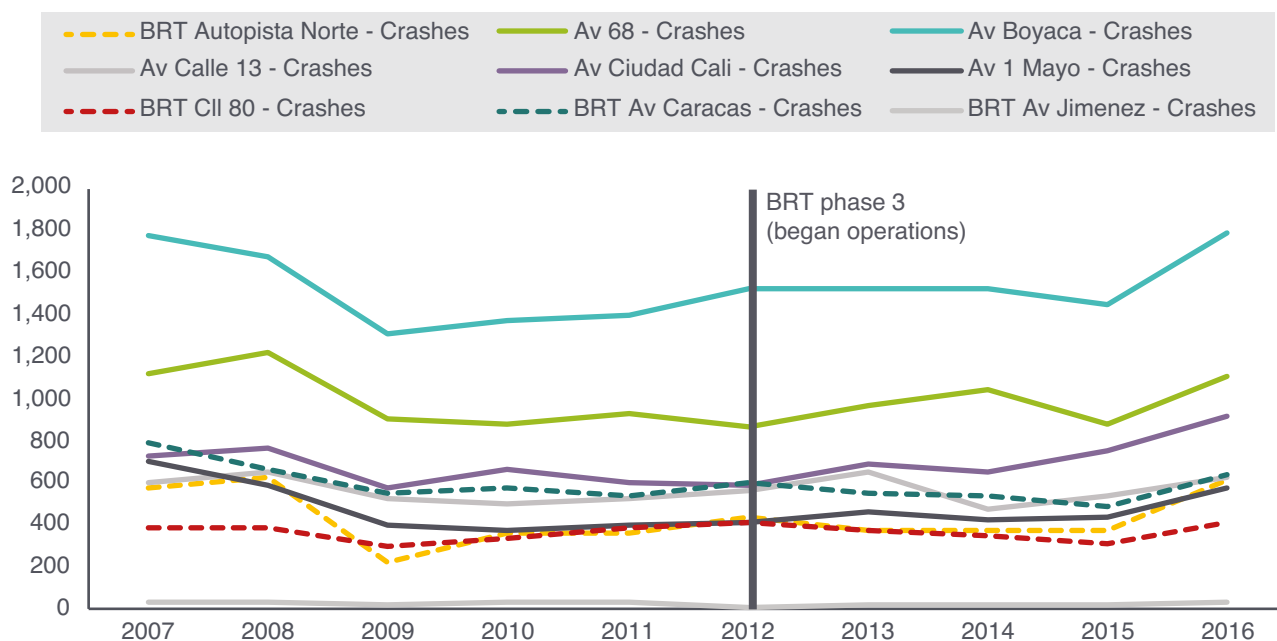
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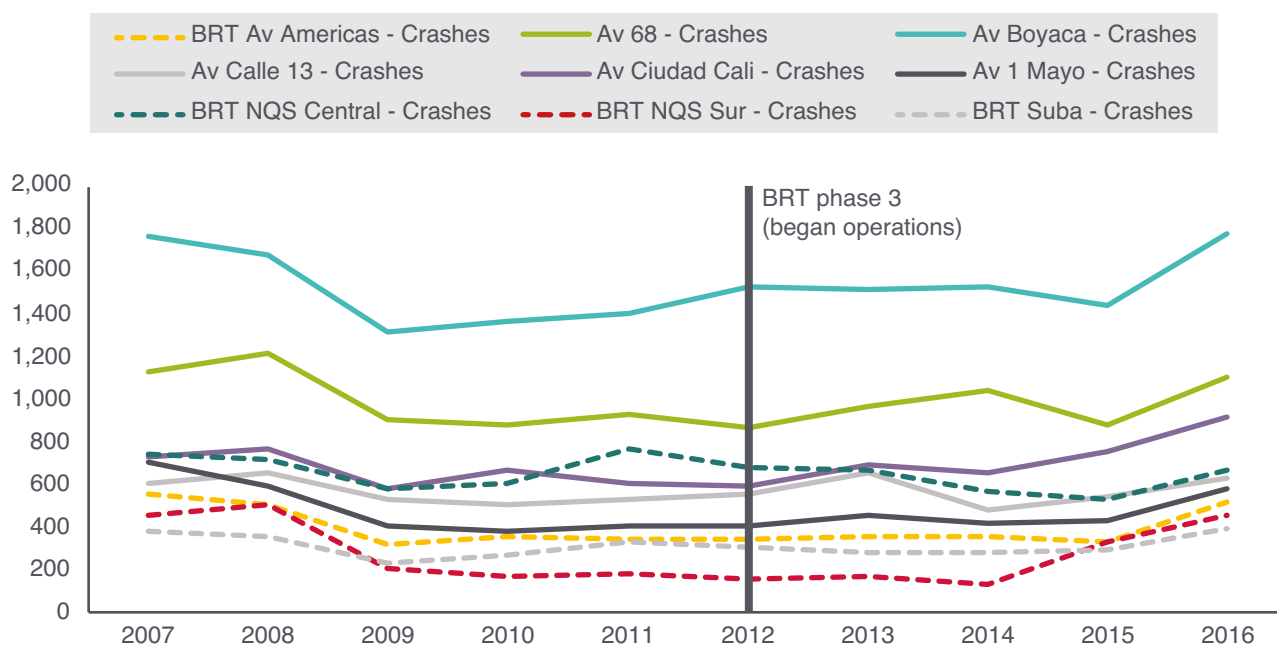
Annex

Figure A1 Total number of road collisions on BRT corridors phase 1 and arterial roads, buffer 35 metres (2007–2016)



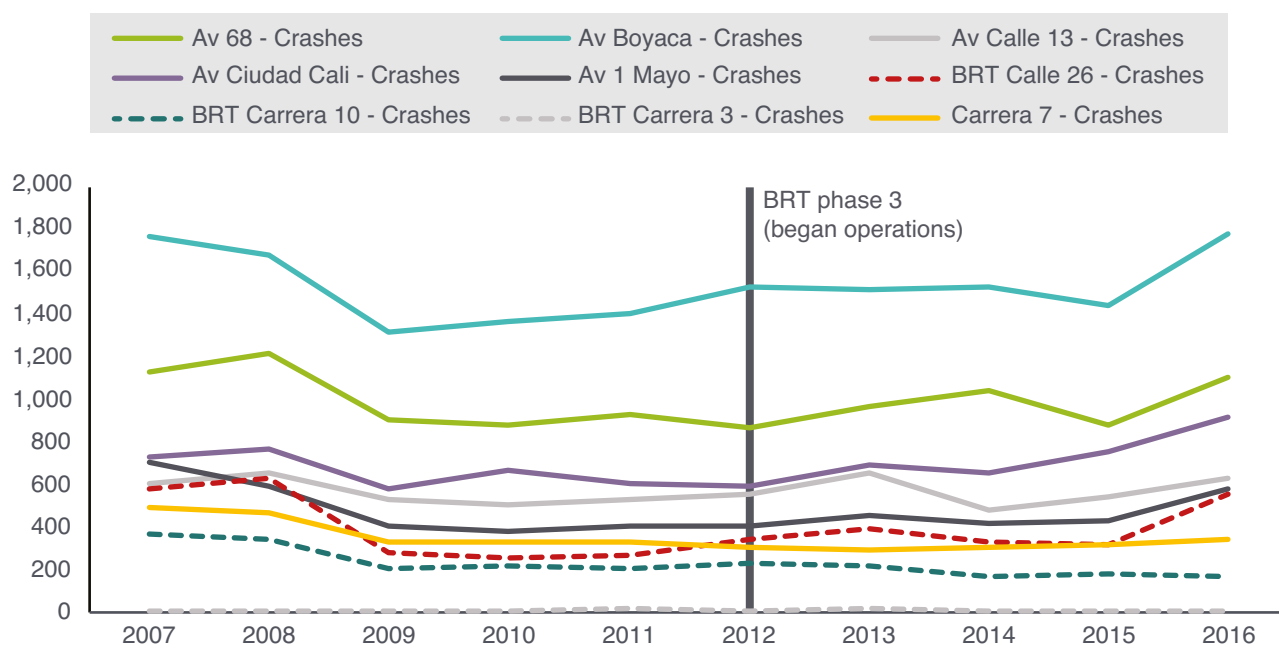
Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure A2 Total number of road collisions on BRT corridors phase 2 and arterial roads, buffer 35 metres (2007–2016)



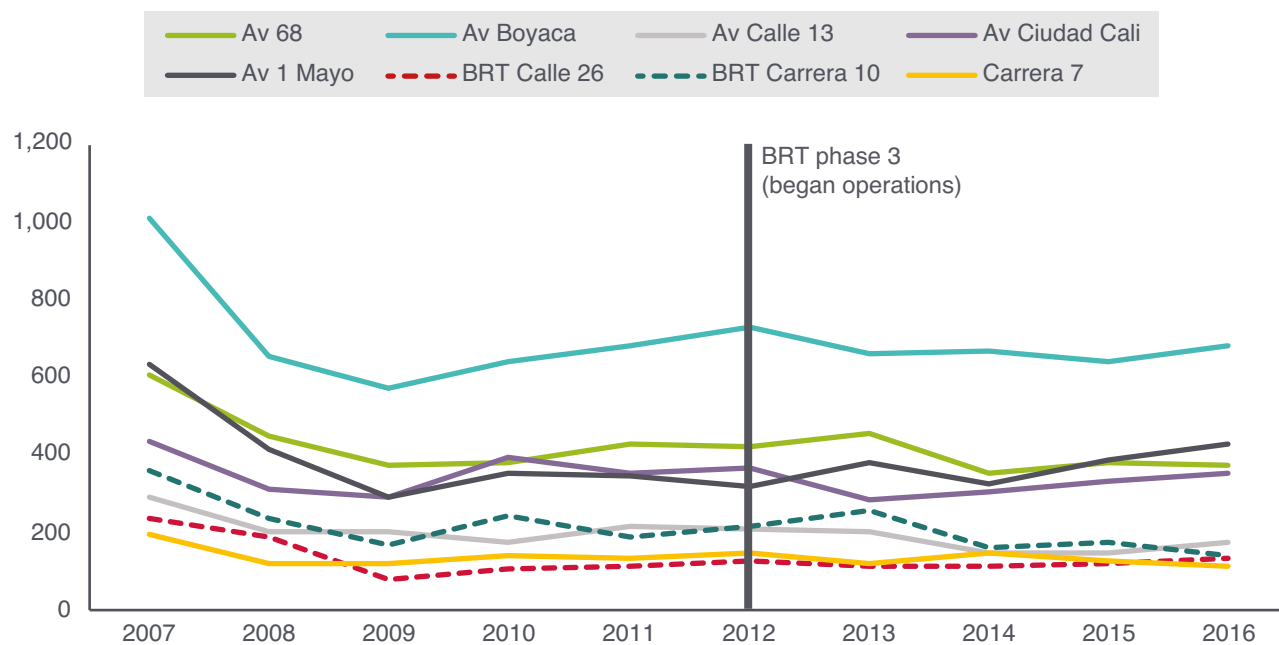
Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure A3 Total number of road collisions on BRT corridors phase three and arterial roads, buffer 35 metres (2007–2016)



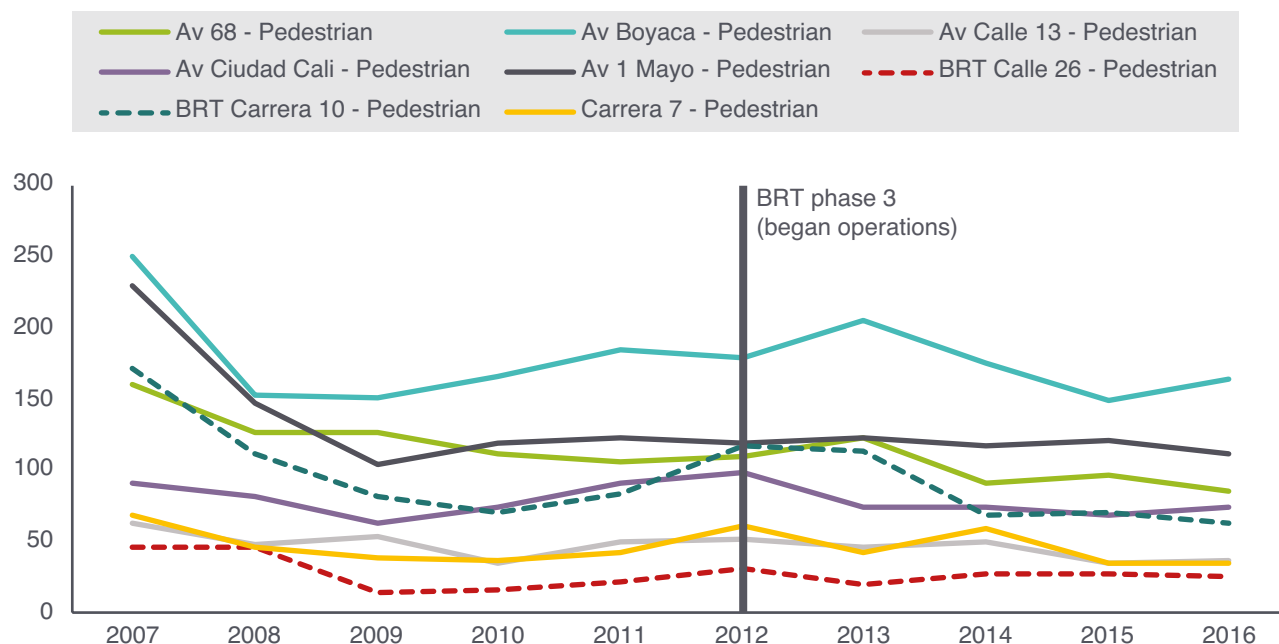
Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure A4 Total number of injured victims in road collisions on BRT corridors phase three and arterial roads, buffer 35 metres (2007–2016)



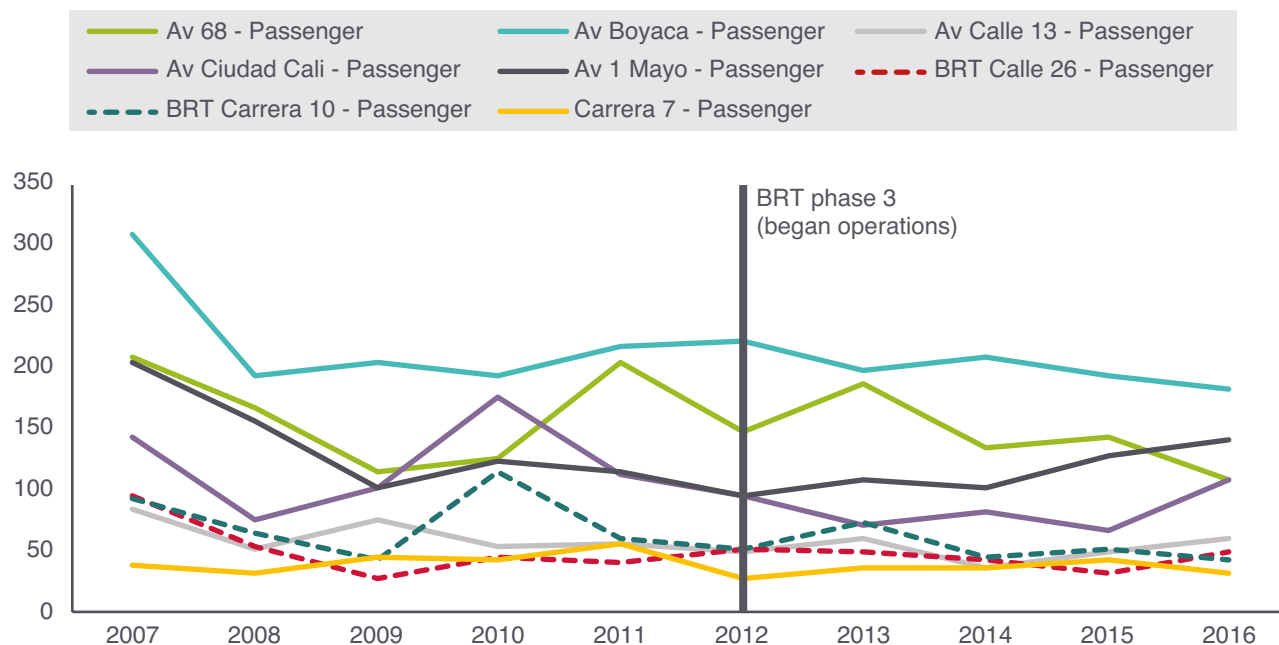
Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure A5 Total pedestrians injured in road collisions on BRT corridors phase three and arterial roads, buffer 35 metres (2007–2016)



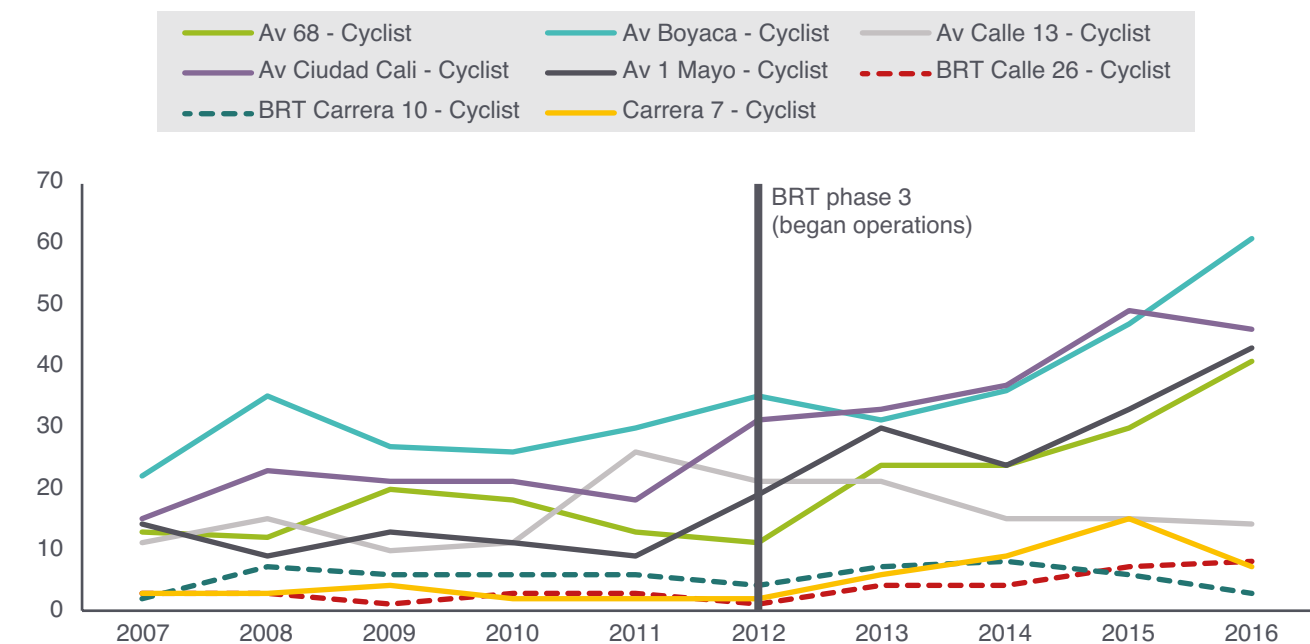
Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure A6 Total passengers injured in road collisions on BRT corridors phase three and arterial roads, buffer 35 metres (2007–2016)



Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Figure A7 Total cyclists injured in road collisions on BRT corridors phase three and arterial roads, buffer of 35 metres (2007–2016)



Source: Secretaria de Movilidad, 2016 (data processed by Vergel-Tovar).

Table A1 National Road Traffic Code (Law 769 of 2002) and topics related to road safety

Section	Main topics directly related to road safety
Principles	<ul style="list-style-type: none"> Regulations aim to secure the safety of road users.
Definitions	<ul style="list-style-type: none"> Roads (adequate levels of safety and comfort) Seatbelt (prevention device in vehicles) Safety and prevention equipment (required in vehicles)
Authorities	<ul style="list-style-type: none"> The National Government will regulate the technical training, professional experience in education required for civil servants or transport authority. The Ministry of Transport will develop a National Road Safety Plan. The National Police will regulate the functioning of the Training and Specialization Road Safety Division. The Ministry of Transport will contribute to the development and functioning of the School for Training and Specialization Road Safety Division.
Vehicles	<ul style="list-style-type: none"> All vehicles must include a prevention and safety equipment in order to circulate along all roads nationwide. Freight transport vehicles must comply with toad safety regulations (vehicle and cargo).
Technical and mechanical review	<ul style="list-style-type: none"> Vehicle owners must comply with optimum mechanical and safety conditions of his/her vehicles to circulate along all roads nationwide.
General rules and education	<ul style="list-style-type: none"> It is an obligation of educational programs to develop courses previously designed by the National Government on road safety and traffic as part of the curriculum at pre-school, basic, secondary and media level education. The Ministry of Transport has 12 months to issue the regulation regarding the development of these educational programs and manuals.
Pedestrians	<ul style="list-style-type: none"> Pedestrians must not invade the area assigned to motorised vehicles, neither circulate on skates or skateboards or similar devices. Pedestrians must not do any of the following: i) carry out without precautions any elements that could obstruct or affect road traffic; ii) cross through prohibited sites or rail roads; iii) to stand in front or behind an engine on vehicle; iv) hang from vehicles in movement; v) risky behaviour for his/her own physical safety; vi) cross a road trough vehicular traffic at places located close to designated pedestrian crossings; vii) occupy the safety buffer area of rail roads (12mts); viii) board and off-board a vehicle in movement at any circumstances; ix) circulate through railways tunnels, bridges and viaducts
Penalty fees sanction	<ul style="list-style-type: none"> Those violating traffic norms will be sanctioned with penalty fees according to violations conducted by different transportation modes (a group of sanctions 1 (4 minimum legal daily salaries): non-motorised vehicles and animal traction) – 12 sanctions; ii) group of sanctions 2 (8 minimum legal daily salaries): driver/owner of private vehicle – 23 sanctions; iii) group of sanctions 3 (15 minimum legal daily salaries): driver/owner of private vehicle – 39 sanctions; iv) group of sanctions 4 (30 minimum legal daily salaries): driver/owner of private vehicle 5 (30 minimum legal daily salaries) – 15 sanctions; v) group of sanctions 5 (30 minimum legal daily salaries): driver/owner of private vehicle 5 (45 minimum legal daily salaries) – 4 sanctions.
Enforcement	<ul style="list-style-type: none"> The enforcement of sanctions because of road traffic violations will be conducted by road traffic authorities where the violation took place. The traffic authorities will be invested in coactive jurisdiction to enforce the payment, in case it will be necessary and the penalty fees will prescribe three years after the violation occurred. The road traffic authorities will adopt indispensable measures to facilitate the payment and collection of penalty fees payments and any other rights in their favour. Penalty fees will be the exclusive property of the road traffic authorities where the violation took place. The destination of payments collected from penalty fees will be devoted to road traffic, education, equipment's provision, gas and road safety plans, apart from the Colombian Federation of Municipalities and other private entities who are also designated to participate in the administration, processing, collection and distribution of penalty fees.



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Cover photo: TransMilenio buses, part of Bogota's bus rapid transit system, travel down lanes separated from regular motorised traffic © Claudio Olivares Medina, 2012.



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