MANAGING SPEED

World Health Organization

DECADE OF ACTION FOR ROAD SAFETY 2011-2020

Save Lives #SlowDown

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Introduction

Road transport systems have contributed enormously to the development of most countries in the world. By improving people's ability to access education, employment and health care and enhancing the efficiency of businesses to provide goods and services, such systems have resulted in a number of positive economic and social benefits.

However, there are also adverse consequences resulting from ever expanding road transport systems and the services they facilitate. Rapid motorization has frequently been accompanied by corresponding increases in road traffic deaths and injuries, while many urban areas now face the additional challenges of increasing levels of air pollution – and associated rises in respiratory diseases – and increasing congestion, which in turn are linked to reduced levels of physical activity and other health consequences.

Speed has a positive effect on mobility in terms of reducing transport times, but it impacts negatively on road safety, affecting both the likelihood of a road traffic crash and the severity of its consequences. Speed also has adverse effects on levels of environmental and noise pollution, and the "liveability" of urban areas.

Over the last decade, along with greater global attention to reducing speed as part of efforts to reduce road traffic deaths and injuries, there has been a growing movement – often instigated at local level – concerned with strategies to manage speed in communities, and the potential benefits in terms of safer and more liveable streets.

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Road traffic injuries: a global health and development problem

Approximately 1.25 million people die every year on the world's roads as a result of road traffic crashes. They are the number one cause of death among young people aged 15–29 years. As well as the public health impact of road traffic injuries, the disproportionate impact of road traffic crashes on the younger age groups makes them an important development problem: road traffic crashes are estimated to cost countries approximately 3% of their GDP, with the economic losses in low- and middle-income countries equivalent to 5% of GDP.

Road traffic deaths are not evenly distributed around the world. Low- and middle-income countries represent 90% of the world's road traffic deaths, although people in these countries only own around half of the world's vehicles. The risk of dying on the roads also depends in great part on where people live: Europe has the lowest number of road traffic deaths per 100 000 population while Africa has the highest rate (see Figure 1).

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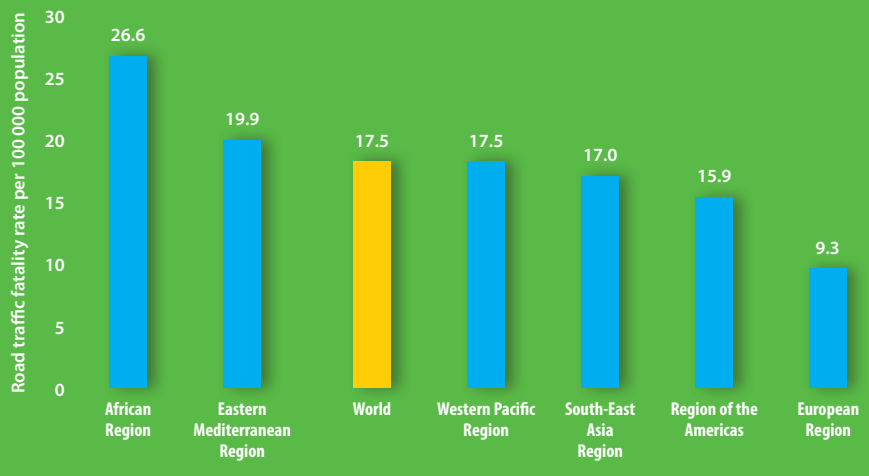
FIGURE 1
Road traffic fatalities per 100 000 population, by WHO region

Source: *Global status report on road safety 2015*. Geneva, Switzerland, WHO, 2015.



As well as disparities in rates, the distribution of road user deaths varies considerably between and within regions. At a global level, about half of all road user deaths (49%) are among vulnerable road users, i.e. pedestrians, cyclists and motorcyclists. However, this distribution varies considerably by region and by country, revealing common transport modes. In countries in the African region, for example, where walking and cycling are an important mode of transport for a large proportion of the population, 38% of deaths are among pedestrians, while in the South-East Asia and Western Pacific regions, motorcyclists comprise the majority of road traffic deaths (33% and 34% respectively).

A global response to road safety

In 2011 the United Nations declared a Decade of Action for Road Safety, which had the target of stabilising and then reducing the number of global road traffic deaths. In September 2015, this goal was augmented by a much more ambitious target within the Sustainable Development Goals[1] which, within its health goal, calls for a reduction in the absolute number of road traffic deaths and injuries by 50% by 2020 (see Box 1).

[1] http://www.un.org/sustainabledevelopment/sustainable-development-goals/

BOX 1

Road safety in the 2030 Agenda for Sustainable Development

SDG Goal 3: Ensure healthy lives and promote well-being for all at all ages
Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents.

SDG Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all.

A 5% cut in average speed can result in a reduction of 30% in the number of fatal road traffic crashes.

A safe systems approach to road safety

Although road traffic injuries have been a leading cause of death and injury globally for many years, most road traffic crashes are both predictable and preventable. There is considerable evidence on interventions that are effective at making roads safer: countries that have implemented these interventions have seen corresponding reductions in road traffic deaths. The most successful examples of where sustained reductions in the numbers and rates of road traffic deaths have been achieved are where a "safe systems approach" has been implemented (see Figure 2). This approach to road safety recognizes that the human body is highly vulnerable to injury and that humans make mistakes. A set of complementary interventions are put into place to create safer roads, safer vehicles, safer speeds, and safer behaviour by road users. Together these elements work to accommodate driver error. All parts of the system need to be strengthened so that if one part of the system fails, other parts will still protect people involved. Adopting a safe systems approach necessitates the involvement and the close collaboration of many sectors including transport, health, police, industry and civil society.

FIGURE 2
The safe systems approach to road safety

Source: *Safer roads, safety Queensland. Queensland's road safety strategy 2015-21*. Department of Transport and Main Roads, Queensland Government, Australia, 2015.

Speed and road traffic injuries

Speed is at the core of the road traffic injury problem. More particularly, excessive or inappropriate speed is a key risk factor for road traffic collisions, deaths and injuries. Excessive speed is a problem common to all countries. A study among OECD countries showed that typically, 40–50%, and up to 80%, of drivers were driving above the posted speed limits, while a similar proportion of vehicles travelling at excessive speed has been found in low- and middle-income countries.

Excessive speed is when a vehicle exceeds the posted speed limit for a particular road.

Inappropriate speed is when a vehicle travels at a speed that is unsuitable for the prevailing road, weather and/or traffic conditions but within the speed limits.

What is the contribution of speed to road traffic deaths and injuries?

In high-income countries, speed contributes to about a third of deaths on the roads. In the United Kingdom, for example, speed is responsible for 28% of all road traffic crashes resulting in deaths, while this figure is 30% in Australia. In low-and middle-income countries this proportion is likely to be greater, given the higher proportion of deaths among vulnerable road users.

What is the effect of speed on a crash and the severity of road traffic injuries?

Speed is a contributing factor in the severity of all road traffic crashes. As average speeds rise, so too does the likelihood of a crash resulting in injury. If a crash does happen, the risk of death and serious injury is higher at higher speeds. An increase of 1 km/h in mean vehicle speed results in an increase of 4–5% of fatal crashes. While those travelling in vehicles are much more likely to be injured in both frontal and side impact collisions when travelling at high speeds, the relationship between speed and injury severity is particularly critical for road users who are "vulnerable", i.e. pedestrians, cyclists and motorcyclists, as well as for children and the elderly.

An adult pedestrian has less than a 20% risk of dying if struck by a car travelling below 50 km/h, but almost a

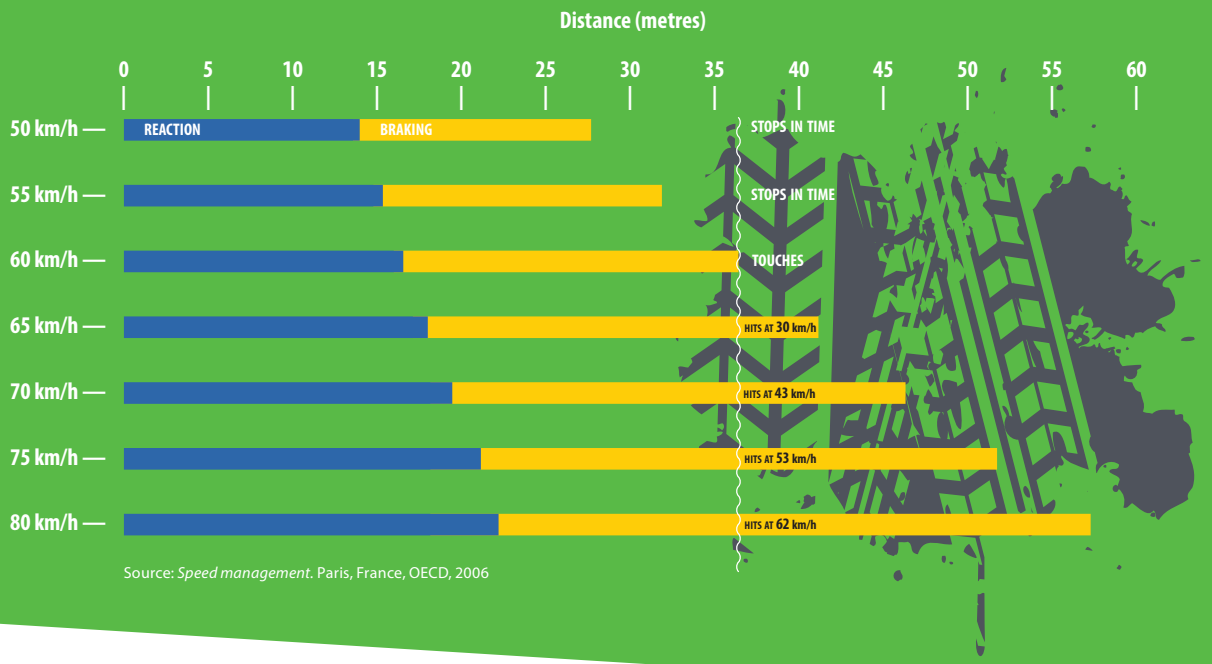
60%

risk of dying if hit at 80 km/h.

What is the relationship between speed and stopping distances?

The higher the speed of a vehicle the greater the stopping distance required, and hence the increased risk of a road traffic crash. For instance, when travelling at 80 km/h on a dry road, it takes around 22 metres to react to an event (the distance travelled during a reaction time of approximately 1 second) and a total of 57 metres to come to a standstill, while at 50 km/h, it takes around 14 metres to react to an event, and a total of 27 metres to come to a standstill (see Figure 3). The latter speed would allow a vehicle to stop in time, successfully avoiding a crash.

FIGURE 3
Stopping distance at different speeds (including reaction time of around 1 second)

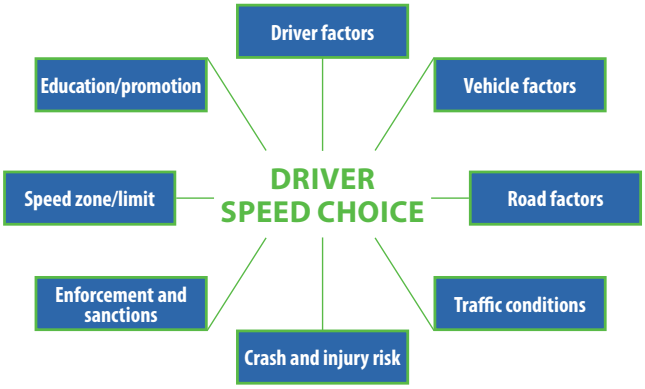


Source: *Speed management*. Paris, France, OECD, 2006

What are the factors which influence speed?

In addition to the speed limit posted on a road, a driver's speed is influenced by a number of other factors such as the driver's age and sex: in most countries male drivers and young drivers are more likely to speed and are therefore over represented in speed-related crashes. Other factors that may influence speed are the driver's blood alcohol concentration, and those related to the road layout and surface quality as well as the power and maximum speed of the vehicle (see Figure 4).

FIGURE 4
Factors affecting speed choice



Source: *Speed management: a road safety manual for decision-makers and practitioners*. Geneva, Switzerland, GRSP, 2008.

Speed management

Speed management encompasses a range of integrated measures that together bring road users to a safe speed, and consequently reduce the number of road traffic crashes and the serious injury and death that can result from them.

Safety must lie at the heart of speed management, yet governments and those involved in speed management at local level frequently face challenges when balancing mobility and safety. However, shifting the emphasis towards safety is at the heart of the safe system approach – a system that underpins successful speed management in high-performing road safety countries such as Sweden, and in local communities that have successfully implemented local speed management programmes (see Box 3).

Governments are increasingly recognizing the need for action to address the problem of speed because of its contribution to their road traffic problem, high pollution levels, or both these factors. With appropriate political support, speed management strategies can make a real contribution to achieving the goals of improved road safety, reducing environmental impacts and moderating energy consumption.

Speed management needs to employ a range of measures which include setting and enforcing appropriate laws, modifying roadways and adapting vehicles (see Table 1). Defining these measures requires considering factors such as the volume and traffic mix on particular roads. For example, speed management in countries with a high proportion of pedestrian deaths, as in many African countries, may comprise different interventions to strategies used in areas where most deaths are among motorcyclists. For optimal effectiveness, these measures should be implemented in combination, and based on a thorough assessment of the country or local circumstances. Garnering political will – at national and/or local levels – and coordination across responsible authorities to implement these interventions are critical.

TABLE 1
Approaches to managing speed

i. Building or modifying roads to include features that calm traffic
ii. Establishing speed limits appropriate to the function of each road
iii. Enforcing speed limits
iv. Installing in-vehicle technologies
vi. Raising awareness about the dangers of speeding

i. Building or modifying roads to include features that calm traffic

Speed management measures should be reflected in road design or redesign. Features that limit speed include roundabouts, speed bumps, chicanes and rumble strips. While each of these approaches may be put in place as separate interventions, they are usually constructed together as part of a traffic calming scheme in order to achieve an appropriate speed for a specific road. Best practice suggests that when motorized traffic mixes with pedestrians and cyclists, travelling speeds should be under 30 km/h (see Box 2). Speeds higher than this should be permitted only when the roadsides are safe, median separation exists, intersections are designed appropriately and different road users are separated.

BOX 2

Saving pedestrian lives in New York City

In the United States, New York City's ambitious target of reducing annual road traffic fatalities by 50% by 2030 aims to save 1600 lives between 2007 and 2030. To achieve this the city has installed pedestrian countdown signals at 1500 intersections citywide; implemented 75 additional 20 mph (32 km/h) school speed zones; developed a pilot programme for neighbourhoods of 20 mph zones; enforced speeding laws along major traffic corridors; and used mass media campaigns to engage and inform the public. Depending upon the specific intervention being assessed, these measures have been credited with reducing pedestrian collisions and total road traffic crashes by 25–51%.

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ii. Establishing speed limits appropriate to the function of each road

Setting speed limits at national, urban and local levels appropriate to the function of each road is an important step in reducing speed. In addition to the road function, the following need to be taken into account when establishing speed limits:

- the type and mix of road users;
- the safety quality of the road infrastructure; and
- the crashworthiness and crash avoidance capabilities of vehicle fleets.

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A safe speed on roads with possible conflicts between cars and pedestrians, cyclists or other vulnerable road users is 30 km/h (see Table 2). To achieve these safe speeds, local authorities should have the legislative power to reduce limits as needed to better protect all who use the roads. In addition, drivers should be informed of limits through sign-posting the legal speed limit on roads and rigorously enforcing the law.

TABLE 2
Safe speeds for a number of road types and their potential conflicts

Type of road	Safe speed
Roads with possible conflicts between cars and unprotected users	30 km/h
Intersections with possible side-on conflicts between cars	50 km/h
Roads with possible frontal conflicts between cars	70 km/h
Roads with no likelihood of frontal or side-on conflicts between road users	≥100 km/h

Source: Tingvall and Haworth, 1999.

BOX 3

Reducing speed around primary schools in Dar es Salaam

The majority of children in African cities walk to school. As such, ensuring that vehicles travel at appropriate speeds around such areas is extremely important to reduce the risk of road traffic injuries among children. Amend's School Area Road Safety Assessments and Improvements (SARSAI) programme improves child safety around primary schools in towns and cities in several African countries, including in Dar es Salaam, United Republic of Tanzania. There SARSAI assesses the areas around the city's 360 public primary schools, identifies measures to improve road safety, and implements those measures with the support of relevant authorities. This includes improvements in infrastructure, such as speed bumps, footpaths, signage and bollards to delineate pedestrian areas. By introducing these modifications to the infrastructure around the schools, the programme helps to ensure safety by reducing vehicle speeds to 30 km/h or less and providing safe walking spaces. The programme is proven to be effective: a recent case–control impact study on road traffic injury rates showed a 26% absolute reduction in road traffic injuries among children. The study also demonstrated that for every 286 children whose school is part of the SARSAI programme, one road traffic injury is prevented every year.

iii. Enforcing speed limits

Enforcement is essential to make speed limits effective. Indeed, where countries have changed their speed limits, but have taken little action to enforce them, there have been very limited benefits. The enforcement of speed limits takes different forms in different contexts and includes manual and automated approaches.

- Manual speed control usually involves a stationary observation unit (a marked or unmarked police car) equipped with a speed measurement device, and, further down the road, another police unit tasked with stopping the speeding vehicle and issuing a fine to the driver.

- Automated speed control uses fixed and mobile cameras which may either be visible (overt) or hidden (covert) (see Box 4):
  - Fixed cameras are installed in a specific location, usually in a box mounted on a pillar.
  - Mobile cameras are installed in police vehicles, and are operated by trained police officers.

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Evidence has shown that enforcement through the use of automated speed control is most-effective at reducing speeds. No matter which method is used, the consequences for violating speed limits should be clearly stated in related laws and regulations, and may include financial penalties, demerit points and license suspension. As well as ensuring that fines are appropriate to act as a deterrent to breaking the law, in many countries – notably where legislation has not previously been accompanied by enforcement – particularly visible and high levels of enforcement may be needed to persuade the public that breaking the law in the future may well result in a swift penalty. A number of police forces around the world have adopted enforcement methods based upon an "anywhere, anytime" approach to deter all speeding on the network. The message is clear: speeding is illegal and unacceptable behaviour, and at odds with the interests of the community.

BOX 4

Enforcing speed limits in France

For the past 15 years, the Government of France has made significant progress in road safety. This was in response to the high road traffic fatality rates in the country as compared to those of other high-income countries in Europe at the time. In 2002, the Government announced its plans to implement automated speed enforcement programmes, combined with more severe penalties for traffic violations. The public was informed about these new measures through the media. Following a trial period, the first photo radar devices were installed on French roads in November 2003. About 500 radar devices were added each year and by 2010 more than 2756 speed cameras – 1823 fixed devices and 933 mobile devices – were in operation. Fixed devices were generally installed close to "black spots" or areas experiencing high levels of excessive or inappropriate speed, whereas mobile devices were used in various contexts based on the local knowledge of police officers. An evaluation of the programme demonstrated that between November 2003 and December 2010 about 15 000 road traffic deaths and 62 000 road traffic injuries were averted. Since 2014 road traffic death rates in France have, however, begun to increase again and the Government is introducing additional speed management strategies, both at national and local levels. Grenoble, for example, is the first French city to reduce the entire city speed limit to 30 km/h, through posted speed limits as well as a number of traffic calming measures, with the aim of improving road safety and reducing air pollution.

iv. Installing in-vehicle technologies

Vehicle safety technologies can greatly help improve safety on the road.

- Intelligent speed assistance (ISA) can help improve drivers' compliance with speed limits by alerting them when they are travelling above the posted speed limit. The standard ISA system uses an in-vehicle digital road map onto which speed limits have been coded, combined with a satellite positioning system. There are different versions of ISA (advisory only, supportive and limiting) and the level at which the system intervenes to control the speed of the vehicle varies.

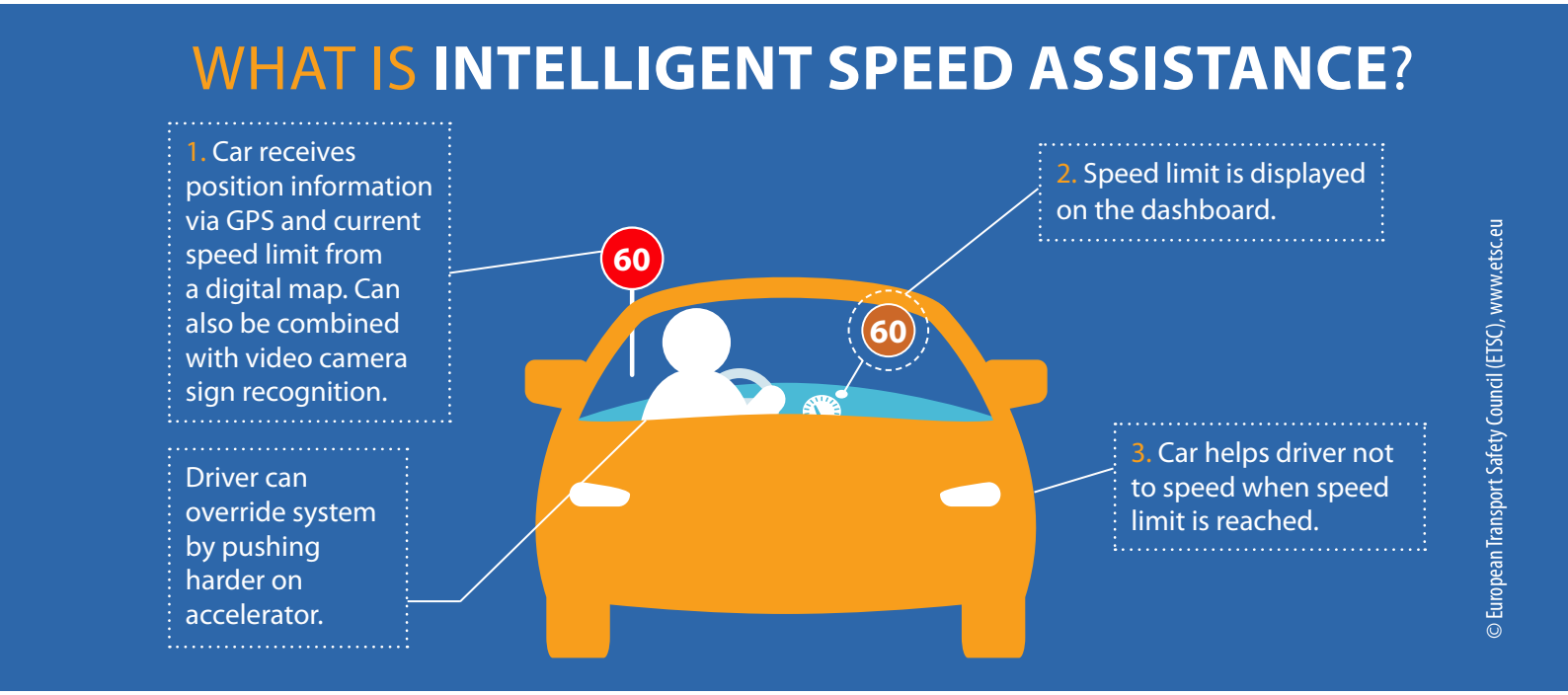
- Autonomous emergency braking (AEB) can help drivers avoid or mitigate collisions with other vehicles or vulnerable road users. The three versions of AEB (city, inter-urban and pedestrian) help provide constant monitoring of the road ahead and can assist the driver by automatically applying the brakes if they do not respond immediately to a potential crash situation (see Box 5).

BOX 5

Ensuring in-vehicle technologies in the United States

Accelerating the penetration of proven life-saving vehicle safety technologies into the global fleet helps to reduce the number of people killed and seriously injured on the world's roads. This can be achieved through regulatory action by government or by voluntary commitment from manufacturers to make these technologies a standard feature of all vehicles. In the United States, twenty vehicle manufacturers representing 99% of the country's auto market have committed to make AEB a standard feature in all new cars by no later than 2022. Their action was initiated ahead of any regulatory change by the Government. In addition to governments and manufacturers, consumers can also play a part by purchasing a vehicle fitted with these technologies.

Further development of these and other technologies and implementation by vehicle manufacturers would reduce fatal and serious road traffic injuries.



v. Raising awareness about the dangers of speeding

Mass media campaigns linked to the other approaches to speed management not only raise awareness about the dangers of speeding, but also gain greater public support for new legislation, stricter enforcement and stronger penalties. Campaigns thus make it easier for governments to act by reducing some of the resistance that they might otherwise encounter. When a community becomes convinced that speeding is unacceptable, it will be more willing to support speed reduction measures as well as other more general road safety interventions (see Box 6).

BOX 6

Community support drives action on speed management

Driving a mile through our streets at 20 mph instead of 30 mph adds just 60 seconds

Myra James was an environmental and sustainable transport campaigner in Hebden Bridge, a market town in the Calderdale area of the North of England. In 2013 she formed a local "20's Plenty for Calderdale" campaign to specifically ask for a community-wide 20 mph limit on roads. After a successful meeting with the politician responsible for transport, it was recognised that showing community support would be an important part of any speed limit change policy. She widened the campaign and activated other community groups by promoting the benefits for walkers and cyclists and the young and elderly as well as for the environment in terms of reductions in emission and noise that come with lower speeds. It became clear to politicians and Calderdale Council officials that there was strong community support for 20 mph limits. In May 2014 the decision was made by the Council to adopt a 20 mph limit for most urban and village roads across Calderdale and started a phased change of the legal speed limit for most roads from 30 mph to 20 mph through Traffic Regulation Orders. At the 2017 national 20's Plenty for Us conference, Calderdale Council's Director of Public Health presented the results of the campaign: a reduction in casualties of 22% since the introduction of the new speed limits and sustained support from the community for the scheme with surveys showing 80% approval. Throughout the campaign, Myra had support and advice from the national 20's Plenty for Us nongovernmental organization and in 2015 Myra was given their Campaigner of the Year award. Calderdale is just one of the many places adopting 20 mph speed limits for residential and urban streets in the United Kingdom.

Conclusion

Easy, quick and relatively low-cost travel is important for people's work and personal lives, and at a national level it is important for development. Over the past few decades, industry has manufactured vehicles that can travel at increasingly high speeds, while the construction of more extensive road networks and related services have also facilitated reducing transport times on the roads. However, these increasing speeds have come at a cost, in terms of increased road traffic injuries, congestion, noise and emission levels.

While much action is taking place at local level in some countries to find strategies to manage speed, more work needs to be done to convince policy-makers and the public of the risks posed by speed, as well as the many benefits of speed management. Countries should develop a comprehensive and integrated policy package of speed management interventions based on a thorough assessment of their situation: such packages are likely to include credible speed limits, enforcement, engineering and education. This document has outlined a number of evidence-based interventions that are shown to be effective at tackling speed, and are likely to form part of such a package. Different approaches and messages are likely to be required for different segments of the driving population.

If every country in the world were to implement speed management as part of a broader set of road safety interventions, progress towards global road safety goals could be made. These efforts would help countries and communities reduce speed-related road traffic crashes, while encouraging non-motorized forms of transport – more (safer) cycling and walking, which in turn have positive health benefits. Speed management initiatives would also help reduce levels of emissions and traffic noise, making streets more liveable.

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FOR MORE INFORMATION PLEASE CONTACT:

WORLD HEALTH ORGANIZATION
MANAGEMENT OF NONCOMMUNICABLE DISEASES, DISABILITY,
VIOLENCE AND INJURY PREVENTION (NVI)
20 AVENUE APPIA
1211 GENEVA 27
SWITZERLAND
PHONE: +41 22 791 2316
http://www.who.int/violence_injury_prevention/road_traffic/en/