



# GLOBAL NCAP

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# DEMOCRATISING CAR SAFETY: ROAD MAP FOR SAFER CARS 2020

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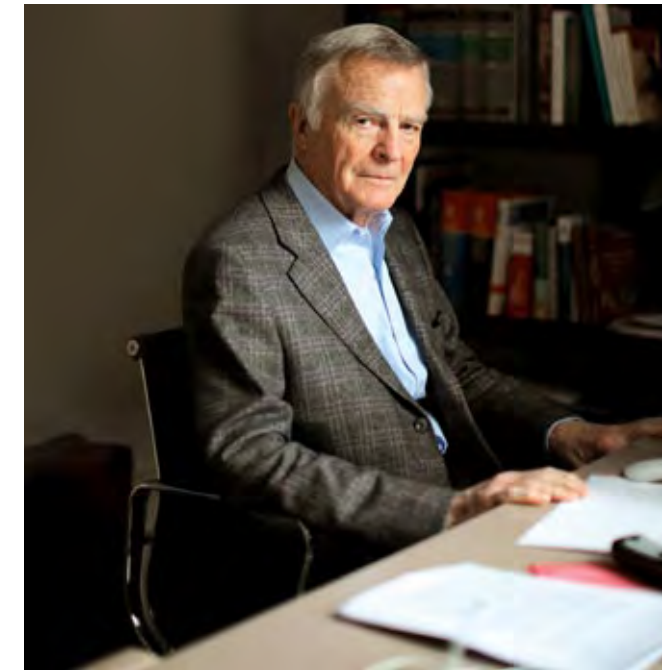
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# FOREWORD



We are living in an era of remarkable progress in car safety. It is now conceivable for some car models to be virtually free of the risk of fatal injury in a typical road crash. Fifty years of engineering innovation stimulated by regulation and consumer awareness, has made passenger cars safer than ever before. Progress did not come easy, however, with determined action needed to mandate safety standards and to give consumers access to the safety information they needed. But it was worth the effort because hundreds of thousands of lives have been saved.

This success story has happened in the high income countries that until recently dominated global car production, sales and use. Today we need to replicate this positive experience in the rapidly emerging automotive markets of middle income countries that now account for around half of the world's passenger car production. That is why promoting safer cars, together with safer roads, and safer road users, are the key features of the current UN Decade of Action for Road Safety. As the mid-point of the Decade is reached it is time to accelerate implementation of policies that will help to avoid so many unnecessary and avoidable fatalities.

So Global NCAP is pleased to publish this Road Map for Safer Cars 2020. Our report proposes action that will sustain improvements in car safety to ensure they are extended across all the world's automotive markets. The technologies and innovation that have already delivered in high income countries must now be made available everywhere. We want to empower consumers, and encourage a market for safety underpinned by the universal application of the UN's most important safety standards. This is our agenda to democratise car safety contributing to a world free from road fatalities. We strongly encourage the United Nations, its Member States, the automotive industry and all interested in road safety to give our Road Map their full support.

MAX MOSLEY  
Chairman, Global NCAP

FRONT COVER: The Nissan Tsuru, a top selling car in Mexico, obtained a poor zero star rating from Latin NCAP in 2013 and would fail to pass the UN's front and side crash test regulations.



The five star result of this Volkswagen up! shows that it is possible for small cars to achieve impressive levels of occupant protection.

# INTRODUCTION

According to the World Health Organisation (WHO) each year 1.3 million people are killed and up to 50 million injured in road crashes worldwide<sup>1</sup>. The global vehicle fleet reached 1 billion in 2010 and is forecast to double in the next ten to fifteen years. This unprecedented increase is occurring in low and middle income countries which account for 90% of total road deaths. About 48% of all traffic fatalities are vehicle occupants; so to avoid a growing global burden of road injury it is essential to improve automobile safety, especially in rapidly motorising regions.

Passenger cars in high income countries are today much safer than ever before. This is the result of many decades of campaigning by safety and consumer rights groups and the efforts of vehicle engineers in the automotive industry. Advocacy and innovation have together made possible a level of car safety many would have thought impossible just a few decades ago. This has saved the lives of hundreds of thousands of people (See Box: Progress Towards Zero Fatalities). The challenge now is to achieve the same positive experience in the rapidly growing automotive markets of the low and middle income countries where the risk of road injury is the highest in the world.

The winning formula for better car safety has been a combination of regulatory “push” and demand “pull”. Government regulation supplemented with consumer information has been the catalyst to build a market for safety and deliver better cars for all. Typically, however, safety innovations are first introduced at the luxury end of the car market. As consumer demand grows they become available more widely across the entire vehicle range, are less costly, and ultimately mandated to be a standard fitment. This final regulatory step ensures that lower cost small cars also have

essential safety features. The powerful effect of regulation and consumer information is, therefore, to democratise safety; guaranteeing minimum standards and empowering all car buyers to choose the safest vehicles they can afford.

The drive for the democratisation of car safety now needs to be extended across all automotive markets worldwide. We cannot expect to meet the life-saving goals of the current UN Decade of Action for Road Safety (2011-2020) if safer motor vehicles are mainly available only in high income countries. A market for safety must also be promoted in the emerging economies where car sales are growing among an expanding middle class. Consumers in these countries will demand and have the right to expect that vital safety technologies become available universally wherever new cars are being sold.

A strategy to achieve this is set out in this Road Map for Safer Cars 2020 which has ten key recommendations. These are summarised on page 55 and include: a package of minimum safety regulations for adoption by the end of the UN Decade, measures to promote a market for safety among car buyers in the rapidly motorising countries, policies to sustain the safety of the vehicles once in use, and a proposed industry voluntary commitment to implement minimum occupant safety standards to all new passenger cars.

If this Road Map is followed by 2020 all new cars in the world would pass the minimum UN standards for crashworthiness and crash avoidance. This would spread the advances in automotive safety technology across all countries, mitigate the risks of rapid motorisation, and help achieve a world free from many avoidable and unnecessary road traffic fatalities.



A UN Regulation 95 side impact test which has helped to improve occupant protection in many high income countries.

## PROGRESS TOWARDS ZERO FATALITIES - CAR SAFETY IN HIGH INCOME COUNTRIES

Motor vehicle occupant fatalities in high income countries are now at record lows. The origins of this remarkable progress can be traced back to the 1960s with the publication of Ralph Nader's landmark publication 'Unsafe at Any Speed'<sup>2</sup> and the signing by US President Lyndon Johnson of the National Traffic and Motor Vehicle Safety Act<sup>3</sup>. This was followed by the creation of the first New Car Assessment Programme by the US National Highway Traffic Safety Administration (NHTSA) in 1979. The subsequent flow of vehicle regulations, and consumer safety rating, first in America and then applied also in Australasia, Europe and Japan has made a huge contribution to improved car safety over the last fifty years.

Since 1975 NHTSA has been assessing the effectiveness of automotive safety technologies required by Federal Motor Vehicle Safety Standards (FMVSSs). The latest study issued in January 2015<sup>4</sup> evaluates virtually all the life-saving technologies introduced in passenger cars, pickup trucks, SUVs, and vans between 1960 and 2012. Seat belts are shown to have been the best at preventing death and injury in a crash having saved more than 330,000 lives. Collapsible steering wheels and airbags together account for a further 123,000 lives saved. The impact of the more recently mandated crash avoidance system electronic stability control (ESC) is also starting to deliver on its fatality reduction potential having already avoided almost 6,200 fatalities. Overall NHTSA estimates that motor vehicle safety technologies have saved 613,501 lives.

Similar progress has been achieved in the European Union (EU), where between 2001 and 2012 there has been a 55% reduction in car occupant fatalities<sup>5</sup>. This improvement is the result of a combination of policies affecting user behaviour (such as seat belt wearing, avoiding speeding & drink driving), better road design, and safer motor vehicles. Passenger car safety benefitted, especially as a result of decisive action by the European Parliament twenty years ago to force the adoption of stringent front and side impact crash test standards<sup>6</sup>. These

came into force in 1998 and have contributed significantly to reducing road fatalities across EU Member States.

In the UK, for example, car occupant fatalities dropped by 56% between 1989 and 2009. According to the Transport Research Laboratory (TRL) safety improvements to vehicles have made the greatest contribution accounting for around 15% of the overall reduction<sup>7</sup>. TRL has also estimated that the number of deaths in 2010 will have been between 18.5% and 20.5% less than would have been the case if there were no improvement in vehicle safety between 2006 and 2010<sup>8</sup>. Another study of crash protection in the UK car fleet published in 2013 concluded that "Cars manufactured after 2008 typically had a crash involvement rate that was 36% below that of cars manufactured in 2000 for the accident year 2011."<sup>9</sup>

Australia also has powerful evidence of gains in occupant protection. A study published in 2014 of vehicle based crash rates in New South Wales over the period 2003–2010 reveal large declines in risk for vehicles built after about 1996<sup>10</sup>. Car safety design and technology improvements appear to have been responsible for a decline in per-vehicle crash risk of at least three percent per calendar year. The study's author Associate Professor Robert Anderson, estimates that occupant fatality risk of cars built in 2010 are 75% lower than for ones built in 1995.

Another report recently published by the Insurance Institute for Highway Safety<sup>11</sup> (IIHS) confirm the rapid pace of improvement in death rates by make and model. Among 2011 models, there were 28 driver deaths per million registered vehicle years through the 2012 calendar year, down from 48 for 2008 models through 2009. Eight years ago, there were no models with driver death rates of zero. But now among 2011 models, a record nine vehicles have driver death rates of zero. So in Australia, the USA, the EU, and in other high income countries, the dynamics of fleet turnover will continue to improve road fatality rates as per-vehicle crash risk reduces still further, even towards zero.

- 1 See [http://who.int/violence\\_injury\\_prevention/road\\_safety\\_status/2013/report/en/](http://who.int/violence_injury_prevention/road_safety_status/2013/report/en/)
- 2 Unsafe at Any Speed, The designed-in dangers of the American automobile, published by Grossman Publishers 1965.
- 3 Signed by President Johnson on 9 September 1966.
- 4 Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960-2012 – DOT HS 812 069, January 2015.
- 5 Ranking EU Progress on Car Occupant Safety, PIN Flash Report 27, April 2014, European Transport Safety Council.
- 6 See: European Parliament Reports 26 June 1995 A4-0160/95 and A4-0161/95 - Rapporteur Mr Alan John Donnelly and 'MEPs stiffen plans for car crash tests' Financial Times 12 July 1995.
- 7 Broughton, J., Allsop, R.E., Lynam, D.A. and McMahon, C.M. (2000). The Numerical context for setting national casualty reduction targets; TRL report 382. TRL Ltd., Crowthorne, UK.
- 8 Broughton, J. (2010) Updated. Casualty Forecasts TRL Ltd. PPR 552.
- 9 Thomas, P. (2013) Developments in the Risk of Crash Involvement and Injury to Car Occupants by Model Year Using Vehicle Specific Exposure Data.
- 10 Anderson RWG, Searson DJ (2014) 'Use of Age-Period-Cohort models to estimate effects of vehicle age, year of crash and year of vehicle manufacture on driver injury and fatality rates in single vehicle crashes in New South Wales, 2003-2010', Accident Analysis & Prevention, 75, pp 202-210.
- 11 Saving lives: Improved vehicle designs bring down death rates, Status Report, Vol. 50, No. 1 January 29, 2015.



# THE INEXORABLE RISE OF GLOBAL MOTORISATION

The road safety challenge facing the world today is closely correlated with the remarkable growth in the use of motor vehicles across the world. In the last ten years there has been a radical transformation in the geography of where automobiles are sold, manufactured, and used. The scale of the rise of motorisation in low and especially middle income countries is dramatic and unprecedented.

In 2005 new passenger car registrations and sales reached 45,209,905<sup>12</sup> with high income countries enjoying the largest share, middle income countries accounting for 26% and low income just 0.1%. By 2013, despite the global financial crisis, new car registration and sales reached a record 62,786,169. Even more impressive has been the increase in the share of middle income countries which has soared to 49%. High income countries account for 51% and low income again just 0.1%.

Since 2005 the low income share has increased by 67% but the absolute number of vehicles remains very low. For middle income countries the increase shared was a remarkable 165% increase!

In parallel to the shift in the pattern of sales and registration there has been a similar relocation of car production. In 2013 the high income countries accounted for 51% of a total of 65,433,287 cars produced. The middle income countries took all the rest at 49% as there is no significant car production in low income countries. Six of the top ten producers are now middle income countries. China leads the way as the world's dominant number one producer

with India, Brazil, Russia, Mexico and Thailand now competing with the EU, Japan, South Korea and the USA. These top ten producing countries were responsible for 92% of all the passenger cars manufactured in 2013. There is a similar concentration of automobile production with the top ten companies (or Original Equipment Manufacturers - OEMs) accounting for 78% of all cars produced in 2013.

Driving this reordered location of production has been a major change in the share of global automobile industry profits. In 2007 middle income countries accounted for €12 billion or 30% but by 2012 this had risen to €31 billion or 60%. By 2020 the profits from middle income countries are forecast to make up 75% of the total<sup>13</sup>.

This transformation of sales and production to an almost 50:50 split between high and middle income countries is rapidly changing the structure of the global car fleet. Ten years ago three quarters of the world's cars were in high income countries. The shares in 2005 were 76% high income, 23.5% middle income and 0.5% low income. By 2012 the middle income countries accounted for 35% and low income 1%.

So in just seven years the middle income countries share of the global car fleet has increased by 91% and in low income by 58%. At this rate of change it will not take many years before the majority of the world's cars will be driving on the roads of the middle income countries.

Safer cars are needed in rapidly motorising low and middle income countries where the risk of road injury is far higher than in high income nations.

This extraordinary growth of automobile production, sales and use is happening in countries where road safety management systems are not yet fully developed and the rate of road fatalities is the highest in the world (see graph opposite). It also exposes a fundamental weakness in the UN's regulatory system. Millions of sub-standard cars that would be illegal in high income countries are being sold in low and middle income countries. And the safety net of global standards is gradually being undermined by the growth in production of new cars in middle income countries which cannot pass the UN's minimum crash tests.

For fifty years consumer and advocacy groups in high income countries fought hard to achieve better standards of automobile safety. But now the fastest growth in car production and sales is in the middle income countries which are much less well regulated and demand for mobility often exceeds consumer awareness of the risk of road injury. The major OEMs are fiercely competing with one another in these most profitable markets. However, the downside of this 'free pass' from regulation is the risk of a deterioration in the standard of the fleet worldwide and a reverse in the steady advance in automotive safety secured over recent decades. On current trends, and in the absence of regulatory harmonisation, this worrying outcome is likely as middle income countries overtake high income as the largest source of new car sales. This will lead to an unnecessary and painful increase in deaths and injuries combined with a heavy burden of avoidable costs these countries can ill afford.

In the most advanced automobile markets of Europe, Japan and the USA there is growing interest in developing fully autonomous vehicle systems that may avoid the risk of having a crash entirely. Important collision avoidance technologies are now available which typically show a 25% crash reduction capability. Regulatory action and measures to promote consumer demand for these technologies is fully warranted. Today's driver assistance systems may in future evolve into tomorrow's driverless cars. However, fascinating as such technological progress may be, cars that drive themselves are unlikely to significantly penetrate the vehicle fleets even of high income countries for many years to come. Consequentially their potential positive safety impact will take a long time to realise and will be largely irrelevant to the growing injury burden of low and middle income countries.

The vehicle safety challenge that warrants much greater attention now is the promotion of safer cars in the rapidly motoring regions of Asia, Latin America, Africa and Middle East. That is why for the rest of this decade Global NCAP believes that the major priority should be to extend the use of existing safety technologies and standards so that they become universal for all new cars regardless of whether they are built in high or middle income countries. This is the opportunity to accelerate the penetration of safer cars worldwide, democratising their life saving potential to all consumers and make a powerful contribution to the UN's efforts to reduce road deaths by 2020 and beyond.



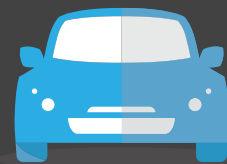
**LOW INCOME COUNTRIES**

Road Deaths per 100,000 population = 18.3



**MIDDLE INCOME COUNTRIES**

Road Deaths per 100,000 population = 20.1

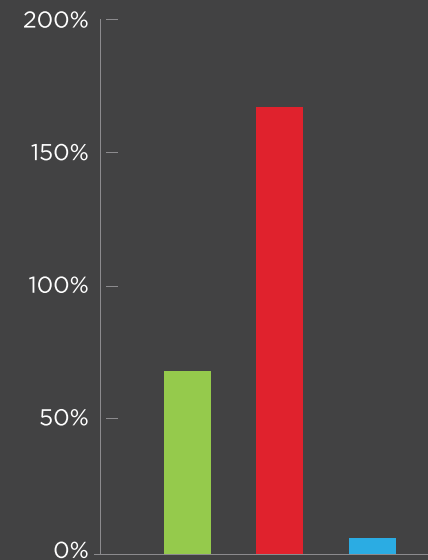


**HIGH INCOME COUNTRIES**

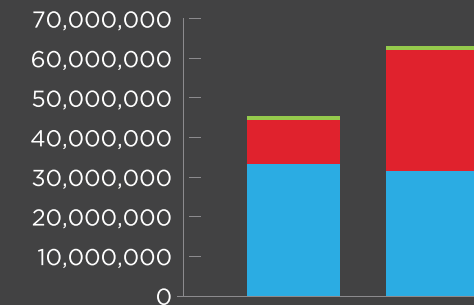
Road Deaths per 100,000 population = 8.7

SOURCES: WHO GLOBAL STATUS REPORT ON ROAD SAFETY 2013, AND PASSENGER CAR SALES AND REGISTRATION DATA BASED ON OICA STATISTICS.

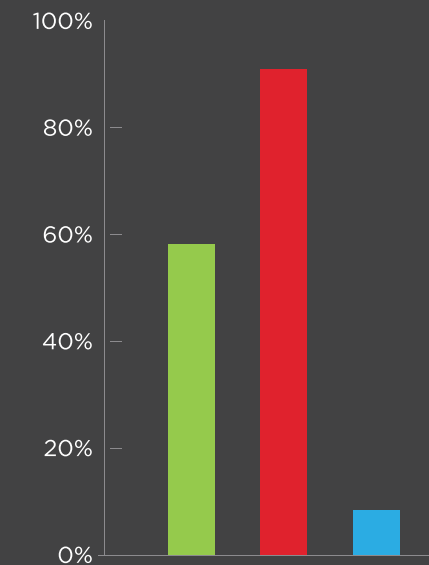
2005-2013 <<<<  
**CAR SALES AND REGISTRATION % CHANGE BY INCOME GROUP**



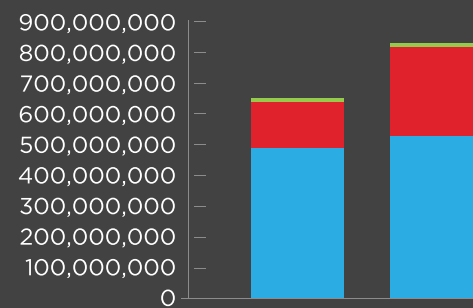
2005-2013 <<<<  
**CAR SALES AND REGISTRATION BY INCOME GROUP**



2005-2012 <<<<  
**CARS IN USE % CHANGE BY INCOME GROUP**



2005-2012 <<<<  
**CARS IN USE BY INCOME GROUP**



**TOP TEN CAR PRODUCERS 2013**  
**TOTAL 60,001,380**

- China: 18,085,213
- European Union: 14,613,286
- Japan: 8,189,323
- USA: 4,346,958
- South Korea: 4,122,604
- India: 3,138,988
- Brazil: 2,742,309
- Russia: 1,919,636
- Mexico: 1,771,987
- Thailand: 1,071,076

**TOP TEN CAR MANUFACTURERS 2013**  
**TOTAL 51,050,698**

- VW: 8,576,964
- Toyota: 8,381,968
- Hyundai: 6,761,074
- GM: 6,608,567
- Nissan/Renault: 6,307,180
- Fiat/Chrysler: 4,498,722
- Honda: 4,110,857
- Peugeot: 2,911,764
- Suzuki: 2,893,602
- Daimler: 2,195,152

12 Source: OICA Passenger Car Data for Vehicles in use, new registration and sales, and production – see: <http://www.oica.net/>  
13 See: McKinsey & Company – The road to 2020 and beyond: What's driving the global automobile industry? (August 2013).



The UN Secretary General Ban Ki-moon together with Mayor Michael Bloomberg at the launch of the UN Decade of Action for Road Safety in New York, May 2011.

# THE UN DECADE OF ACTION AND THE SAFE SYSTEMS APPROACH

To try to avoid an inexorable rise in road injury the United Nations General Assembly has proclaimed a Decade of Action for Road Safety 2011-2020<sup>14</sup>. The Decade's goal is to 'stabilize and then reduce the level of road fatalities'. If achieved this will reduce the forecast level of fatalities in 2020 by 50% and avoid five million deaths, 50 million injuries and \$3 trillion in social costs. To support this aim the UN Road Safety Collaboration (UNRSC)<sup>15</sup> has prepared a Global Plan<sup>16</sup> with five pillars of policy actions as follows:

1. road safety management
2. safer roads and mobility
3. safer vehicles
4. safer road users
5. post-crash response

The third pillar encourages UN member states to ensure that all new motor vehicles are equipped with seat belts and anchorages that meet regulatory requirements, pass applicable crash test standards, and support global deployment of crash avoidance technologies such as electronic stability control and anti-lock braking systems in motorcycles. It also recommends the implementation of new car assessment programmes in all world regions to increase the availability of consumer information about the safety performance of motor vehicles.

The Global Plan is inspired by the Safe Systems approach which envisions a world eventually free from traffic fatalities. Promoting a 'forgiving' strategy for road injury prevention, it recognizes that whilst mistakes are inevitable, deaths and serious injuries from road crashes are not. Also known as 'Vision Zero' the Sweden Government was the original pioneer of Safe Systems

in the late 1990s. The aim is to apply an integrated 'fail-safe' strategy to reduce fatality risk across the whole traffic system. The underlying principles of Safe Systems are that:

- human beings can make mistakes that can lead to road crashes;
- the human body by nature has a limited ability to sustain crash forces;
- all road users, road managers, vehicle manufacturers have a shared responsibility to take appropriate actions to ensure that road crashes do not lead to fatal or serious injuries.
- all parts of the system need to be strengthened - - roads and roadsides, speeds, vehicles, and road use - so that if one part fails, other parts will still protect all the people involved.

Today Safe Systems or 'Towards Zero' inspired strategies have been applied by countries that are the world's best performers in road injury prevention (including Australia, the Netherlands and Sweden) and are also increasingly being adopted by other Governments, major cities (such as New York), fleet managers, and car companies (notably Volvo). The potential for improved design and technologies for crashworthiness and crash avoidance to support the vehicle pillar of the Safe Systems approach is considerable. They have already delivered dramatic fatality reductions for car occupants and increasingly will also contribute to injury risk reduction among vulnerable road users as well.

<sup>14</sup> UN General Assembly Resolution 64/255 2nd March 2010.

<sup>15</sup> UNRSC is a consultative body led by the WHO, UN Regional Commissions, development banks, governments and civil society to promote best practice in road injury prevention and monitor progress of the Decade.

<sup>16</sup> See [http://www.who.int/roadsafety/decade\\_of\\_action/plan/global\\_plan\\_decade.pdf](http://www.who.int/roadsafety/decade_of_action/plan/global_plan_decade.pdf)



The Datsun Go launched in India in 2014 scored zero stars and suffered a collapsed body shell with a high risk of fatal injury for its front occupants.

# THE ROLE OF GLOBAL CAR SAFETY REGULATIONS

An integral feature of the Safe Systems approach is the application of regulations to promote safer vehicles. The original automobile safety standards date back to 1909 and the adoption in of the first International Traffic Convention which introduced the concept of 'type approval' for new motor vehicles. A type approval procedure usually requires tests to be carried out on a vehicle model to ensure that it complies with regulatory standards before it is available for sale in the country or region concerned.

The EU, for example, uses a Whole Vehicle Type-Approval (WVTA) system under which manufacturers can obtain approval for a vehicle type in one Member State and then sell it across the EU without any further tests or checks. Registration of the model must be granted on simple presentation of a certificate of conformity. In contrast in the USA (and Canada) a self-certification system is used. Rather than carry out approval tests, it is the manufacturer's responsibility to certify that their vehicle is in compliance with Federal Motor Vehicle Safety Standards (FMVSS). The National Highway Traffic Safety Administration's (NHTSA) Office of Vehicle Safety Compliance then randomly each year selects models and equipment to be tested at independent testing laboratories.

The passenger car has become one of the most heavily regulated products in human history subject to a wide range of national, regional, and international standards. In the EU regulations now cover the entire life-cycle of a vehicle from

original approval, registration, use on the road, to final scrappage. But as the automobile industry becomes ever more global in structure, so the case for a globally harmonised system of regulations is becoming steadily more powerful. This is because global standards can help to reduce the cost of regulatory compliance and promote the affordability of safer cars for the consumer; so today both the UN and also the International Standards Organisation (ISO)<sup>17</sup> play an important role promoting international harmonisation of vehicle standards.

The UN World Forum for Harmonization of Vehicle Regulations (World Forum) hosted by the United Nations Economic Commission for Europe (UNECE) is the primary global body responsible for the development of passenger car safety standards. Through the World Forum motor vehicles can now be internationally approved without further tests provided they meet the relevant UN regulations. This unique system facilitates international trade and promotes the safety of motor vehicles whilst reducing regulatory compliance costs to industry and to approval authorities. In March 2010 the World Forum began preparing an International Whole Vehicle Type Approval (IWTA) system which once operational will operate on a similar basis to the EU's WVTA but at a global level. It is expected that the negotiations on the framework for the new IWTA will be completed by 2016.

Currently the World Forum uses two Agreements, adopted in 1958 and 1998<sup>18</sup>, to provide a legal framework that allows



any UN Member State to apply voluntarily a wide range of motor vehicle standards. The 1958 Agreement produces UN Regulations containing provisions (for vehicles, their systems, parts and equipment) related to safety and environmental performance. They include test requirements for type approval, the conformity of production (i.e. the means to prove the ability of manufacturers to produce a series of products that exactly match the original type approval specifications) and the mutual recognition of the type approvals granted by Contracting Parties.

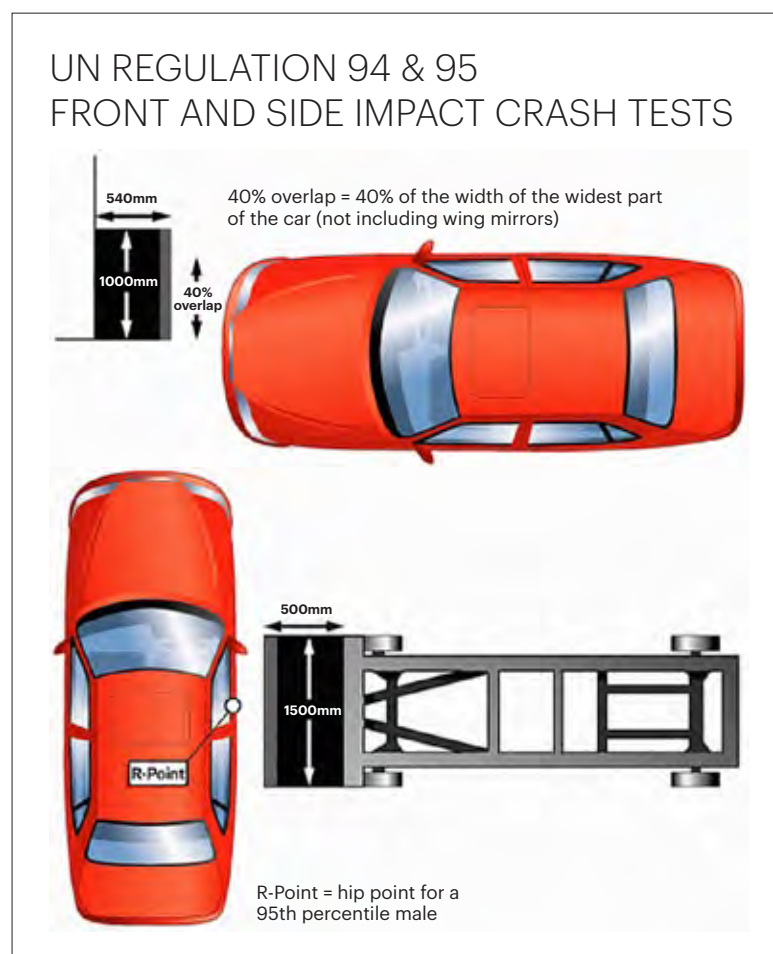
The 1998 agreement issues Global Technical Regulations (GTRs) which, unlike the 1958 agreement, do not require mutual recognition of approvals or certification. This was done particularly to accommodate the USA given its use of self-certification rather than type approval. Although the USA is not a contracting party to the 1958 Agreement, NHTSA's FMVSS standards are widely regarded to be functionally equivalent to many of the UN's Regulations.

All of the UN Regulations are subject to a constant process of updating in order to adapt to technological progress. Among the Forum's most important safety regulations<sup>19</sup> applied to light duty vehicles are:

- Occupant protection in frontal collision - Reg. 94
- Occupant protection in lateral collision - Reg. 95
- Seat belts and seat belt anchorages - Reg. 14 and Reg.16
- Electronic stability control – Reg. 13-H/GTR 8<sup>20</sup>
- Pedestrian protection – Reg. 127/GTR 9

The most important regulatory crashworthiness requirements are for front and side impact. The UN Reg. 94 frontal test simulates a car to car crash at 56 kilometres per hour (km/h) in which the vehicle hits a barrier that replicates the soft front end of the other vehicle. The impact is 'offset' with a 40% overlap as most frontal crashes occur in this configuration. The side impact test (UN Reg. 95) uses a trolley that hits the vehicle just above the door sill area at 50 km/h. (In the US the corresponding tests are FMVSS 208 and 214). They are performance tests which stipulate loadings on an instrumented dummy that must not be exceeded. Reg. 94, for example, does not mandate the fitment of a particular technology such as an airbag. However, to remain within the specified tolerances of the test a vehicle will need both a body shell with an adequate 'crumple zone' and at least a driver's side airbag.

The seat belt anchorage regulation (UN Reg.14) tries to ensure that the seat belt anchor points can withstand the loadings incurred during a crash, to minimise the risk of belt slippage and the safe evacuation of occupants. The Regulation also includes the requirements for 'ISOFIX' child restraint anchorages in which the child seat is securely plugged into sockets and by tether, rather than held in place only with an adult seat belt. The related standard for child restraints is UN Reg. 44 which is being superseded by a new 'enhanced' UN Reg. 129. (See Box: Protecting Children in Cars).



An area of growing importance is crash avoidance. Many lives have been saved as a result of improved crashworthiness but, of course, it is better by far to avoid the collision and risk of injury in the first place. To achieve this highly desirable outcome the automotive industry has invested heavily in technologies that will help to prevent the driver from having a crash at all. The earliest such system was anti-lock brakes (ABS) and this has been followed more recently by electronic stability control (ESC) which prevents loss of control (under-steer or over-steer) skidding incidents. It is widely acknowledged to be the most important safety device since the seat belt. It works by detecting if the steering inputs of the driver are inconsistent with the vehicle's direction of travel. If this happens ESC applies the brake to one of the wheels using the ABS to correct the slide.

Seventeen different studies undertaken between 2001 and 2007 have shown ESC to be highly effective, avoiding single vehicle crashes by approximately 30% and also being notably beneficial in preventing rollover crashes especially for Sport Utility Vehicles (SUVs)<sup>21</sup>. ESC has become mandatory in Australia, Canada, the European Union, Japan, New Zealand, South Korea, and the USA. It is estimated that it will avoid 10,000 deaths annually in the USA and at least 4,000 in the EU. The World Forum has adopted a global standard for ESC which makes it much easier to encourage worldwide application of the system.

## PROTECTING CHILDREN IN CARS

During a 30-mph crash, an unrestrained child will hit the dashboard or windshield with an impact equal to that of a fall from a three-story building. Like seat-belts child restraint systems secure the child to the vehicle to reduce the risk of injury. Three types of restraint systems for child passengers are used:

- rear-facing restraints for infants/children up to four;
- forward-facing child restraints;
- booster cushions or booster seats, for older children.

Child restraints are very effective at preventing fatalities, and are the most important "in-vehicle" safety measure for children<sup>22</sup>. The use of child restraints in high income countries is now widespread and usually required by legislation supported by enforcement. Since the early 1980s the World Forum's Regulation 44 has also provided a standard for the manufacture of child restraints. However, a major problem has been persistent misuse of child restraints. A child may, for instance, be restrained in a seat that is wrong for its age or weight or the straps or harnesses may be inadequately secured. A recent EU study in 2011 found that the average rate of misuse was about 65% which confirms that many children are still incorrectly secured in cars<sup>23</sup>.

To try to improve child restraint effectiveness and reduce misuse in the 1990s the ISOFIX system was developed. Instead of holding the child seat in place with the adult seat belt, ISOFIX uses anchorage points and a top tether to secure the device directly to the frame of the vehicle. In this way ISOFIX child seats are easier to use and more effective. Amendments to UN Regulation 14 on seat belt anchorages and Regulation 44 on child restraints have been applied to support the use of ISOFIX seats.

Further progress was made recently with the adoption of a new enhanced child restraint regulation. UN Regulation 129 adopted in July 2013 introduces a new 'i-size' system which aims to make child car seats easier to fit, provide better protection from side impacts, using a height based making on the product that is simpler to understand and keep children rearward-facing for longer. Initially, Regulation 129 will only be applicable to ISOFIX restraints. However, future phases of the new regulation will apply to all child seats and the older Regulation 44 will be phased out.

In low and middle income countries child restraint use remains very low and the market for the devices is largely untapped. A major barrier is affordability<sup>24</sup> and low and middle income countries will need to consider adopting a variety of measures to encourage child restraint use. In the EU child restraints are eligible for a reduced rate of VAT and similar fiscal incentives can be used in rapidly motorising countries. Various studies have demonstrated positive cost benefit ratios from the application of child seat incentive schemes such as subsidised loans or insurance discounts



to increase both the accessibility and affordability of appropriate restraint systems.

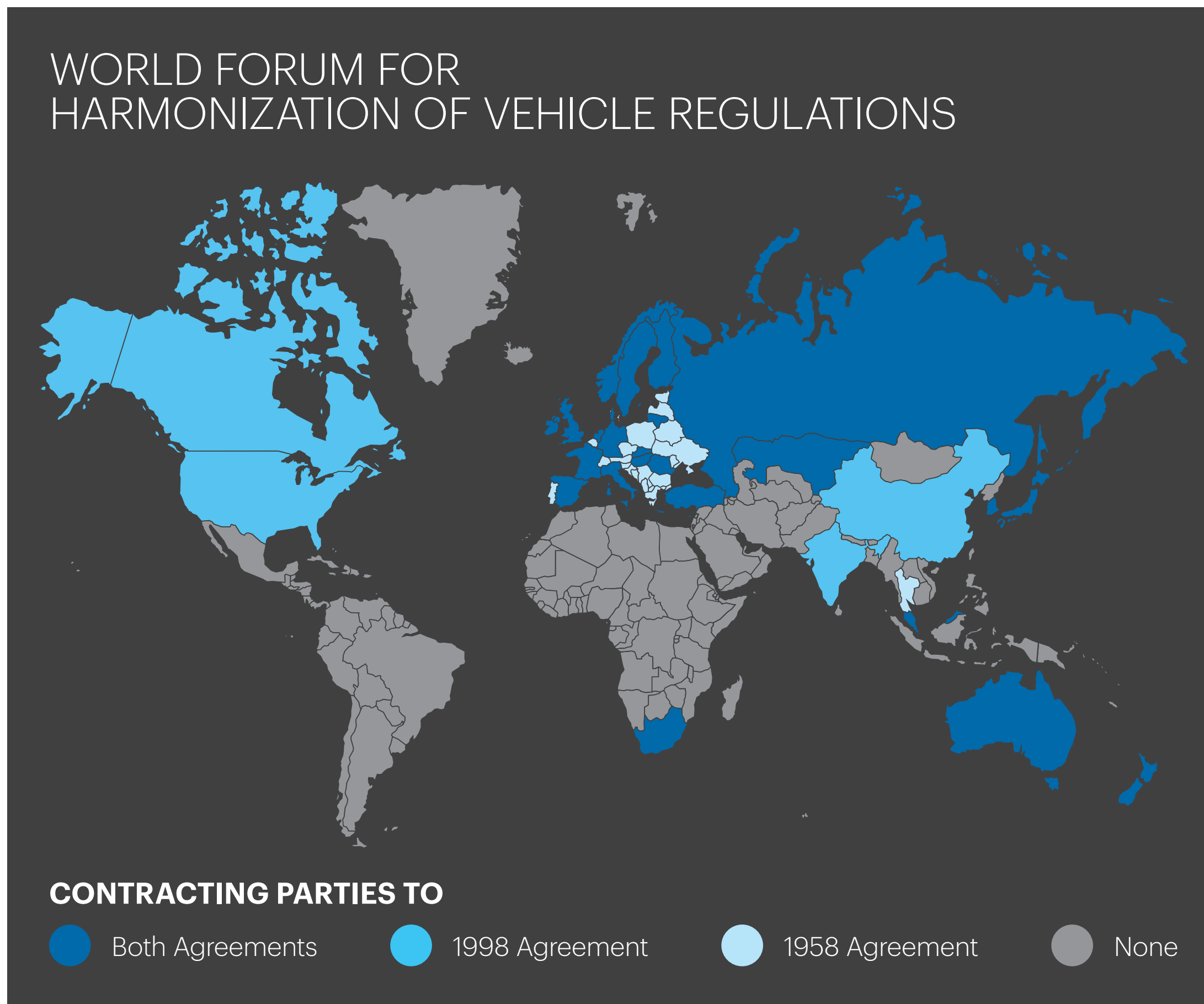
Inevitably as car use grows rapidly in low and middle income countries child occupant protection will become an issue of concern. The application of appropriate usage laws and UN regulations will be required, combined with awareness and enforcement campaigns. As air bag use grows, for example, it will be important to prevent use of a child restraint in the front passenger seat of a car equipped with air bags. Certainly better consumer information about child occupant protection will be needed. Most NCAPs include child seat assessments in their overall rating systems and they can play a key role in informing parents about how to keep their children safe in cars. In 2014 both ASEAN and Latin NCAP were able to award their first five star results for child occupant protection demonstrating once again the role of consumer information to drive improved product safety.

The UN is also promoting measures to reduce the risk of injury to pedestrians in a collision with a passenger car. Every year 270,000 pedestrians are killed on the roads or 22% of all road traffic deaths. Most pedestrian fatalities occur in low income countries but they are a major issue in all regions. In high income countries they are taking an increasing share of road deaths as other at risk groups such as vehicle occupants become safer. UN Reg. 127 (GTR No.9) encourages the design of more forgiving car fronts. Softer bumpers, combined with better bonnet area clearance and removal of unnecessarily stiff structures, are required to reduce the severity of a pedestrian impact.

Unfortunately none of the World Forum's regulations listed above are universally applied by UN Member States. For example, only 48 countries currently apply frontal impact crash test standards (Reg. 94 or equivalent) and the overwhelming majority of these are high income countries. Annual updates listing those countries applying the regulations are contained in annual status reports for both Agreements<sup>25</sup>. Contributing to this low level of use is the absence from or limited engagement by entire world regions (Latin America, the Middle East and most of Africa) in the World Forum and its regulatory process (see map). Major vehicle producing middle income countries, such as Brazil, China, and India are yet to become parties to the 1958 Agreement which includes all the most important passenger car safety regulations highlighted above.

As a result there are many new cars being produced today in emerging economies that are sub-standard in comparison with the UN's minimum safety requirements. In 2013 a record level of 65 million new passenger cars were built but Global NCAP estimates that as many as one third would fail to pass the front and side crash tests, and about half do not have ESC systems fitted. If the relative share of vehicle production in middle income countries continues to grow the current UN regulatory system risks becoming marginalised. This is why it is so important to encourage the application of the UN's minimum vehicle safety standards and the participation at least of all major car producing countries in the work of the Forum. A key part of democratising car safety is, therefore, to ensure that global vehicle production and the UN's regulatory system remain aligned and fit for purpose.

# WORLD FORUM FOR HARMONIZATION OF VEHICLE REGULATIONS



17 The ISO, a legal association comprising national standards bodies, has a technical committee on road vehicles (TC22) in which 23 countries participate and 44 more have observer status. The TC has developed a body of hundreds of voluntary technical standards many of which are included within the international regulatory work of the UN Forum. For more information see: [http://www.iso.org/iso/iso\\_technical\\_committee?commid=46706](http://www.iso.org/iso/iso_technical_committee?commid=46706)

18 The 1958 Agreement has 58 countries as Contracting Parties (CPs) and has established 128 UN Regulations. This means that all other CPs who accept the same regulation will recognize the approval. The 1998 Agreement has 33 countries as CPs and it has established 12 UN Global Technical Regulations (GTRs). For further information visit: <http://www.unece.org/trans/main/welcwp29.html>

19 The equivalent Federal Motor Vehicle Standards (FMVSS) standards are: FMVSS 208 - front impact, FMVSS 214 - side impact, FMVSS 201 - seat belt anchorages, and FMVSS 126 - electronic stability control. The USA does not currently have an equivalent regulation for pedestrian protection.

20 Both ESC and Pedestrian Protection are also available as Global Technical Regulations under the 1998 agreement.

21 See: ESC Effectiveness Summary Fitzharris et al, 2010 and various studies, Regulation Impact Statement for the Control of Light Commercial Vehicle Stability Department of Infrastructure and Transport, Canberra, Australia, January 2013.

22 Relative to no restraint, rear-facing child restraints are 71% effective and forward-facing child restraints are 54% effective in reducing the likelihood of death and serious injury. (Kahane C.J - An evaluation of child passenger safety—the effectiveness and benefits of safety seats. DOT HS 806 890. National Highway Traffic Safety Administration, Washington, DC, February 1986). Use of a booster seat reduces risk of fatal injury for children aged 4–8 years by 55–67% (Morgan C.- Effectiveness of lap/shoulder belts in the back outboard seating positions. DOT HS 808 945. National Highway Traffic Safety Administration, Washington, DC, 1999).

23 Child Advanced Safety Project For European Roads (CASPER), Better Knowledge and Better Tools to Improve the Real Protection of Children in Cars - 23 ESV Paper Number 13-0426.

24 See: Hendrie, D., Miller, T.R., Orlando, M., Spicer, R.S., Taft, C., Consunji, R. & Zaloshnja, E. (2004). Child and family safety device affordability by country income level: an 18 country comparison. *Injury Prevention* 2004;10:338-343.

25 See: <http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29docstts.html> and [http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29glob\\_stts.html](http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29glob_stts.html)



# THE ROLE OF NEW CAR ASSESSMENT PROGRAMMES



In parallel with traditional regulation, New Car Assessment Programmes (NCAPs) have proven to be highly successful in promoting the supply and demand for safer vehicles. NCAPs use consumer information to promote safety among car-buyers which, in turn, encourages automobile manufacturers to sell safer products. The first NCAP was launched in 1978 in the United States by the then Administrator of the NHTSA Joan Claybrook. This was followed by the creation of Australasian NCAP in 1993, Japan NCAP in 1995, and European NCAP in 1997. There are now nine NCAPs or similar bodies active in Asia, Australia, Europe, Latin America and the USA<sup>26</sup>. Some NCAPs are run by governments, and others involve automobile clubs, consumer groups and insurance groups or a combination of these organisations.

Typically NCAPs carry out crash tests on new cars and then make a rating assessment of the vehicle's performance with 'five stars' representing a high score<sup>27</sup>. The test scores are derived from the measurement of the loadings and decelerations that occur to the instrumented dummies during the crash. Most NCAPs use the same front and side impact crash tests as the UN regulations. However, unlike regulatory bodies, NCAPs have greater flexibility in test methodology and the capacity to assess how cars perform above minimum standards. So, for example, NCAPs usually conduct their frontal offset impact tests at a higher speed of 64 km/h. Some NCAPs also use additional pole, whiplash, and pedestrian impact assessments, include seat belt reminders, and crash avoidance technologies

such as ESC in their scoring systems. The effectiveness of consumer information in driving forward vehicle safety is well demonstrated by the positive results achieved in Australasia, Europe and the United States.

Since 1992 the Australasian New Car Assessment Programme (ANCAP) has crash-tested and published the results for more than 490 vehicles. A powerful indicator of the impact that ANCAP has had on Australasian car safety has been the huge increase in the number of vehicles achieving a five star rating. A decade ago fewer than 20% of the cars tested by ANCAP achieved five stars. By 2013 the number of five star cars reached 80% of the total tested. It has been estimated that you have twice the chance of being killed or seriously injured in a one star ANCAP rated vehicle compared to a five star rated vehicle<sup>28</sup>.

In 1997, the European New Car Assessment Programme (Euro NCAP) released its first test results for front impact at 64 km/h. This was one year ahead of the application by the EU of the legislative test at 56 km/h. Despite the increased stringency of the tests, manufacturers rapidly saw the benefits of achieving high scores in Euro NCAP. The European Commission has estimated that Euro NCAP tests brought "forward the benefits of new legislation by 5 years"<sup>29</sup> and in 2003 noted that "cars awarded five stars have a 36% lower intrinsic fatal accident risk than vehicles which are simply designed to meet the legal standard".



In 2002 it was estimated that an increase in occupant protection from 4 to 5 stars reduces the risk of fatal injury by 12%<sup>30</sup>. An update of this research published in 2010<sup>31</sup> shows that 5 star rated Euro NCAP cars have a 69 ± 32% lower risk of fatal injury than 2-star rated cars. The corresponding risk reduction for collisions resulting in death and serious injuries was found to be 23 ± 8%. Today most new cars in the EU now achieve five stars; a safety level that far exceeds the original 1998 regulations.

The US based Insurance Institute for Highway Safety (IIHS), founded in 1959, began front crashworthiness ratings in 1995. Side impact ratings were included in 2004 followed by a roof strength test to promote better rollover crashworthiness in 2009. In all three of these tests, there have been dramatic increases in the percentage of good-rated vehicles, with the improvements coming faster with each program. The frontal programme required 16 model years to achieve good ratings for 90 percent of rated vehicles, the side programme, 11 years, and the roof strength programme, just 6 years.

The UN has recognised the beneficial role played by NCAPs. In September 2011 the UN Secretary General Mr Ban Ki-moon submitted a note 'Improving Global Road Safety' to the 66th Session of the UN General Assembly (A/66/389) which stated that NCAPs "have proved to be very effective in creating a market that encourages consumers to choose vehicles based on their safety ratings". The Secretary General's report concluded with a recommendation to Member States to "participate in the new car assessment programmes in order to foster availability of consumer information about the safety performance of motor vehicles". This recommendation was endorsed by UN General Assembly in subsequent resolutions adopted in April 2012 and again in 2014.

Consistent with this UN mandate the Global New Car Assessment Programme (Global NCAP)<sup>32</sup> was established in 2011 to provide a platform for cooperation among NCAPs worldwide. Its annual meetings bring together all NCAPs to share best practice, and to support new testing programmes in rapidly motorizing regions. With support from Bloomberg Philanthropies, the FIA Foundation, International Consumer Research and Testing, the Road Safety Fund, and other philanthropic sources, Global NCAP is providing financial and technical assistance to new NCAPs in Latin America and in South East Asia and has also launched the 'Safer Cars for India' project which has acted as a catalyst for Government action both as regards regulation and the creation of an NCAP (Box: Safer Cars for India).

With Global NCAP's support the Latin New Car Assessment Programme (Latin NCAP) has become a major stimulus for passenger car safety<sup>33</sup> in a region with an annual road fatality rate of 17 deaths per 100,000 individuals. This is almost double the average rate registered for high income countries where the average is 10 deaths per 100,000. In the absence of strong road safety action it is projected that by 2020 the rate in the region will reach 24 deaths per 100,000.<sup>34</sup>



A side impact for the five star VW up!. OPPOSITE: A Toyota advert featuring a five star result for their Corolla; Global NCAP's 2014 Annual Meeting hosted by CNCAP; A five star results plate issued by ASEAN NCAP to Nissan's Teana;



Latin NCAP has now tested over fifty cars. Its first results revealed levels of safety in top selling cars twenty years behind North America and Europe. However, by 2014 five models were awarded five star ratings which is remarkable progress providing a level of safety in advance and well above of regulatory requirements. Impressively among the high scorers is a super mini the VW 'Up' which shows that small cars in emerging markets can obtain five star results. Manufacturers have engaged constructively with the programme, sponsoring cars, using their ratings in advertising, and improving their product specification in order to obtain better occupant and child protection scores. Latin NCAP has also generated substantial media coverage and been the subject of some in depth documentary films on the regions vehicle safety issues.

The ten countries of the ASEAN region<sup>35</sup> are also experiencing high fatality rates similar to Latin America. ASEAN's vehicle sales are forecast to increase from 2.4 million in 2011 to 4.7 million units by 2018 which potentially makes the region the world's sixth largest automotive market<sup>36</sup>. Given the expected doubling in sales Global NCAP, ANCAP, and Euro NCAP have partnered with the Malaysian Institute of Road Safety Research (MIROS) to launch the ASEAN New Car Assessment Programme (ASEAN NCAP).

In 2012 MIROS opened their own crash laboratory and in the following year ASEAN NCAP released the first two phases of crash tests of 18 vehicles manufactured in the key markets of Malaysia,

Thailand and Indonesia<sup>37</sup>. The results highlighted the wide variation in vehicle safety, with star ratings ranging from two to five stars and have already accelerated improvements. In their Phase 1 test, where Proton received a one-star rating for its single airbag Saga FLX compact car, the company stopped production and replaced it with the FLX+ model with dual airbags.<sup>38</sup> By the end of 2014, ASEAN NCAP had assessed 36 models produced by 17 of the top twenty producers, and awarded 12 five star results. ASEAN NCAP maintains that their test results show that safety is not just a luxury option but affordable and highlight the Perodua Axia, on sale for US\$8,000, which obtained a four star results for both occupant and child protection. Like Latin NCAP manufacturers are now using ASEAN NCAP ratings in their promotional materials.

Although most NCAPs use star ratings to rank vehicle safety performance not all five star cars are equivalent around the world. In some NCAPs, for example, to obtain five stars requires that the model has ESC whereas in others this is not yet applied. The differences between NCAPs are the result of the use of a variety of assessment tools, test and assessment procedures and the different regional market and regulatory conditions around the world. Nevertheless, any NCAP rated 'five star' car (or the IIHS 'top safety pick') represents a far safer vehicle than one which simply meets the minimum UN standards.

A single global 'five star' rating is neither feasible nor desirable given the current widely differing make-up of the global car

## SAFER CARS FOR INDIA



India ranks sixth largest in the world for the production and sale of passenger cars and could become the world's third largest market by 2020. The export share of the country's passenger car production has risen over the last ten years from 10% to 21% and it is emerging as an important global hub for small car production. Each year India loses over 130,000 lives in road traffic crashes. Around 17% of these fatalities involve car occupants.<sup>39</sup> Although now a major car producing nation, India does not yet require its vehicles to meet the United Nation's minimum crash test standards and does not have an NCAP that can provide consumers with independent reports on vehicles' crash safety.

In 2013 Global NCAP established the Safer Cars for India project with its partner the Institute of Road Traffic Education (IRTE). The first phase of the project tested five popular and important models to assess their performance in both the UN Reg. 94 crash test at 56 km/h and at an NCAP speed of 64 km/h. The models tested

included India's best-selling car, the Suzuki-Maruti Alto 800. The Tata Nano, Ford Figo, Hyundai i10 and Volkswagen Polo also underwent the safety assessment. Combined sales of these five cars account for around 20% of all the new cars sold in India last year. Global NCAP chose the entry-level version of each model and as a result none were fitted with air bags as standard.

The results, launched at a Conference<sup>40</sup> held in New Delhi in January 2014, highlighted major differences in the structural integrity of the vehicles tested. The body shells of the Suzuki-Maruti Alto 800, the Tata Nano and the Hyundai i10, proved inadequate and collapsed to varying degrees, resulting in high risks of life-threatening injuries to the occupants (see images to left of the Alto and i10). The structural weaknesses of these models were such that fitting airbags would not be effective in reducing the risk of serious injury. The Ford Figo and Volkswagen Polo had structures that remained stable. All but one of the five models failed the Reg. 94 test and all scored zero stars at 64 km/h as a result either of poor structural integrity or lack of air bags.

Coinciding with the Global NCAP tests, Volkswagen decided to withdraw the non-airbag version of the Polo from sale in India. Global NCAP then agreed to a request from VW to assess a version of the Polo that has two airbags fitted as standard. The airbag-equipped model received a four-star rating for adult occupant protection. The news coverage generated by the launch in January reached an estimated audience of over 68 million, was featured on NDTV influential Car and Bike show and was extensive in both the Indian and international media.

A second phase of test results involving the Datsun Go, a new design launched in 2014, and the Maruti Suzuki Swift both with and without airbags were released in December. The Go scored zero stars as its body structure collapsed making it redundant to even fit an airbag. With no airbags, the Swift also scored zero stars. However, although its body shell was rated unstable the car would benefit from the use of airbags. In a separate test of a version with air bags (sold in Latin America) it scored three stars which clearly demonstrated the model's potential for improvement.

Since the launch of the project there have been important developments in car safety in India. Global NCAP and its partner IRTE have held very constructive discussions with the new Government led by Narendra Modi. In January 2015 the Transport Minister Nitin Gadkari confirmed that India will apply UN equivalent crash test standards for front and side impact in two phases; for new models from 1 October 2017 and for all cars from 1 October 2019<sup>41</sup>. A Bharat New Car Assessment Programme is also being developed and will begin testing once the necessary laboratory capacity is available. In another encouraging development Toyota Motor Corporation announced that all its passenger cars in India will be fitted with at least driver side airbags<sup>42</sup>.

fleet in terms of age and safety performance. Since NCAPs are largely voluntary, operating above and beyond regulatory requirements, these differences and capacity for innovation are positive features. The diversity in NCAP testing helps increase knowledge, promote innovation, and can be adapted far faster than regulation. As outlined earlier, the strongest priority for global harmonisation is with the UN's minimum standards to establish a regulatory floor and level playing field. Until this is done it is simply premature to consider NCAP harmonisation. There is scope, however, to encourage co-operation and greater convergence by NCAPs especially among the newly created programmes in the newly motorising regions.

As part of its technical co-operation between NCAPs, Global NCAP will, therefore, encourage convergence in testing activities especially among the recently created programmes. Already close co-operation exists between NCAPs and in some instances test results are even shared. By sharing best practice and wider use of common assessment tools, test and assessment procedures it is hoped that NCAP test requirements will follow common trajectories but at a pace reflecting the needs of their own regional circumstances.

NCAPs can play a leading role in demonstrating the benefits of new crashworthiness and crash avoidance systems that are not yet subject to regulation. In this way they can encourage and recognize innovation by OEMs and the components industry as well as alert consumers to products that will enhance the safety of cars they and their families use. Euro NCAP, for example, is encouraging manufacturers to fit speed assist systems (SAS). These can provide the driver with information about the posted speed limit and allow an upper limit to be set manually. Given the crucial influence of speed in reducing road fatalities more must be done to promote consumer awareness of the benefit of these SAS technologies.

Another positive development is autonomous emergency braking (AEB). This technology uses laser/radar/camera systems to detect impending collisions and automatically applies the brakes if the driver does not react in time; and has been estimated to reduce low speed collisions by 20%<sup>42</sup>.

AEB has also opened up significant further potential to avoid and mitigate pedestrian injuries. With sensors used to detect pedestrians AEB can reduce impact speeds by as much as 15 km/h so reducing the severity of injury. This will maximise the benefit of softer and 'forgiving' car fronts. So the combined effect of improved pedestrian crashworthiness and crash avoidance promises further gains in safety for pedestrians.

AEB is now being included in the most advanced NCAP rating systems and is a strong candidate for future regulatory action. At this stage in its development it would be premature to include AEB in a regulatory road map for low and middle income countries for 2020. It should, however, be a priority technology for consumer awareness actions as a precursor to later regulatory enforcement towards 2030.

AEB systems offer the potential to reduce pedestrian fatal and serious injuries.



- 26 ASEAN NCAP, Australasian NCAP, China NCAP, European NCAP, Japan NCAP, Korean NCAP, Latin NCAP, US NCAP and the Insurance Institute for Highway Safety.
- 27 Rather than award stars the Insurance Institute for Highway Safety's highest accolade is its 'Top Safety Pick' rating).
- 28 See: Paine M, Paine D, Case M, Haley J, Newland C and Worden S (2013) Trends with ANCAP safety ratings and real-world crash performance for vehicle models in Australia, Paper 13-0390 Proceedings of 23rd ESV, Seoul.
- 29 See: European Commission (2000) Priorities in EU Road Safety Progress Report and Ranking of Actions (page 18), and European Commission(2003) European Road Safety Action Programme (page 22).
- 30 Lie A. and Tingvall C. (2002), How Do Euro NCAP Results Correlate with Real-Life Injury Risks? A Paired Comparison Study of Car-to-Car Crashes in Traffic Injury Prevention, 3:288-293.
- 31 Kullgren, A., Lie, A., Tingvall C. (2010) Comparison Between EuroNCAP Test Results and Real-World Crash Data Traffic Injury Prevention 11:587-593, 2010.
- 32 For further information visit: [www.globalncap.org](http://www.globalncap.org)
- 33 See - <http://www.latinncap.com/en/?pg=&id=>
- 34 See - Road Safety Strategy – IDB, Closing the Gap: Reducing road traffic deaths in Latin America and the Caribbean, Action Plan 2010-2015 page 3.
- 35 Brunei Darussalam, Cambodia, Indonesia, Laos PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.
- 36 See - <http://www.motortrader.com.my/news/asean-vehicle-sales-to-reach-4-7-million-units-by-2018/>
- 37 See - <http://www.aseancap.org/>
- 38 <http://www.globalncap.org/asean-ncap-featured-in-car-safety-rules/>
- 39 Road Accident Sampling System India (RASSI) presentation 31 January 2014 Emerging Market Automobile Safety Conference.
- 40 <http://www.globalncap.org/first-emerging-market-automobile-safety-conference-proves-successful/>
- 41 <http://timesofindia.indiatimes.com/india/Crash-tests-to-be-mandatory-for-all-new-cars-from-October-2017/articleshow/45712792.cms>
- 42 <http://www.cartoq.com/toyota-india-car-suv-mpv-airbag-standard-safety-feature/>
- 43 See: <http://www.thatcham.org/aeb>



The Tata Nano sold in India failed to pass the UN frontal impact test at 56 km/h and scored zero stars in a 64 km/h NCAP test.

# ARE SAFER CARS AFFORDABLE?

An issue that is always raised against those advocating for safer cars is the proposition that it is too expensive to apply UN regulations and vehicle technologies originally developed for high income countries. It is argued that the extra cost will make cars unaffordable in the low and middle income countries and result in continued use of motorised two wheelers which are intrinsically more dangerous than passenger cars, even sub-standard ones. Both these assumptions are highly questionable.

Regarding affordability the additional costs involved in meeting the basic UN frontal crash test (Reg. 94) consist in using a body shell that incorporates a crumple zone and at least a single driver air bag. The additional engineering required for a crumple zone is well known and non-demanding technically. It usually requires the inclusion of some extra stiffening structures combined with deliberate failure points designed to limit intrusion into the occupant area in the event of a crash. The extra cost is limited to a small amount of extra steel per unit in a typical vehicle body shell.

A very important construction trend in the passenger car industry is the growing use of so-called 'global platforms'. In order to promote economies of scale, lower costs and improve profitability many car makers are using modular production units with standardised manufacturing process and common parts applied to a wide variety of different models sold across their global markets. It has been estimated that in the second half of this decade 50% of the passenger cars sold globally will be based on just twenty core platforms<sup>44</sup>.

The other key safety feature to pass Regulation 94 is the fitment of at least a driver side air bag. As the use of air bags has become almost universal across the high income countries the unit costs of this life saving technology has plummeted by around 60%. Today the typical price of an airbag sold by the suppliers to OEMs is around \$50. As global growth in the airbag market continues to expand across the middle income countries the unit costs will fall even further.

The same gains from economies of scale are reducing the costs of ESC. It has become a standard requirement in many high income countries and now costs less than \$50. Given that it works in conjunction with ABS costs in the middle income countries may be a little higher from \$75 to \$100 if both systems need to be fitted. (Penetration of ABS in new cars ranges from 80% in China, 100% in Brazil and 27% in India).

Given the growing use of global platforms, the reduced costs of key technologies such as airbags and ESC it is simply not the case that safer cars are unaffordable. It should be possible for a typical small car to pass UN Reg. 94 for an extra cost of just \$200 (assuming two airbags and some body strengthening). An additional crash avoidance technology package of ABS & ESC might cost a further \$125. All these amounts are well within the savings the OEMs are already making through use of global platforms. Applying the reasonable implementation timescales envisaged by the Global Plan for the Decade these costs will be both lower and non-challenging for the OEMs to absorb.

This leaves the question of whether or not slightly more expensive cars will deter motorcyclists from becoming motorists. In many low and middle income countries motorcycle use still far exceeds car use and continues to grow. Of course, riders and passengers of motorised two wheelers face greater risk of fatal and serious injury. Whilst it can be argued that from a safety perspective it is desirable to encourage motorcyclists to switch to cars it is far from clear that this kind of mode substitution is actually happening on a significant scale. It is presumptuous to assume that sales of ultra-low cost cars (ULCCs) will inevitably reduce motorcycle travel. The new family car may be the source of additional mileage with the motorcycle being retained for existing patterns of use such as commuting in heavily congested urban environments.

Although some OEMs say their motivation for building ULCCs is to discourage motorcycle use there is no hard evidence to back their claims. Against the grain of their argument has been the real world experience of the world's most famous ULCC, the Tata Nano in India. Launched in 2009 at a price of just 100,000 rupees (approx. US\$1,700) the Nano has proved to be a commercial failure. It is also a notably bad car in terms of safety as shown by crash tests released in January 2014 by Global NCAP which revealed that the car would fail the UN frontal impact standard test at 56 km/h and scored zero stars at 64 km/h.<sup>45</sup>

The Nano's poor sales performance suggest that the consumer choices of first time car buyers are not merely utilitarian but may also involve expressions of social status that count against 'bargain basement' products. In the Nano's case Indian consumers seem to prefer its competitors which include better quality second hand cars and more expensive new models that offer higher status value.

The focus on the ULCC segment also overlooks the fact that the highly profitable middle income markets also contain many other more affluent middle class purchasers. Typically the markets of the rapidly motorising countries contain at least three segments ranging from ultra-low cost, towards mid-range and finally premium<sup>46</sup>. From a consumer perspective surely all these car buyers in middle and low income countries are entitled to expect the vehicles they buy at least meet minimum international safety standards?

In any case the fundamental question is whether or not small low cost cars need to be sub-standard? As argued above the technology threshold to pass the basic UN frontal impact crash test is not very high or costly. Recent results from NCAPs in the ASEAN region and in Latin America also show that the OEMs are capable of producing models that offer adequate levels of safety at competitive prices. With greater regulatory harmonisation, more use of global platforms, and improved economies of scale passenger cars can be made both affordable and compatible with UN minimum standards. This is a far better path to follow than trying to encourage riders of unsafe motorcycles into unsafe cars.



Over the last twenty years airbag costs have dropped by around 60%; the four star Perodua Axia tested by ASEAN NCAP shows that safety is affordable; the VW MQB global platform;



44 See: Evalueserve - White Paper: Platform Strategy will Shape Future of OEMs Flexibility to Drive Growth January 2012.  
 45 See results of the 'Safer Cars for India Project'.  
 46 See an analysis of these market segments see: A D Little 'The Future of Mobility 2020 - The Automotive Industry in Upheaval' which identifies the shares of three main categories; 'Basic' (48%), 'Smart Basic' (43%), Premium (4%) and Other (5%).

# A STRATEGY TO DEMOCRATISE CAR SAFETY BY 2020

Global NCAP's Technical Partner the ADAC Technical Centre carries out NCAP tests on behalf of both Euro NCAP and Latin NCAP

The main target of a strategy for safer cars by 2020 is to improve the quality of new vehicles being sold in the fast growing markets of middle income countries. This is the leverage point where the twin track regulatory 'push' and demand 'pull' action must be applied. The sooner that all new vehicle models are required to meet acceptable safety standards the quicker will be the overall improvement in passenger car safety worldwide. In contrast the continued sale of millions of new sub-standard cars in rapidly motorising countries will leave a worrying legacy for decades of avoidable fatality risk. This is because today's new sub-standard car will remain in use as a second hand vehicle for many more years, possibly in more than one country. These unsafe cars will continue being driven with greater exposure to fatal injury than a vehicle that meets the UN's minimum safety standards.

The automotive turnover cycle is, therefore, the key determinant of the pace of safety improvements of passenger car fleets. This is clear, for example, from the 'age-period-cohort' study of vehicle risk in New South Wales in Australia mentioned earlier<sup>47</sup>. In the high income countries the life expectancy of a typical passenger car is about 13 years or 150,000 miles. However, increased reliability with good maintenance is extending vehicle longevity up to 200,000 miles<sup>48</sup>. It is likely that car owners in middle income countries will extend this use even further.

In Europe it has taken a period of about twenty years for safer cars to penetrate almost fully into the vehicle fleet. The EU originally introduced its front and side impact tests (UN Reg. 94 & 95) in 1998. Initially mandatory only for new models it was eventually applied to all cars in production by 2003. Since 1998, therefore, across the EU year on year millions of new safer cars took to road. Over the same period millions of older non-compliant cars were de-registered, and either re-sold outside of the EU or scrapped<sup>49</sup>. Today the overwhelming majority of passenger cars on the roads of the EU can pass these front and side impact tests. The positive result of the regulations (together with Euro NCAP's promotion of 'five star' safety) has been the substantial contribution they have made to the impressive 55% reduction in EU car occupant deaths.

In the USA it has also taken a long time for key safety features to spread through the vehicle fleet. Frontal airbags, for example, were first available to consumers in 1984 and by calendar year 2000 most vehicles used by private passengers were required to have frontal airbags to protect the driver. However, in calendar year 2010 (ten years later) there were still an estimated 13 percent of vehicles registered without this feature available<sup>50</sup>.

The experiences gained in Australasia, the EU and the USA over the last twenty years have demonstrated that market forces alone will not deliver sufficient progress in motor vehicle safety. Better consumer information plays a very important role. They also show powerfully why regulation is beneficial and ultimately necessary. This can be clearly seen from example of the crash avoidance technology ESC.

Originally developed in the mid-1990s, ESC was first introduced into the market by premium brand OEMs. Gradually all the major manufacturers adopted the system and offered it across their product range but as an additional extra rather than standard feature. Fitment rates grew steadily but remained low or even non-existent in the highly competitive small car classes; ironically where the crash avoidance capability of ESC is probably needed the most.

This stalling of technology penetration among the high volume but low margin small car segment is a classic example of a market failure. To guarantee 100% penetration of ESC across all vehicle segments, and thus realise its full safety potential, has required government action. This is car safety democratisation in action and why Australia, the EU, Japan, South Korea, the USA and more recently New Zealand have all made ESC mandatory albeit some twenty years after its original invention.

If today, the UN's most important safety standards could be universally applied in all the rapidly motorising middle income countries, a new cohort of safer cars (equipped with air bags, crumple zones and ESC) would take to the road. Within a few years these better quality cars would also begin to enter and improve the safety of the second hand market in both low and middle income countries. In this way acceptable levels of crashworthiness and avoidance would start to cascade down through the entire global vehicle fleet.

That is why regulatory action is needed now to set a minimum 'level playing field' and act as a catalyst to encourage 100% penetration or 'full democratisation' of these proven and effective safety systems. A qualitative safety improvement could then be engineered among all new cars by 2020 and eventually for the majority of cars in use by 2030 and beyond.

This kind of twenty year horizon is the realistic timescale to deliver substantial improvements in global passenger car safety. Although a gradual process better regulation will deliver improved safety exactly at the pace the vehicle fleet turns over. That is why there is real urgency during the current UN Decade of Action to encourage especially the major vehicle producing middle income countries to take prompt regulatory action; because with each year of delay another tranche of millions of new sub-standard and unsafe cars appear on the road remaining as a potential death and injury trap for decades to come.

47 Anderson RWG, Searson DJ (2014) 'Use of Age-Period-Cohort models to estimate effects of vehicle age, year of crash and year of vehicle manufacture on driver injury and fatality rates in single vehicle crashes in New South Wales, 2003-2010', *Accident Analysis & Prevention*, 75, pp 202-210.

48 See New York Times, March 16, 2012 - 'As Cars Are Kept Longer, 200,000 Is New 100,000'.

49 In 2006, for example, 15.9 million new cars were registered and 13.4 were de-registered. Of the de-registered 7 million were scrapped leaving 6.6 million either disappeared or resold outside of the EU probably to Eastern Europe or Africa.

50 See: Highway Loss Data Institute, Bulletin Vol. 28 No.26, April 2012 - Predicted availability of safety features in registered vehicles.



# THE ROAD MAP FOR SAFER CARS 2020

*The mid-point in the current UN Decade of Action is an appropriate time to set out clear recommendations and a timeline for implementation for improved car safety by 2020 and beyond. Action is needed now to achieve the goals of the Decade and also to anticipate the further progress required by the UN's new framework of Sustainable Development Goals (SDGs) to be achieved by 2030. An outline set of vehicle safety recommendations is already included in Pillar Three of the Global Plan for the UN Decade but without specifying precise policy details or implementation timescale. To provide this, Global NCAP, therefore is proposing the adoption of the following recommendations in this Road Map for Safe Cars 2020.*



# RECOMMENDATION 1

That all UN Member States adopt Global NCAP’s two stage minimum car safety regulation plan by the end of the UN Decade of Action in 2020.

## Stage One – Crashworthiness and Child Restraints

Encourage the widest possible application by UN member states of the (latest version) regulations for frontal, side impact, and seat belt anchorages for all light duty vehicles (category M1). This could be applied in two phases; firstly to all new car models in 2016, and then secondly to all cars in production after 2018. This would have the immediate effect of discouraging OEMs from launching any new models that fail to comply with the UN crash test standards whilst also setting an end date for the production of older non-compliant models. The seat belt anchorage requirement would also boost the potential use of ISOFIX child restraints and make it easier to apply the new ‘iSize’ enhanced child restraint Regulation 129 at the latest by 2020. Both the producing and importing countries could adopt the same regulatory approach. For the latter this would ensure that the quality of imported second hand cars would also move towards the UN minimum standard.

Action all new cars would have to meet a basic package of vehicle standards combining measures of crashworthiness, crash avoidance, and protection of vulnerable road users. A level playing field in safety for the global light duty vehicle market would be established.

The recommendation is also equally relevant to the much larger number of exclusively importing countries. Frequently these nations control their vehicle imports by relying only on age limits (typically ranging from five to seven years) that prohibit the entry of older cars. Unfortunately by applying criteria based on year of manufacture alone there is no guarantee that the imported vehicle (new or second hand) will meet adequate safety standards. A better approach is to apply qualitative standards using the UN regulations as a benchmark. New Zealand’s import control system has worked successfully in this way for many years.

## Stage Two – Crash Avoidance and Pedestrian Protection

By 2018 encourage the widest possible application by UN member states of the (latest version) regulations for electronic stability control and pedestrian protection also to category M1 vehicles. Again this could be applied in two phases; firstly to all new car models after 2018, and then secondly to all cars in production after 2020.

The positive benefit of this recommendation would be its long term effect on the turnover of the world’s passenger car fleet. Year on year a larger number of safer vehicles would be built, sold and re-sold so that by 2030 a majority of cars in use would comply with its basic safety requirements. The proposed regulatory action would offer the OEMs a predictable planning horizon to make the necessary improvements at minimum additional unit cost. As explained above economies of scale resulting from global harmonisation, combined with increased use of modular vehicle platforms will ensure that the automobile manufacturers can implement the Road Map whilst remaining profitable and producing safer cars that are still affordable to consumers around the world.

If this two stage recommendation was applied by all major vehicle producing countries by the end of the UN Decade of

ROAD MAP FOR SAFER CARS 2020	ALL NEW CAR MODELS PRODUCED OR IMPORTED	ALL CARS PRODUCED OR IMPORTED
STAGE 1 - UN REGULATIONS* FOR: Frontal Impact (No.94) Side Impact (No.95) Seat Belt & Seat Belt Anchorages (No.14 & 16)	2016	2018
STAGE 2 - UN REGULATIONS* FOR: ESC (No.13H or GTR. 8) Pedestrian Protection (No. 127 or GTR.9)	2018	2020

\*or equivalent FMVSSs



## RECOMMENDATION 2

All UN Member States with significant automobile production should participate in the World Forum for Harmonisation of Vehicle Regulations to promote a levelling up of the safety standards in an open and competitive market for automobiles and their components.

A very important way to increase the worldwide market for safety is to promote international trade in passenger cars and their components provided that they meet good standards of consumer safety. The World Forum (which meets in the UN Palais des Nations in Geneva) encourages trade through reciprocal recognition of vehicle approvals. Increased harmonisation of standards should, in principle, help to reduce industry costs, promote economies of scale, lower prices to the consumer and promote safety. That is why Global NCAP strongly supports wider engagement in both the World Forum's 1958 and 1998 Agreements by all UN Member States especially middle income countries now have significant automobile production such as Brazil, China and India. These countries, and especially their own citizens, will benefit from applying the minimum safety regulations proposed in this Road Map.

Bilateral trade agreements, such as the proposed EU-US Transatlantic Trade & Investment Partnership (TTIP), could be beneficial on condition that they must level up to the best standards applied by either negotiating party. There is already a high degree of equivalence between European type approval and American FMVSS requirements. Both the EU and the USA have at times led the other in pioneering safety innovation. For example, the EU has promoted pedestrian protection and the US similarly legislated first and also initiated a UN GTR for ESC. Despite their different approval systems (type approval vs self-certification) if the TTIP is achieved it would create the world's largest single market for safer passenger cars. Nevertheless, the rest of the world will be a

far larger market and less adequately regulated given the rapid growth of production and sales in middle income countries. That is why Global NCAP urges both the EU and the USA to strongly support the widest possible adoption by 2020 of the proposed minimum safety standards recommended in this Road Map and also encourage adherence by all major middle income vehicle producing countries to the World Forum's 1958 and 1998 Agreements.

The trade in key safety components such as airbags and crash avoidance technologies is also an important issue. OEMs buy in these components from the supplier industry and prices can be influenced significantly by the trade rules applied to them. Middle income countries run the risk that use of import restrictions and local content rules may add to the cost of safety technologies. Whilst it may seem attractive for a country to incentivise its local automotive industry by applying import protection measures this may have the perverse effect of making safer vehicles more expensive and slow down penetration of technologies that will save the lives of their own citizens. Global NCAP believes that key safety technologies such as airbags, child restraints and ESC systems should wherever possible be exempted from import restrictions.

Overall Global NCAP supports the development of an open and competitive global market for automobiles and their components, underpinned by universally applied minimum UN safety standards and driven by informed and safety aware consumers.



## RECOMMENDATION 3

Fleet purchasers both in the private and public sectors and rental companies should adopt Global NCAP's Buyer's Guide and choose 'five star' vehicles wherever possible.

Another effective 'demand pull' measure to promote vehicle safety can be the purchasing decisions of public and private fleet managers. Motivated by a combination of duty of care for employees, corporate social responsibility and effective cost controls, a growing number of organisations are introducing fleet safety policies and selecting only five-star cars for their employees. For example this policy has been adopted by the world's largest resource extraction company BHP Billiton and by the Governments of Australia and Sweden. Rental companies should similarly aim to ensure that their car fleets offer five star levels of service to their customers.

This approach is consistent with the recommendations of the Global Plan for the Decade which encourages "managers of governments and private sector fleets to purchase, operate and maintain vehicles that offer advanced safety technologies and high levels of occupant protection" and also the new road traffic

safety management standard ISO 39001, which identifies vehicle safety as a significant factor for fleet operators seeking to reduce death and injury in road crashes.

To promote fleet safety Global NCAP in May 2014 released new guidelines for organisations operating vehicle fleets recommending that they only buy 'five star' cars. The guidelines advise fleet purchasers to select vehicles that have been rated by New Car Assessment Programmes (NCAPs) with the much coveted 'five-star' safety rating. As well as calling for 'five star' cars wherever possible, the guidelines propose that manufacturers are asked to confirm that the vehicle passes the minimum United Nations safety regulations concerning seat belts, and front and side crash tests. Vehicles that meet regulations for electronic stability control and pedestrian protection are also rated as "strongly preferred" and the new crash avoidance technology AEB is "highly recommended".



## RECOMMENDATION 4

Governments and the insurance industry should provide fiscal incentives and discounts to car buyers opting for safer models to encourage more rapid deployment of new technologies through the passenger car fleet.

It is well established policy practice by governments to provide financial or fiscal incentives to speed up the introduction of improved or new technologies, especially in advance or in conjunction with tougher regulatory requirements. This is common practice, for example, with regard to vehicle emissions and fuel quality standards and it is equally applicable to safety. Incentives can include reduced sales or registration taxes for new cars that meet chosen safety standards and technology requirements.

Denmark provides an example of the positive impact of such an incentive scheme. In 2003 Danish vehicle taxes were reduced for cars equipped with ABS, airbags and ESC. The ESC incentive started at in 2003 at €470 and then declined in value year on year to €94 by 2008 when the scheme was withdrawn. ESC only became mandatory by 2012 but the incentive raised the fitment rate in new cars to 77% by 2007; one of the highest then achieved in the EU.

The Danish experience shows how a fiscal incentive can powerfully accelerate penetration of a new safety technology in advance of regulation. As ESC prevents crashes entirely it avoids all the

associated costs and so offers very strong societal benefits. The positive benefit that ESC can bring in reduced crash costs over the long term will very likely exceed the revenue foregone with a temporary tax reduction. As ABS usage increases in middle income countries there is, therefore, a powerful case for offering a Danish style fiscal incentive for ESC in advance of its mandatory application as proposed by the 'Road Map for Safer Cars 2020'. The unit costs of ESC are considerably lower than was the case in 2003 so the size of incentive that would be effective now in a middle income country would be much less than originally offered by the Danish government.

The insurance industry can also take a lead in offering premium reductions for safer vehicles. Again crash avoidance systems like ESC and also AEB prevent or mitigate crashes and so will help to reduce insurance claims. So insurers should be able to offer discounts for vehicles fitted with the technology. In the UK, for example, some insurers are changing their group rating system to incentivise the purchase of cars equipped with AEB. Similarly in Australia, the major insurance company the NRMA is offering discounts of between 10 to 15% on vehicles equipped with AEB as standard and tested by the insurer for its effectiveness.



## RECOMMENDATION 5

NCAPs should be supported by Governments and donors to extend consumer related testing to include all the world's major automobile markets and the widest range of models especially the most popular and important.

As recommended by both the UN General Assembly and the Global Plan for the Decade more effort is needed to ensure that NCAPs are active across all the world's major automobile markets especially in middle income countries. Good progress has already been made in Latin America and in the ASEAN region. An NCAP in India will also be launched within the next few years as laboratory capacity comes on stream. There could also be scope for NCAP activity in larger vehicle markets of Africa and Middle East.

NCAP testing is relatively expensive and it is, therefore, difficult to ensure that all cars on the market in newly motorising regions will be tested. Many NCAPs permit manufacturers to sponsor vehicles for testing. This collaborative approach helps increase

the number of models tested. However, vehicle sponsorship almost invariably involves testing a model which the manufacturer is already confident will perform well.

To continue testing a wide range of cars on the market, including those less likely to perform well requires resources. It is important, therefore, that Governments, regional public authorities, multilateral development banks, and philanthropies continue to provide financial support to NCAP activities. Doing so is a highly cost effective means of promoting road safety. Another possibility is to make it a legislative requirement for the OEM to display an accredited NCAP test result for all the models they sell in the relevant market. This is the approach used by the NHTSA's NCAP in the USA.



## RECOMMENDATION 6

Investment should be encouraged in laboratory capacity and skills training to enable homologation, in-use compliance, and independent NCAP testing in all world regions.

Automotive laboratory testing facilities are essential for safety and emissions related homologation, type approvals, and validation of vehicle certification & in-use compliance. They are also needed for the independent consumer testing undertaken by NCAPs. At present there is insufficient laboratory capacity in many middle income countries and this has inhibited their ability to develop effective regulatory and consumer information systems. In some regions the most cost effective approach would be for Governments to work collaboratively to establish at least one regional laboratory to serve their needs and be capable of providing type approval or certification consistent with the World Forum's requirements.

As well as investing in laboratory capacity a parallel effort is needed to support skills training in vehicle regulatory systems and testing. Government Departments or agencies responsible for vehicle approvals need to have available the expertise to ensure the quality and integrity of their homologation processes. Once this level of knowledge exists Governments will be far better equipped to decide on their vehicle safety and environmental priorities and engage with the World Forum and its decision-making processes. This would also help to enhance training and skills development in the automotive sector in general. Global NCAP would especially encourage the World Bank, and its sister Regional Development Banks to give priority to training in vehicle regulatory systems and testing as part of their investment in regional public goods and sustainable transport.



## RECOMMENDATION 7

The automobile manufacturers should make a voluntary commitment to apply front and side impact crash test standards (UN Regs. 94 & 95 or FMVSS 208 & 214) to all their new models from 2016.

The ultimate source of safer vehicles is the automobile and components industries. Their overall record of innovation, stimulated by regulation and consumer demand, has been extremely impressive, developing vital safety technologies such as crumple zones, three point seat belts, airbags and ESC.

Some car companies such as Volvo Car Corporation have a long history of engagement with safety. This has led to the adoption of a 'Vision Zero' commitment with the aim that by 2020 no one should be killed or seriously injured in a Volvo. The challenge now is to encourage more companies to follow Volvo's example not just to invest in new technologies but to also to apply acceptable safety standards across the entire product range of every manufacturer in all global markets.

At its 2013 Annual General Meeting in the Republic of Korea, Global NCAP adopted the Seoul Declaration which called upon the automotive industry to consider adopting a voluntary global initiative to improve the minimum safety standards of new passenger cars sold worldwide. It is not unprecedented for the industry to take such an initiative. For example, in 2006 the 17 automotive CEOs took the welcome step to ensure that seat-belts would be fitted in all models produced by their companies by 2008<sup>51</sup>. Given that the United Nations has declared a Decade of Action for Road Safety it would surely be appropriate and timely for the industry leaders to consider a further voluntary initiative to promote safer automobiles.

Responding to Global NCAP's proposal the International Organisation of Motor Vehicle Manufacturers (OICA) confirmed that safety is "a key priority for vehicle manufacturers", but stressed that "manufacturers are bound by the legislation of the countries and regions in which they operate"<sup>52</sup>. OICA "could not commit to specific requirements that are not necessarily required in all countries and all regions". They further added that "a minimum level of safety performance exists in the current global fleet".

Global NCAP welcomes OICA's prioritisation of safety but cannot agree that a minimum of level safety performance currently exists. It is hard to sustain the view that a minimum level of safety exists when some brand new models on the market today suffer catastrophic collapse of their body shells. The poor structural performance of these 'zero' rated cars makes even the fitting of

a single driver airbag superfluous. If one basic safety system is so poor that another is rendered useless this is surely evidence of less than minimum standards.

Leaders of OEMs and industry associations frequently offer strong statements in support of global standards and harmonisation. For example, Sergio Marchionne the Chairman and CEO of FIAT Chrysler Automobiles has confirmed that, "the world needs standards. Standards help an enterprise manage business-critical issues, such as quality, environmental performance and safety"<sup>53</sup>. Similarly the European Car Manufacturers Association (ACEA) supports "the uptake by third countries of UN Regulations, in an effort to harmonise standards and to reduce the cost of placing automotive products on foreign markets"<sup>54</sup>. And yet at the same time some OEMs seek to delay the introduction of these standards or actively dismiss their application in middle income and low income countries<sup>55</sup>.

Global NCAP strongly believes that the industry as a whole should now make a clear commitment to voluntarily applying UN regulations 94 and 95 to all their new models at the latest in 2016. By applying these standards the industry would encourage harmonisation and contribute to securing a level playing field of fair competition in the emerging automotive markets. It would help to secure a minimum level of safety performance for all passenger cars, and also be a welcome contribution to the UN Decade of Action.

If a joint agreement is too difficult to negotiate, there is also nothing to prevent individual OEMs from making a voluntary commitment of their own. They can confirm that none of their production will fall below UN Regulations 94 and 95. This is certainly already the case for a number of major car companies. By certifying the standards of occupant protection applied to their products they would simultaneously promote the company's brand values and demonstrate their commitment to the safety of their customers.

51 See: <http://www.oica.net/category/safety/safety-belts/> - 4th Global Industry Meeting, Geneva February 26th 2006, Worldwide CEO's Commit to Seat Belts.

52 Letter to Global NCAP from Patrick Blain, OICA President, September 4th 2013.

53 See: Interview published in ISO Focus+, February 2012.

54 See: A Manifesto for a Competitive European Automobile Industry, ACEA June 2014 page 9.

55 See: <http://www.autocar.co.uk/car-news/geneva-motor-show/nissan-chief-slams-criticism-emerging-market-car-standards>.





## RECOMMENDATION 8

The automotive industry should cease the practice of de-specification and bundling of safety features. Instead they should make available the full range of safety design and devices in all their major markets and price the relevant technologies separately.

A significant barrier to deployment of advanced safety technologies is the way in which some OEMs de-specify their model ranges and bundle safety systems with non-safety related items. Such practices prevent market forces from operating effectively and limit consumer choice. Ironically they also undermine the industry's own arguments against mandatory regulation.

Extending fitment rates of life-saving technologies such as ESC or AEB should be a shared objective of industry and consumers alike. However, OEMs frequently de-specify such technologies in the same models sold in different markets depending on the prevailing regulatory requirements. This problem is widespread even among high income countries. In Europe, for example, some OEMs offer AEB as either standard or optional equipment but in Australia the same model is not available with the technology at all.

Bundling is another market practice that adversely affects fitment rates of safety technologies. Typically a new safety feature is made available only as an optional package that includes luxury items such as leather seats or better entertainment system. The additional combined cost is very likely to act as a significant

deterrent to consumer interested in buying a safer car. An inquiry carried out by the Parliament of Victoria in Australia in 2008 found the "the practice of bundling safety technologies with non-safety features to be immoral"<sup>56</sup>. Global NCAP concurs with this opinion.

Rather than manipulate market access in this way, Global NCAP believes that OEMs should guarantee availability (both standard and optional) of the same safety specifications in all car models sold in all major markets. Similarly safety technologies should not be bundled but available as stand-alone options priced transparently. This will encourage early take up of safety systems, grow consumer awareness, and make incentive schemes offered by Governments of insurers more effective. Global NCAP, therefore, recommends that OEMs stop de-specification and bundling and Governments act to encourage the widest possible availability of safety technologies to their consumers.

<sup>56</sup> Parliament of Victoria, Road Safety Committee – Inquiry into Vehicle Safety, August 2008 page 160.



## RECOMMENDATION 9

The automobile manufacturers should improve the content of their sustainability reporting to include data on the applied safety standards of its global vehicle production.

Together with a voluntary commitment OEMs could also improve the safety content of their sustainability reporting. There is growing interest by investors, customers and other stakeholders in the detail and transparency of manufacturers' sustainability disclosures. At present, however, some of the safety reporting published by the OEMs has too much 'spin' and are too selective in the information provided.

Nissan Motor Corporation's 2014 Sustainability Report<sup>57</sup>, for example, claims that their "ultimate goal is to achieve virtually zero traffic accidents involving Nissan vehicles that result in serious or fatal injuries". But this laudable aim sits rather uncomfortably with their continued sale in Mexico of the Nissan Tsuru or their introduction of the Datsun Go in India; both 'zero star' cars that completely fail to provide minimum levels of occupant protection. Similarly, Renault Group's corporate website<sup>58</sup> proudly highlights its fifteen five star results in Euro NCAP but entirely overlooks its considerably less successful results in Latin NCAP (such as the zero star Clio Mio shown on the left) .

Global NCAP believes that OEMs should transparently make available more detailed information to support their safety claims. The Global Reporting Initiative<sup>59</sup> could provide a possible template for better reporting practices. It could, for example, include voluntary road safety commitments and details of the production standards being applied by each OEM. Why not have a declaration of how many passenger cars are produced that fail to pass UN regulations 94 and 95, and list both the number of models rated as zero as well as five stars in NCAP tests? This kind of information would reveal the true safety profile of the company which should be readily available to investors and customers alike.

<sup>57</sup> See: Nissan Motor Corporation Sustainability Report 2014 – page 43.

<sup>58</sup> See: <http://group.renault.com/en/commitments/road-safety/road-safety-for-all/>

<sup>59</sup> See: <https://www.globalreporting.org/information/about-gri/Pages/default.aspx>



## RECOMMENDATION 10

To sustain the in-use safety of automobiles UN Member States should, a) apply conformity of production checks to models already approved on their market, b) carry out regular roadworthiness testing and include tyre depth and pressure checks in such PTI requirements, and c) consider using scrappage schemes to remove older unsafe vehicles from the road.

During the regulatory life-cycle of a motor vehicle testing conformity of production and periodic technical inspection (PTI) play a crucial role in ensuring that a vehicle meets required standards for emissions control and safety, and sustain them whilst in use on the road.

Once approved and on sale a vehicle model should be tested for conformity of production (CoP). This will ensure that later examples of the model continue to meet its regulatory requirements as originally tested and approved. The ability to carry out CoP testing will be much assisted by an increase in laboratory capacity referred to above.

PTI roadworthiness testing is also an important means to ensure that all motor vehicles (both private and commercial) maintain adequate levels of safety and environmental performance during their life on the road.

Recent studies from the UK and Germany indicate that up to 10% of cars have a defect that would cause them to fail these countries' PTI tests. The European Commission has estimated that technical defects are responsible for 6% of all car crashes in their region, accounting for 2,000 fatalities and many more injuries yearly<sup>60</sup>. Since 1977 Member States of the EU must apply minimum standards for PTI. Directive 2009/40/EC applies to passenger cars, buses and coaches and heavy goods vehicles and their trailers. The UN also has an Agreement on PTI adopted in 1997<sup>61</sup>. The Agreement creates UN Rules for PTI and provides Contracting Parties (CPs) with capacity for reciprocal recognition. However, it is underused and only has 12 countries that are CPs. As an integral part of the safe systems approach middle and low income countries should try to develop similar regional framework for roadworthiness testing and also participate in the World Forum's 1997 Agreement.

A vitally important roadworthiness issue is tyre safety. Under inflated and worn tyres extend stopping distances and reduce road holding. They also raise fuel consumption and shorten tyre life. To obtain the full effectiveness of crash avoidance

technologies like ESC and AEB it is, therefore, even more important to encourage car owners to regularly monitor and maintain their tyres to ensure that they are inflated to the manufacturer recommended levels. There is a strong argument, therefore, to include both checks on tread depths and also pressure in the PTI systems of all UN Member States.

Surveys across the EU have shown that up to 65% of European cars have permanently under-inflated tyres. To reverse such trends in the EU and the USA tyre pressure monitoring systems (TPMS) have become mandatory fitment for new passenger cars. The TPMS is a battery powered in-car warning device that alerts the driver when the vehicle's tyre pressure has dropped below recommended levels. Alongside the EU and US legislation the UN Forum has adopted its own TPMS standard in Regulation 64.02 which sets out the technical requirements (e.g. warning indication, malfunction detection, etc.) and compliance test procedure. Rapidly motorising countries could similarly benefit from using TPMS devices particularly in both their public and private sector vehicle fleets.

Finally vehicle scrappage schemes can also contribute to road injury reduction by accelerating the removal of unsafe vehicles from the road. In a number of countries scrappage schemes have been used to promote the retirement of high polluting and fuel inefficient vehicles. For instance, vouchers issued in exchange for a scrapped vehicle can be used to reduce the cost of buying a cleaner vehicle. However, additional co-benefits can also be gained if safety features alongside environmental criteria are included in the specification of the replacement vehicle. This will then improve the overall societal savings of the scrappage scheme.

<sup>60</sup> See: European Commission: Roadworthiness Pack age, Impact Assessment 13/07/2012.

<sup>61</sup> See: 1997 Agreement: "Concerning the adoption of uniform conditions for periodical technical inspections of wheeled vehicles and the reciprocal recognition of such inspections".

## CONCLUSIONS

Improved passenger car safety has a vital role to play in securing the UN's ambitious but realistic goal to halve the forecast level of road deaths by 2020 and then achieve further reductions by 2030. Of course, not all of the necessary progress will come from safer cars. Some of the gains will have to come from better safety of other vehicles, especially motorcycles, and other policy measures such as improved road design and stronger enforcement of traffic rules. This is fully recognised in the Global Plan for the Decade and its five pillared 'Safe System' approach. We need safer roads, safer road users and safer motor vehicles. To bring this about all those involved in road transport share the duty to undertake the maximum they can achieve in their own respective area of responsibility.

In high income countries we have witnessed huge reductions in vehicle occupant deaths as cars have improved their crashworthiness and crash avoidance potential. In low and middle income countries the density and mix of vehicle use widely differs but is also changing rapidly from year to year. So the potential contribution from safer cars will differ from country to country but will be significant nonetheless. In Brazil, for example, the host of the 2nd Global Ministerial Conference on Road Safety, car occupant deaths have risen by 121% between 1998 and 2008<sup>62</sup> and accounted for 22% of total fatalities in 2013<sup>63</sup>. By implementing the Road Map for Safer Cars 2020 in conjunction with other safe systems policies, many middle income countries like Brazil could expect to achieve a 50% reduction in road deaths by 2030. This would be exactly in line with the UN's new framework of Sustainable Development Goals for improved health and transport.

Global NCAP is confident that better regulation and more consumer information will deliver real reductions in the risk of road injury and save lives. But this depends on action now by all UN Member States, and especially all major car producing countries, to apply the most important UN regulations, support NCAP consumer awareness initiatives, and promote measures to sustain in-use safety performance. The twin track approach of regulatory push and demand pull has proved very successful in high income countries and can also work effectively if systematically applied in the rapidly motorising regions. As automotive markets globalise so must the fruits of safer automotive design and technology; this is the challenge of democratising car safety in the UN Decade of Action, and why Global NCAP hopes that UN Member States, UN agencies, development banks and the car manufacturers will welcome and support all the recommendations of this Road Map for Safer Cars 2020.

62 Traffic accidents in Brazil from 1998 to 2010: many changes and few effects, Rev Saúde Pública 2011;45(5), Giancarlo Bacchieril,II & Aluísio J D BarrosII.  
63 See: [http://www.who.int/violence\\_injury\\_prevention/road\\_safety\\_status/2013/en/](http://www.who.int/violence_injury_prevention/road_safety_status/2013/en/)



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## SUMMARY OF RECOMMENDATIONS

- 1 That all UN Member States adopt the following two stage minimum car safety regulation plan and implementation timescale by the end of the UN Decade of Action in 2020:
  - STAGE 1**  
UN REGULATIONS\* FOR FRONTAL IMPACT (NO.94), SIDE IMPACT (NO.95), SEAT BELT AND SEAT BELT ANCHORAGES (NO.14 & NO.16) by 2016 for All All New Car Models Produced or Imported by 2018 for All Cars Produced or Imported
  - STAGE 2**  
UN REGULATIONS\* FOR ESC (NO.13H OR GTR. 8), PEDESTRIAN PROTECTION (NO. 127 OR GTR.9) by 2018 for All New Car Models Produced or Imported by 2020 for All Cars Produced or Imported

*\*or equivalent FMVSSs*
- 2 All UN Member States with significant automobile production should participate in the World Forum for Harmonisation of Vehicle Regulations to promote a levelling up of the safety standards in an open and competitive market for automobiles and their components.
- 3 Fleet purchasers both in the private and public sectors and rental companies should adopt Global NCAP's Buyer's Guide and choose 'five star' vehicles wherever possible.
- 4 Governments and the insurance industry should provide fiscal incentives and to encourage more rapid deployment of new technologies through the passenger car fleet.
- 5 NCAPs should be supported by Governments and donors to extend consumer related testing to include all the world's major automobile markets and the widest range of models especially the most popular and important.
- 6 Investment should be encouraged in laboratory capacity and skills training to enable homologation, in use compliance, and independent NCAP testing in all world regions.
- 7 The automobile manufacturers should make a voluntary commitment to apply front and side impact crash test standards (UN Regs. 94 & 95 or FMVSS 208 & 214) to all their new models from 2016.
- 8 The automotive industry should cease the practice of de-specification and bundling of safety features. Instead they should make available the full range of safety design and devices in all their major markets and price the relevant technologies separately.
- 9 The automobile manufacturers should improve the content of their sustainability responsibility reporting to include data on the applied safety standards of its global vehicle production.
- 10 To sustain the in use safety of automobiles UN Member States should, a) apply conformity of production checks to models already approved on their market, b) carry out regular roadworthiness testing and include tyre depth and pressure checks in such PTI requirements, and c) consider using scrappage schemes to remove older unsafe vehicles from the road.



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