Countries with bicycle friendly road networks are safer for all users

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Abstract

About 1.3 million people die each year as a result of road traffic crashes worldwide. Nearly half of them are "vulnerable road users": pedestrians, cyclists and motorcyclists. Furthermore, the world's fleet of passenger cars peaked at 1 billion in 2010 and car drivers killed most of the 1.3 million people. The World Health Organization believes that road safety generally and bicycle safety in particular need to given priority in all countries .

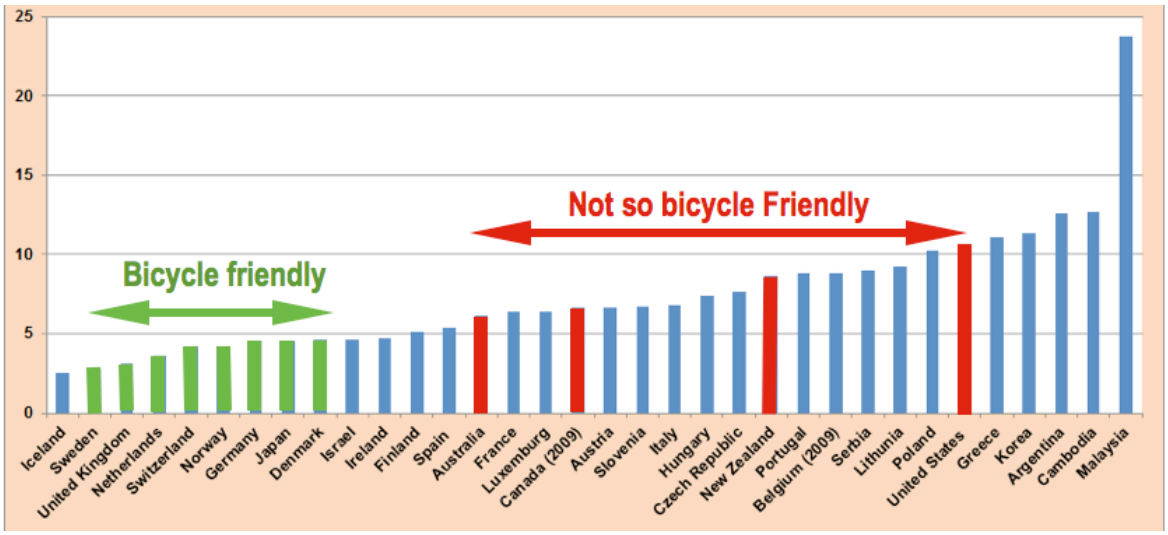
This paper focuses on national road death rates per 100,000 population and the number of bicyclists' deaths in 32 countries in east and western Europe, the Pacific region, Japan and China. Trends from 1970 to 2010 are charted which suggest that bicycling has become much safer in Japan, Switzerland, Germany, the Netherlands and Scandinavia because of their innovative bicycle planning and intermodal bicycle/public transport planning practices. Australian cyclists deaths, which are are charted by state and gender, have declined since 1980.

This paper argues that due to unsustainable vehicle ownership and population trends on expanding road systems in developing countries child cyclists, are at risk. Therefore the resolution of the June 2012 Velo-city global conference (that included Australian representatives) that called for the UN to enshrine "Rights to Cycle" for Children should be endorsed by this conference.

1. The role of WHO in reducing bicycle and pedestrian road deaths

Since 2000 the World Health Organization (WHO), the OECD and the European cycling organizations have done their collective homework about road safety generally and for greater bicycle and pedestrian safety. European countries are focusing on ways to reduce the carnage on the world's roads.

Figure 1 Deaths per 100,000 population in 34 countries showing the relative position of the the bicycle friendly countries in green and not so friendly countries in red and blue



Source: WHO regional data for Europe 2009

The road safety role of the WHO is to persuade the rapidly developing countries to manage their road systems in such a way as to constrain the growth in deaths and injuries to achieve similar levels of safety to those countries with good safety records (shown in green on figure 1). According to the WHO about 1.3 million people die each year worldwide as a result of road traffic crashes mostly in the poorest and developing countries which have little chance of reducing their road deaths below 23 per 100,000 population (see far right of figure 1). Europe's current road deaths are one fortieth of the current world road deaths. (WHO fact sheet No 358 2011))

2. More passenger cars threaten our mobility and health

This paper refers to motor vehicles but its focus is on the **passenger car,** which causes most of the world's road traffic deaths, and vulnerable cyclists and pedestrians. The **passenger car** has at least 4 wheels and is used for the transport of passengers, with no more than 8 passenger seats in addition to the driver's seat . **Passenger cars** make up approximately 74 % of the world's total motor vehicle fleet. The remaining 26% are**:** light commercial vehicles, heavy trucks, road trains, buses, coaches and minibuses. **Passenger cars** today come with different drive units: internal combustion, 4WDs, electric and hybrids (IC & electric). (Worldometers 2012)

In 2012 over 60 million **passenger car**s were produced for the first time in a single year , that is 20 million more than in 2000. Road safety is getting worse in many poor countries because of the growth of both the human and motor vehicle populations. (WHO fact sheet No 358 2011) Add that to the lack of resources and of trained planners to deal with their often unstable or uncontrolled level of level of economic growth.

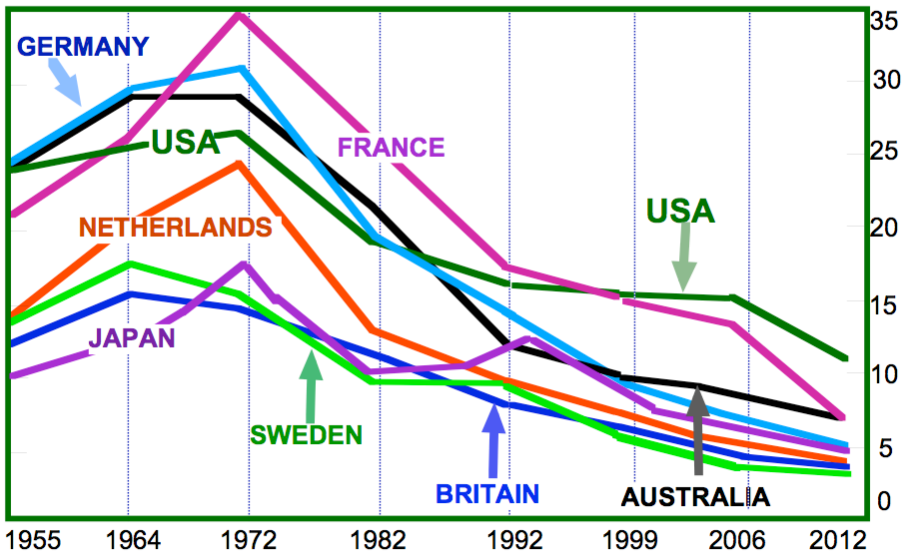
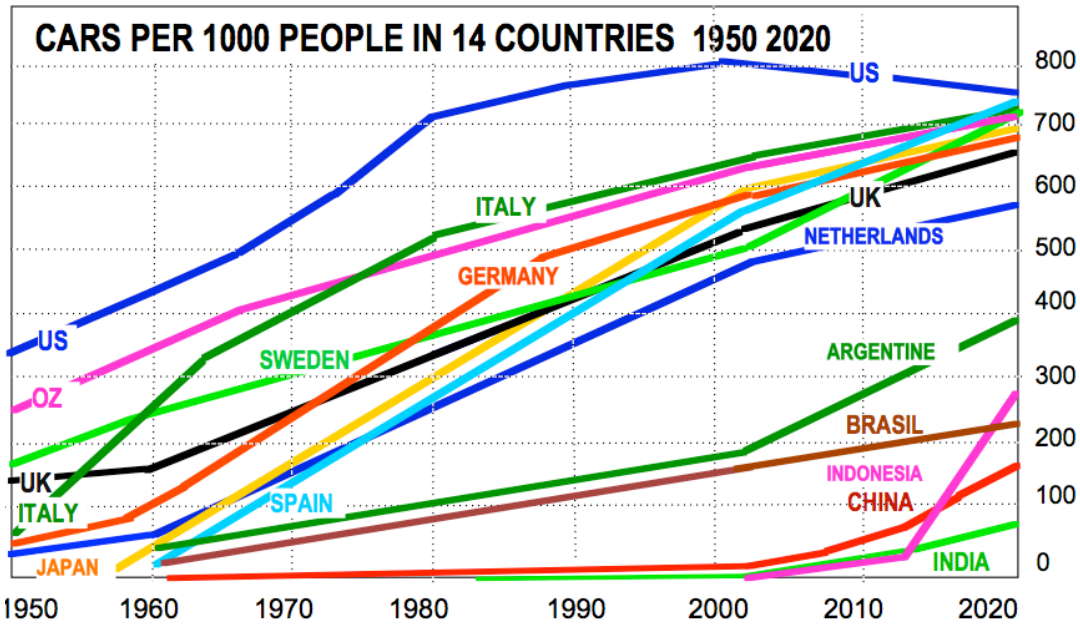


Figure 2 : Road death rates per 100,000 population in 5 EU countries, the US, Japan and Australia from 1955 to 2012
Source: IRTAD (2009 & 2011). 1955-1970 UN Annual Reports of road deaths

Figure 2. shows those European countries and Japan with good road safety records and a not so good record in the USA. The WHO hoped to avoid the mistakes made in the reconstruction of Europe in the 1950s and 1960s. After World War 2, as Europe's car industries expanded, this resulted in 1972 in a peaking of road deaths in the EU countries (shown on figures 2, , 4, 5 and 6). After 1972 the growth in car passenger travel was increased but was constrained by traffic management and road law enforcement measures. The greater use of public transport, walking and

cycling was encouraged in ways that achieved this outcome; in interestingly different ways from after 1972 to the present time.

The WHO mission is to use these different ways of reducing the road death rates in Europe to counter the rapid increase in road death rates in the rest of the world and cope with the world total of 60 million new cars produced in 2011. The number of passenger cars produced in China was 14.5 million, Japan 7.2 million, Germany 5.8 million, South Korea 4.2 million, USA 3 million, India 3 million, Brazil 2.5 million and France 1.9 million. Five developing countries also produced between 600,000 and 500,000 passenger cars: Turkey, Argentine, Indonesia. Thailand,



and Malaysia. (Worldometers 2012)

Figure 3. Passenger cars per 1000 population in 14 countries
Car production has generated higher levels of car ownership per 1000 population in Argentine and Brazil (see figure 4). in the last decade. There are other important car producers starting with South Korea, 4.2 million, and France, 1.9 million, and 10 other producers making more than 500,000 cars.(Worldometers 2012).

3. Population growth threatens our mobility and health

World wide the implications for the future of every day cycling are not good because the demand for motor vehicle traffic is dependent on the growth of population . Only in the high income countries of the EU can we see a resolution of this conflict through reduced population growth and the creation of bicycle friendly road networks. Of the developing countries, only in China do we see a similar commitment to constraining population growth while supporting bicycle use, public transport, high speed trains and the development of electric vehicles (shown on figure 4). We also see the sacrifice made by Chinese families in accepting the necessity of the one child policy.

The ten countries which will contribute *most* to world population growth over the next 30 years are India, China, Pakistan, Nigeria, Ethiopia, Indonesia, the United States of America, Bangladesh, the Democratic Republic of the Congo and Iran - in that order! These countries will create demand for all kinds of road vehicles; and the road death rates will go up due to an explosion in their human population and passenger car fleets. (Worldometers 2012)

China's population is now 1.3 billion and still growing. By the year 2025 the population will have increased to 1.4 billion; with no further population growth it will then decline by 2035, unless their one child per married couple policy is abandoned. India's population is now 1.2 billion and will join China as the world's two most populous nations by 2025, with a total population of 2.8 billion in 2025 (US Census Bureau 2010).

By 2025 India's population will increase by 120 million; Indonesia will grow to 273 million, Bangladesh will grow by 193 million, Pakistan by 130 million and Nigeria by 127 million. The population of the USA will increase to 350 million in 2025. The population of the European Union in 2025 will be around 372 million and reducing.

China's 100 million million bicycle fleet are growth of transport CO2 and pollution in their bicycles and electric than the predicted motor vehicles as is

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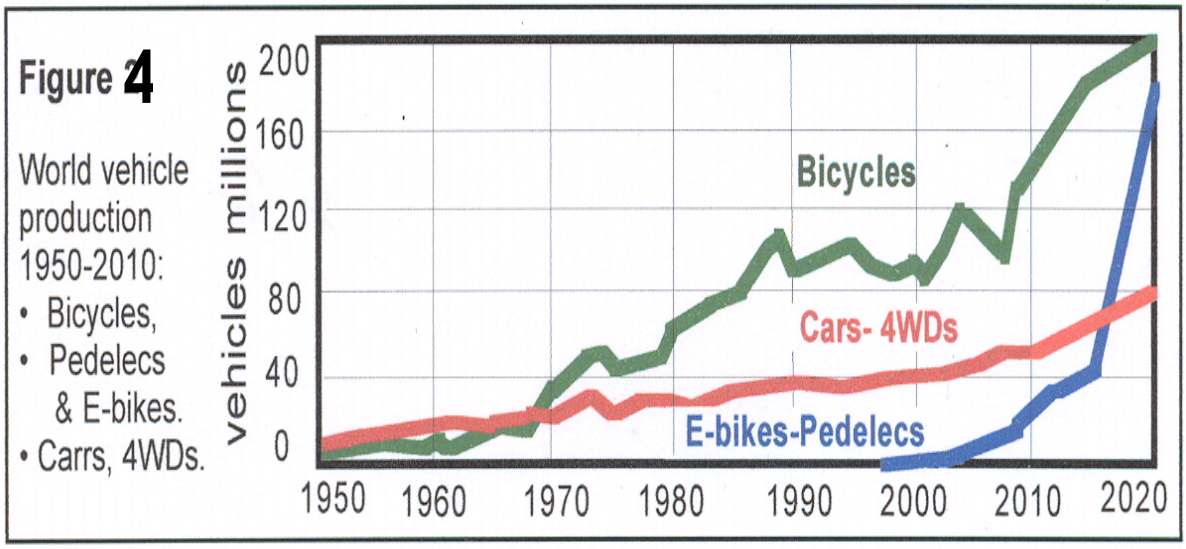
electric bike fleet and 450 already constraining the emissions, oil imports cities. The world fleet of bicycles is growing faster doubling of the passenger shown on figure 4

4. Transport technology needs to be adapted conserve energy

To see the the production of passenger cars in perspective in the developing world a clear picture of the major sustainable alternatives on urban and rural roads is required. Oil and gas supplies for transport have already peaked and will be very costly by 2020, according to many reliable sources.

China's 100 million electric bike fleet and 450 million bicycle fleet are already constraining the growth of transport CO2 emissions, oil imports and pollution in their cities. The world fleet of bicycles and electric bicycles is growing faster than the predicted doubling of the passenger motor vehicles, as is shown on figure 4.

Figure 4: Production of passenger vehicles 1950 to 2020. Bicycles, electric bicycles and pedelecs; passenger cars with different drive units



Source: China bicycle year book in English and Chinese Tokyo (2008). Jamerson, F. and Benjamin, E. Electric bikes worldwide reports 2011 & 2012 update, www.ebwr.com .

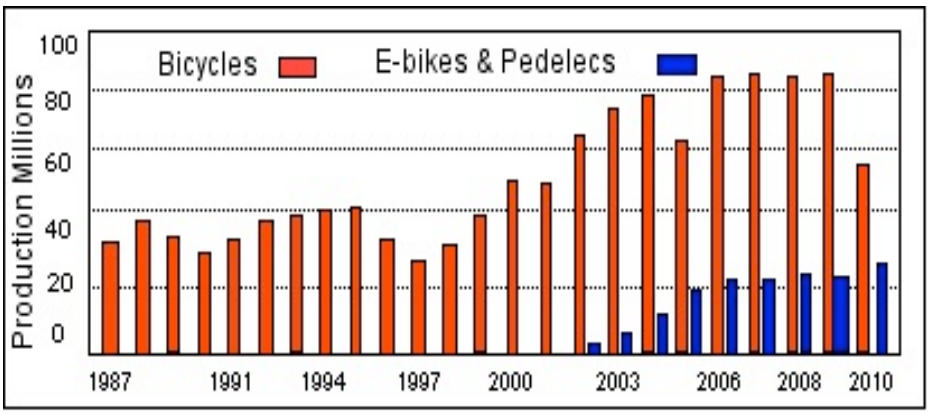
Figure 4 shows one sustainable option - electric bicycles - which is well within the transport technology now available. China produced 84.5 million bicycles in 2011 including 51 million units for export and 3.6 million e-bikes, 600,00 of which were exported.

500 million people live in the under developed areas of China (China Population Census 2010). The 230 million elderly population who live in China's cities and rural areas need more bicycles, electric bikes and scooters to improve their mobility.

Chinese cities will be mass producing quality electric cars , motor cycles, other electric vehicles. Weinert, Jonthan et al (2008)

China has both the capacity and the need to become a global leader in sustainable development and innovation in environmental technology. Only 2.5% of all batteries used in the past were lithium based, but China is gradually increasing and is aiming for 30%. In unified efforts between the Chinese government and industry cycling will be promoted for further economic development and to improve the urban environment.

Figure 5: Growth of China's bicycle and electric bicycle production 1987 to 201



China has succeeded in bringing down its road death rate per 100,0000 population from a high level of 8.8 in 2002 to 4.7, in 2010; a very good performance in 8 years given the number of powered road vehicles in that time. However police reporting of accidents is still slack in China, according to several reports. (Source Cycle Press 2011)

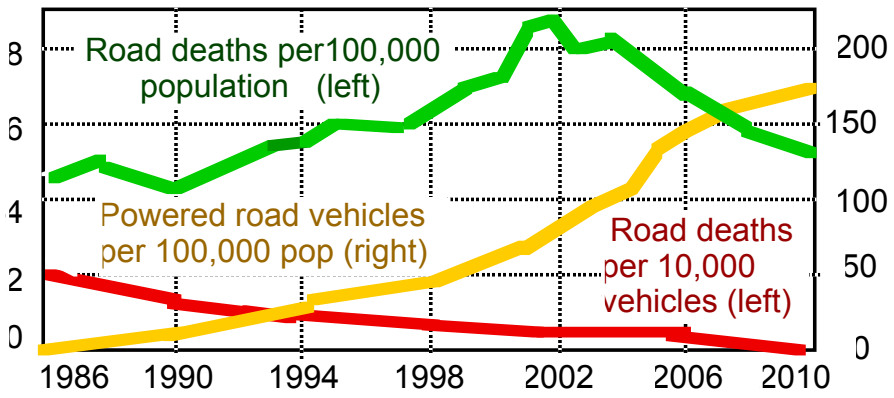


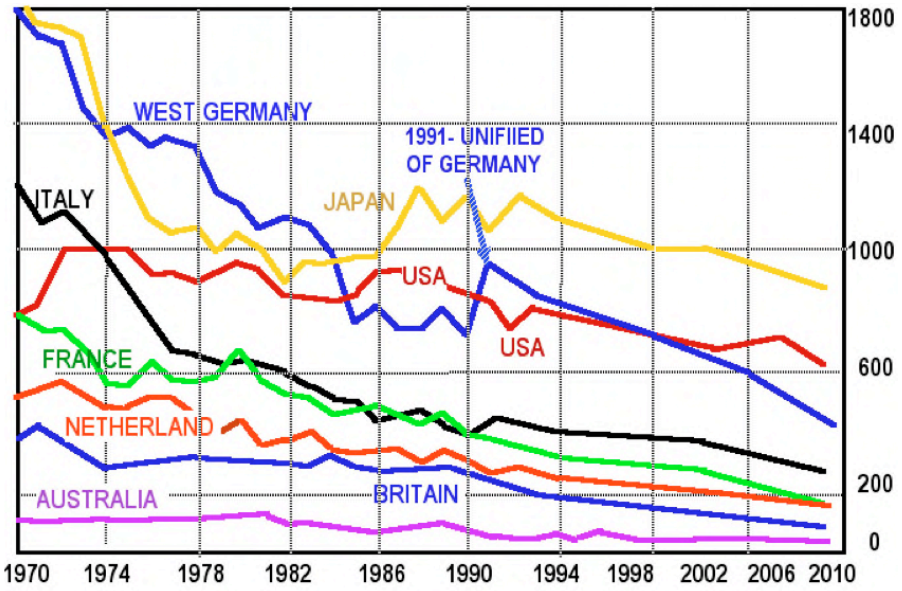
Figure 6: Road deaths in China are still high but their current road death rate trends down are good given the rapid growth in car ownership
Source: Alan Parker (2011)

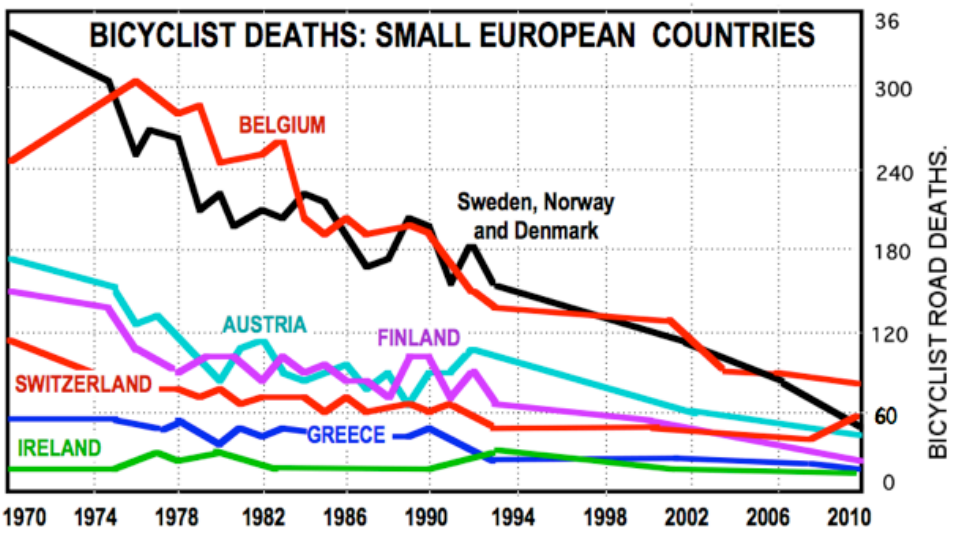
5. Bicycle friendly road networks are safer for all road users

In the last decade the most important change that has taken in Europe is that several bicycle friendly countries have made their road systems much safer for children, bicyclists and pedestrians, particularly the elderly. Consistent accident monitoring throughout Europe has enabled national road deaths to be compared per 100,000 population from 1970 to 2010. Bicycling has become much safer in Japan, Switzerland, Germany, the Netherlands and Scandinavia because of their innovative bicycle planning and intermodal bicycle/public transport planning practices.

Figure 7 shows that in Europe, Japan , Australia and the USA the number of bicyclist deaths dropped from 1955 to 1970 although they had increased following World War 2 due to the priority given to post war reconstruction of damaged infrastructure in the 1950s an 1960s. However Sweden, from 1964, reduced its death rate and and that was noticed by the powers that be who wanted a united Europe to put an end to war, once and for all. The road death rates of the small European countries and Scandinavia (shown on figure 8) confirm that the early Swedish leadership was important throughout Europe. Indeed this provides a model from which Australia and New Zealand could learn.

Figure 7: The decrease in the number bicyclists road deaths 1955 to 2012 in 5 EU countries, the US, Japan and Australia



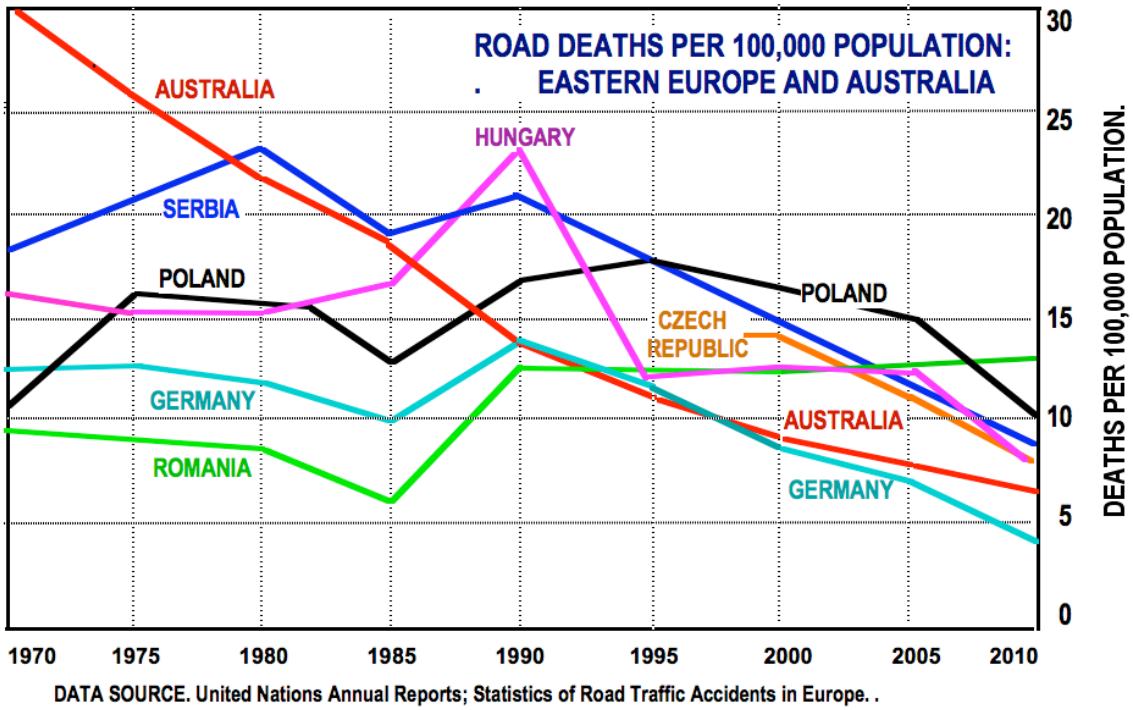


Source: IRTAD reports (2010 & 2011) Parker (1996)

Figure 8: The decrease in the number bicyclists road deaths from 1970 to 2012 in the small European countries.
IRTAD reports 2010 & 2011. Parker (1996)

Road deaths in 8 small European countries from 1970 to 1994 with the exception of Ireland. Since 1970 there has been a large increase in their populations and car ownership, but the total road deaths rates per 100,000 people have declined except for Ireland.
As a general rule those countries that have provided the best bicycle infrastructure and have high levels of bicycle use have the lowest overall death rate per million population for all road users. The small European countries provide a model for large states or regions within a country.

The road safety record of the former communist countries is nothing to be proud of; at least half of their road deaths could have been avoided given that they heavily relied on public transport and that car ownership was very low, as shown table 3. The former East European death rates ranged from 12.5 to 17 deaths per 100,000 population, but by 2009 had dropped to between 7.5 and 12 with around



half the number of cars per 1000 population in 2010. (Dargay et al 2007).

Figure 9. Decline of road death rates in former Eastern European countries & Australia
Source: IRTAD reports (2010 & 2011) (Parker 1996)

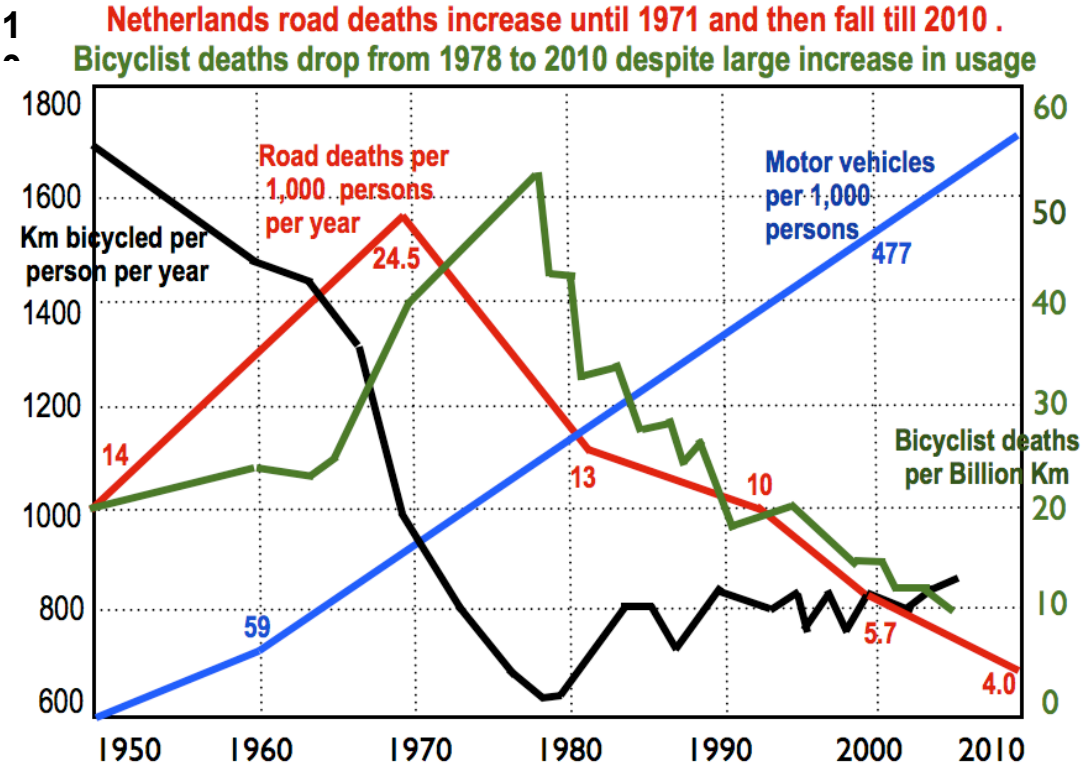
The deaths of all road users 1970-2010 shows that Australia compares well with five of the EU former Soviet republics. Until the unification of East and West Germany in 1990 the German data did not include East Germany but the downward trend since is good news for cyclists. In 2009 car ownership was 660 per 1000 in Australia and 565 in Germany. Much higher than in Hungary 300, Poland 355, and the Czech Republic 400, and far higher than Romania 170, and Serbia 180. Even so between 2001 and 2009 the number of cyclist deaths dropped by around 70%.

Only in Romania was there an increase of 10 %. The safety of cyclists increased in all these countries and pedestrian deaths went down Even in Rumania safety measures were introduced in 2010 that

reduced bicycle fatalities in 2011**.** These countries are all investing in footpaths and traffic calming programs as result of WHO initiatives.

5. Netherlands road networks are safer for all road users

In Australia and New Zealand no robust national data are collected regularly for "all walking" and



"all cycling trips" which makes it difficult to measure how safe cycling is per distance travelled and the death rate per billion kms.` The only time this was measured in Australia was in 1985 (INSTAT 1989)when the Netherlands was 5.6 times safer for walking and 2.2 times safer for .bicycling.

Source: Netherlands Ministry of Transport (2007) . IRTAD 2011

Figures 10 shows the large reduction in death rate per billion km of bicyclists from 1978 to 2010 and the large increase in bicycle Kms travelled from 1978 to 2008. The decrease in cycling from 1950 to 1980 is driven by increased motor vehicle use (blue) which increases from 1950 to 2010. But total road deaths per 1000, persons (red) rapidly increases from 14 in 1950 to 24.5 in 1970 then drops down to only 4 in 2010. Cycling is forecast to rise much further even if the EU economy fails. abilise.

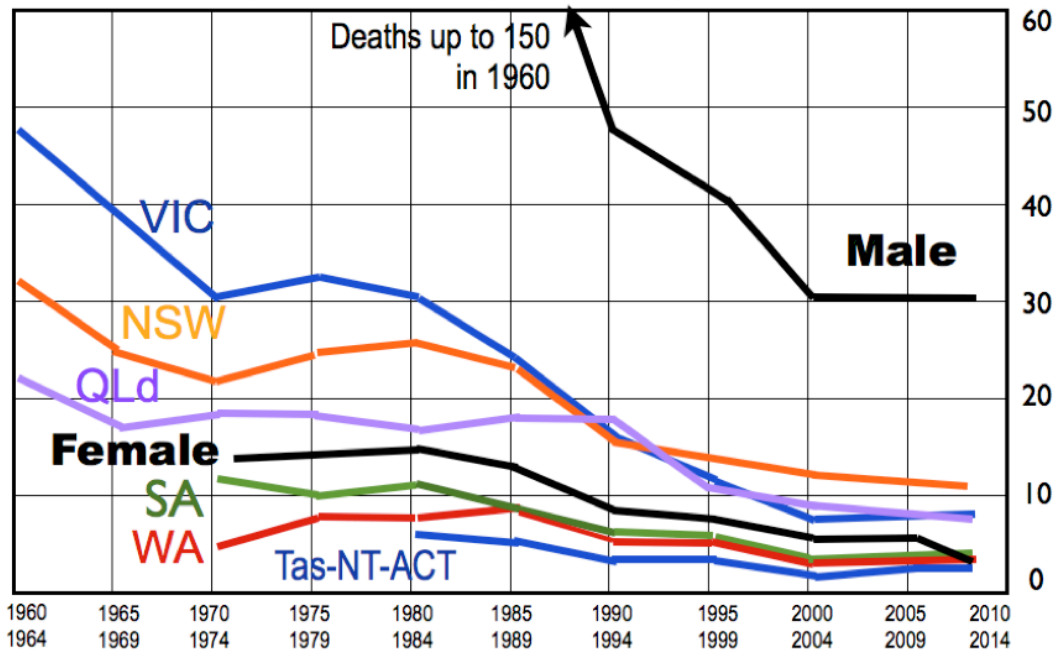
Jan Gerard, who is perhaps Australia's leading bicycle planning consultant, sums up the merits of learning from world best practice in the Netherlands as follows:-

"The Netherlands recognised several decades ago that for the multiple short-to-medium distance trips that characterise daily living, the most efficient vehicle is the bicycle. This is also feasible for Australia, where about 50% of household trips in urban areas are less than 5km. Despite already having excellent cycling infrastructure, the Netherlands continues to invest about $25 per head per annum in cycling infrastructure.

Annual investment in cycling infrastructure varies across Australia's states, territories and local government areas, but rarely exceeds $10 a head. The Victorian Government's decision to no longer fund bicycle infrastructure may well mean that Victoria now takes the wooden spoon for state-funded cycling investment" Gerrard, Jan (2012)

Most of Australia's population lives in urban areas; in total the urban areas are not so different from the urban rural areas of the Netherlands. It is pretty clear that in the Australian capital and provincial cities about $20 per head per annum is what could be described as the Australian bicycle movement's demand from all local, state and federal governments. It will be difficult to work out an equitable distribution by the three tiers of government but the time has come to ask for what is needed: $20 per head per annum per urban area and a 13 % cycling mode target.

Figure 11: Deaths of Australian bicyclists by state and gender



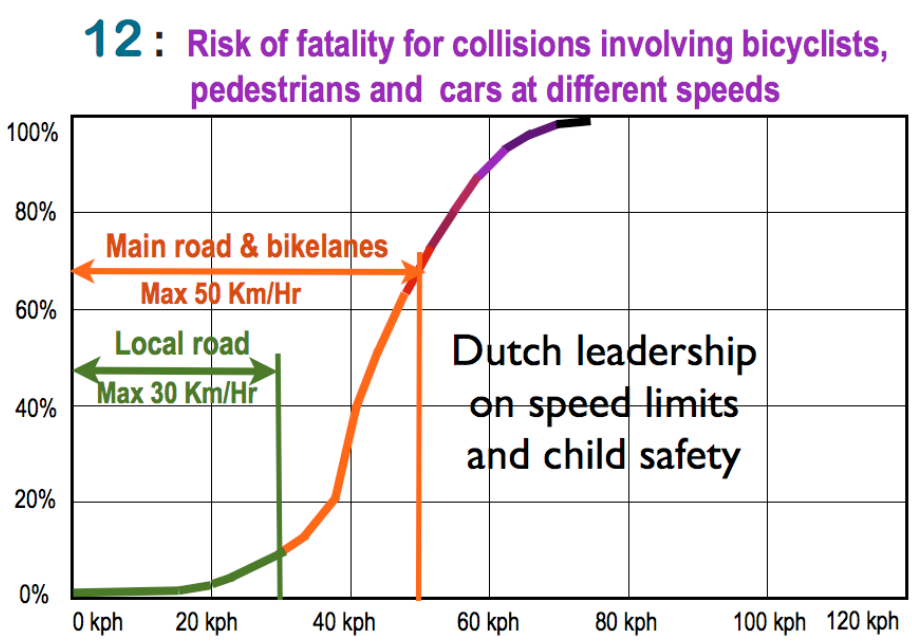
NOTE: deaths are aggregated into 5 year periods to smooth the trends. Some data1960 to1970 NA

My experience of this problem comes from my own enlightenment when 20 years ago I did a study tour of bicycle facilities in 10 Dutch cities after which I produced long articles in the cycling and planning press in Australia. After my study tour I was advocating to road engineers and urban planners that they travel and study to learn from world best practice in the Netherlands, Denmark and Sweden .

6.Conclusion

This paper concludes that due to unsustainable vehicle ownership and population trends in the developing world, that many of the world's child cyclists, are at risk on their rapidly expanding road systems. Therefore the June 2012 Velo-city global conference call for the UN to enshrine the "Rights to Cycle" for Children should be endorsed by this conference. The simplest way to promote this idea is to tecognise that speed limits are an important in the growing world cities. And that is where speed kills as shown on figure 12

This paper



examines the problems facing cyclists on the roads in Australia by considering world best road safety practice in the 30 countries in Europe, in China, the USA and Japan. It describes the work of the WHO in coordinating world road safety programs and particular its strategy for reducing deaths on the world's roads and for the better integration of public health and transport objectives.
This paper proposes an increased level of funding, based on world best practice in Europe, to enable Australian governments to fund bicycle infrastructure . This will enhance the mobility and health of the young, the elderly and the partially disabled. Parker, A A (1993)

For those those concerned with fossil fuel shortages need to know that China is a major Australian trading partner and can mass produce bicycles and electric bicycles to EU regulations and safety standards, and is reducing its air pollution and road death rate for all road users per 100,000 population.
For most other developing countries. In 2020 solar charged electric bicycles will potentially be just as important as the various kinds of hybrid car in reducing carbon dioxide emissions and for reducing

the growing dependence on imported crude oil that will probably increase to US$150 plus per barrel in a year or so (Parker 2006 and 2007). Australia also needs both these hybrid vehicles and lots of them as quickly as possible.

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