TRENDS IN ROAD SAFETY

A BRITISH SUCCESS STORY

by

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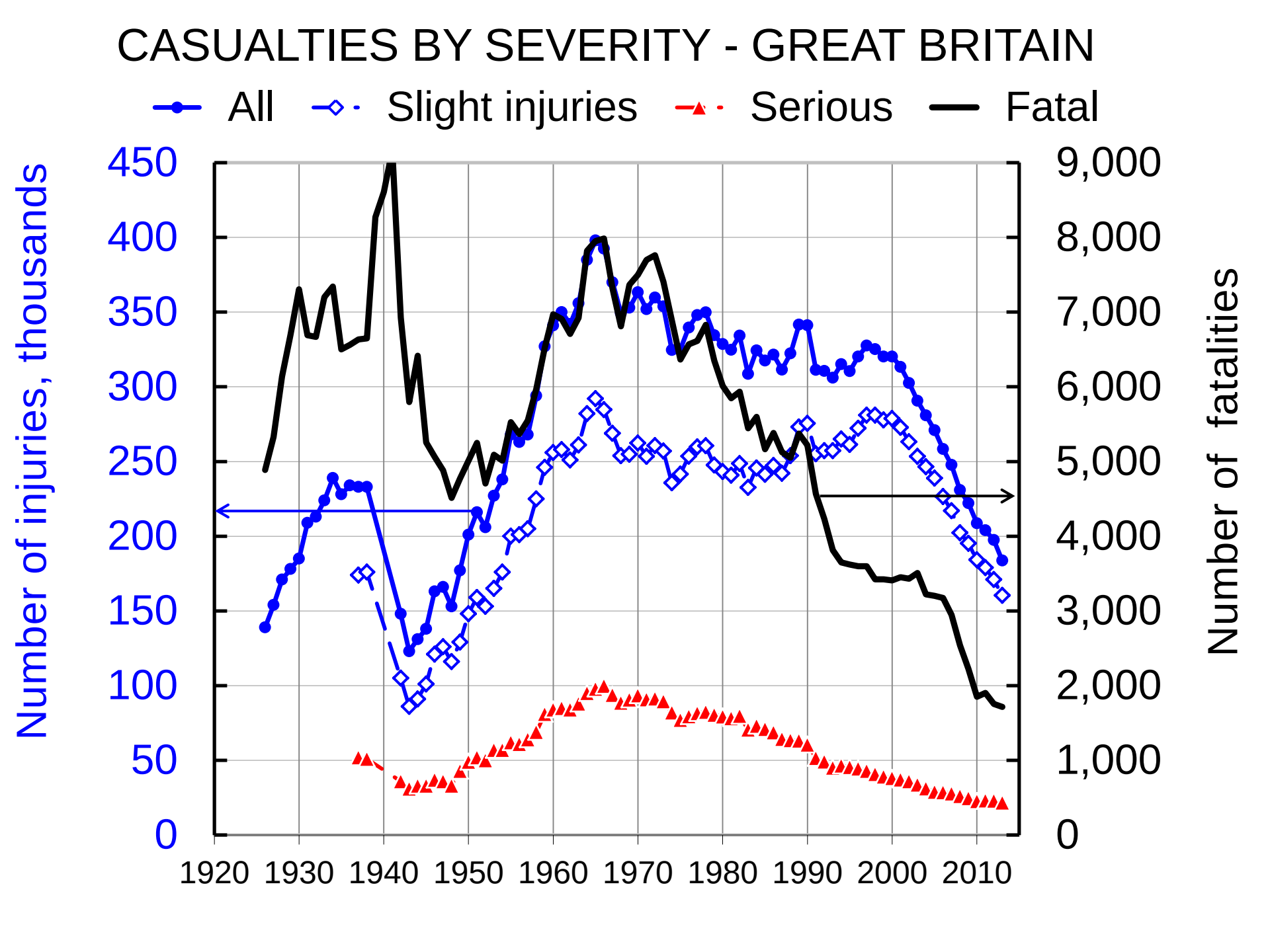
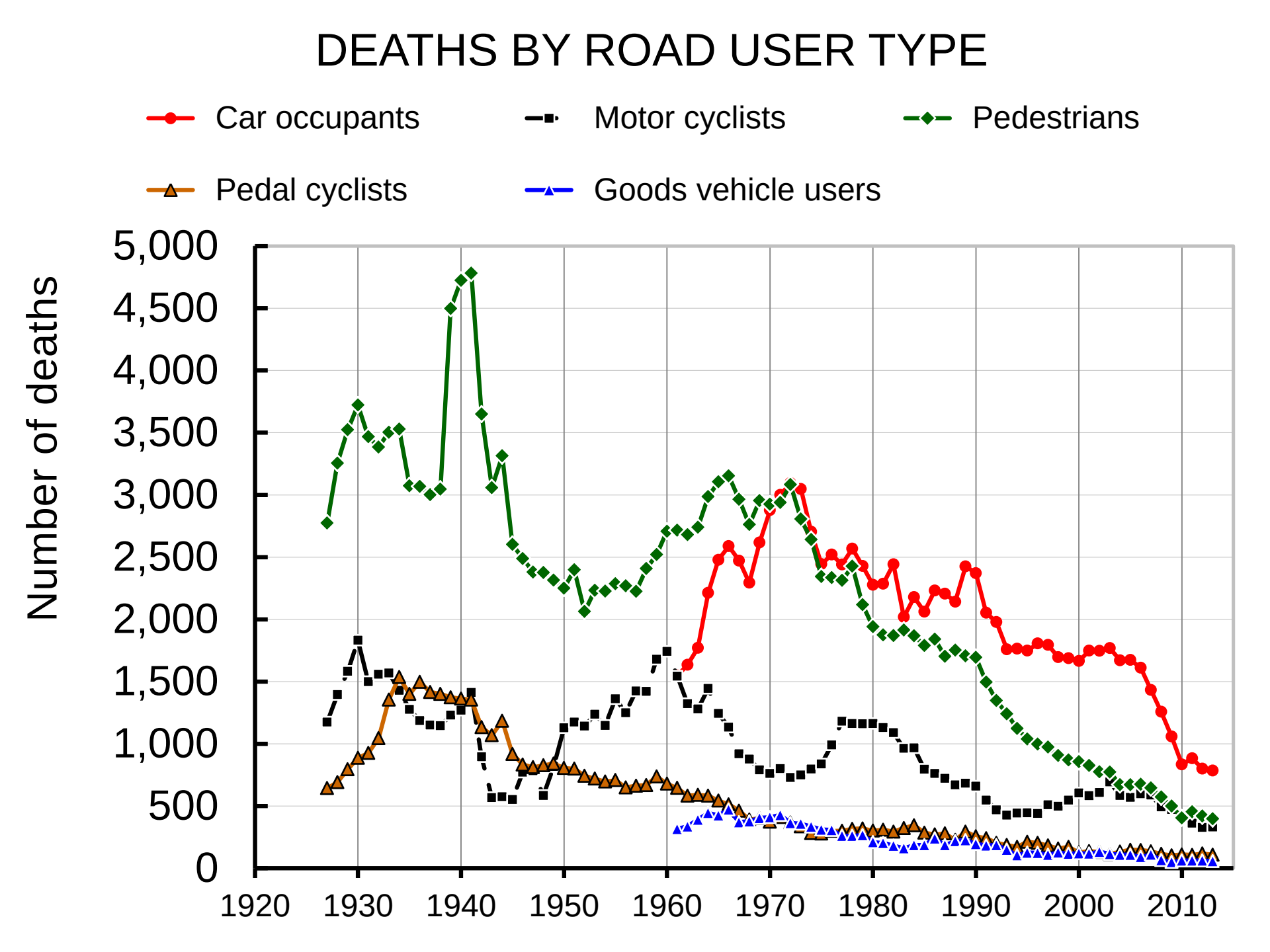
In this talk, I plan to cover

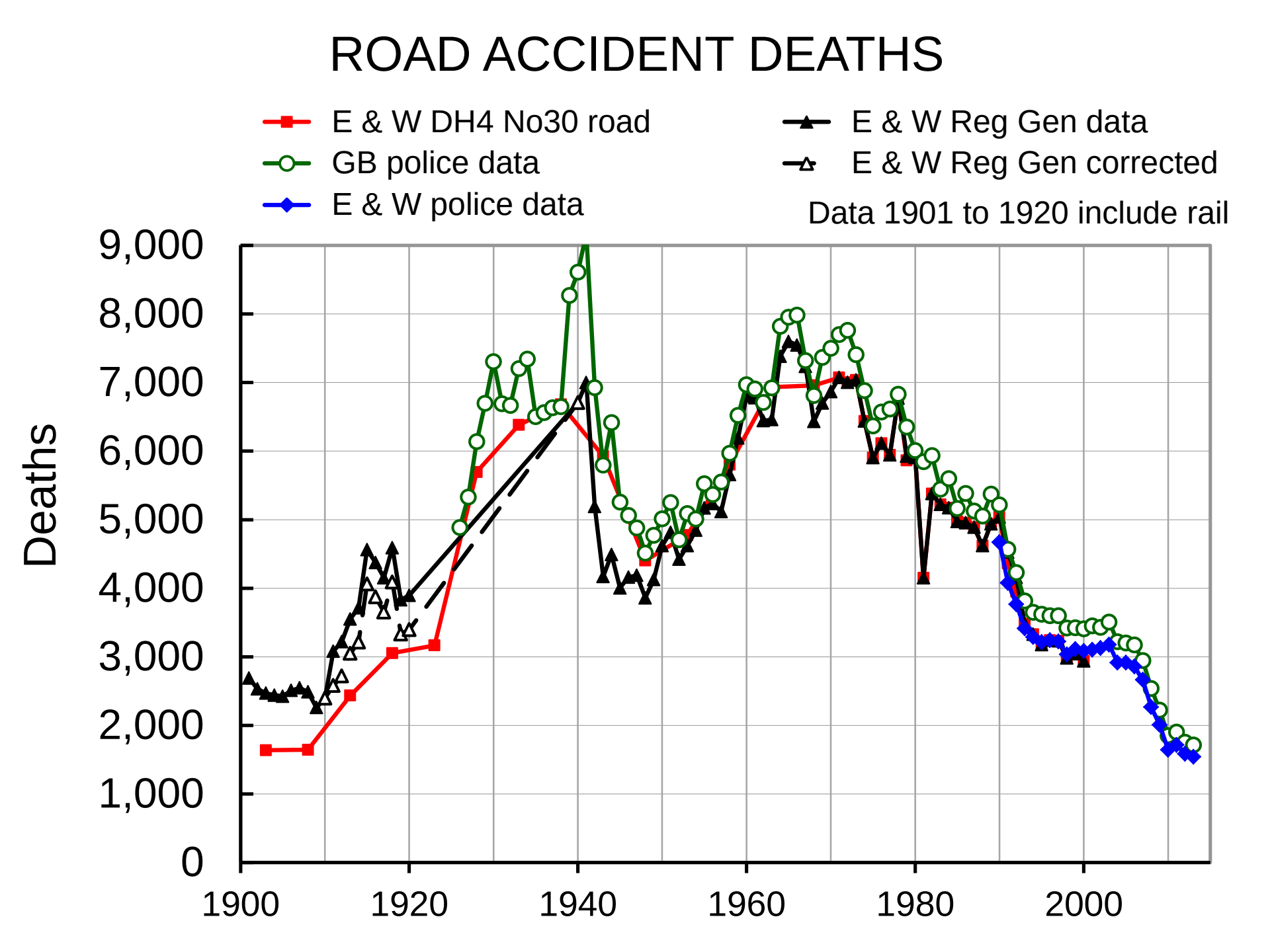
- Trends in road casualties in Britain;
- How Britain compares with other countries;
- Who is involved in accidents;
- Factors contributing to casualties;
- Safety of pedal cyclists;
- A look to the future.

Casualty trends

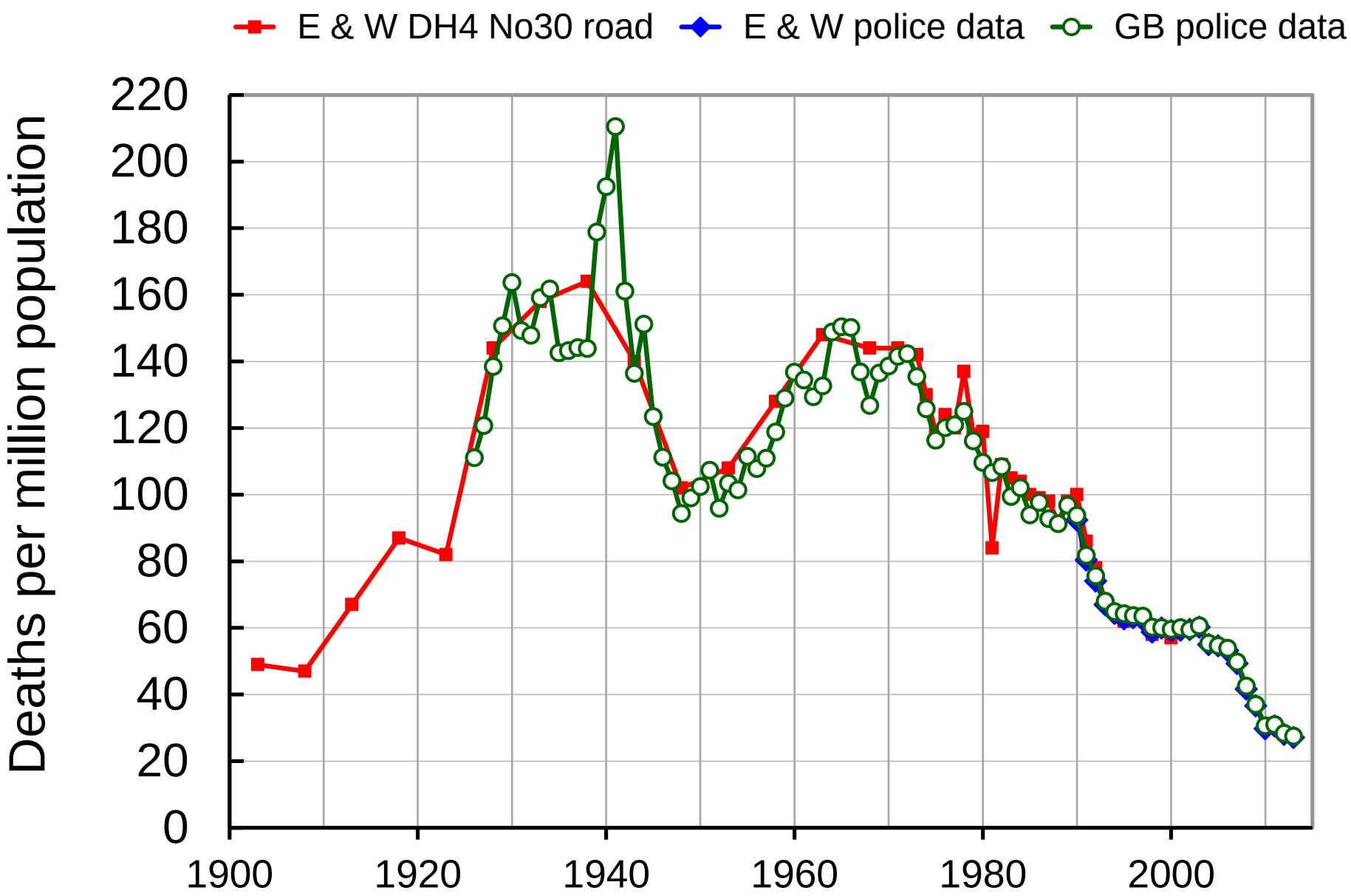
Britain


CASUALTIES BY SEVERITY - GREAT BRITAIN
All
Slight injuries
Serious
Fatal
Number of injuries, thousands
Number of fatalities
450
400
350
300
250
200
150
100
50
0
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


DEATHS BY ROAD USER TYPE
Car occupants
Motor cyclists
Pedestrians
Pedal cyclists
Goods vehicle users
Number of deaths
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


ROAD ACCIDENT DEATHS
E & W DH4 No30 road
GB police data
E & W police data
E & W Reg Gen data
E & W Reg Gen corrected
Data 1901 to 1920 include rail
Deaths
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1900
1920
1940
1960
1980
2000

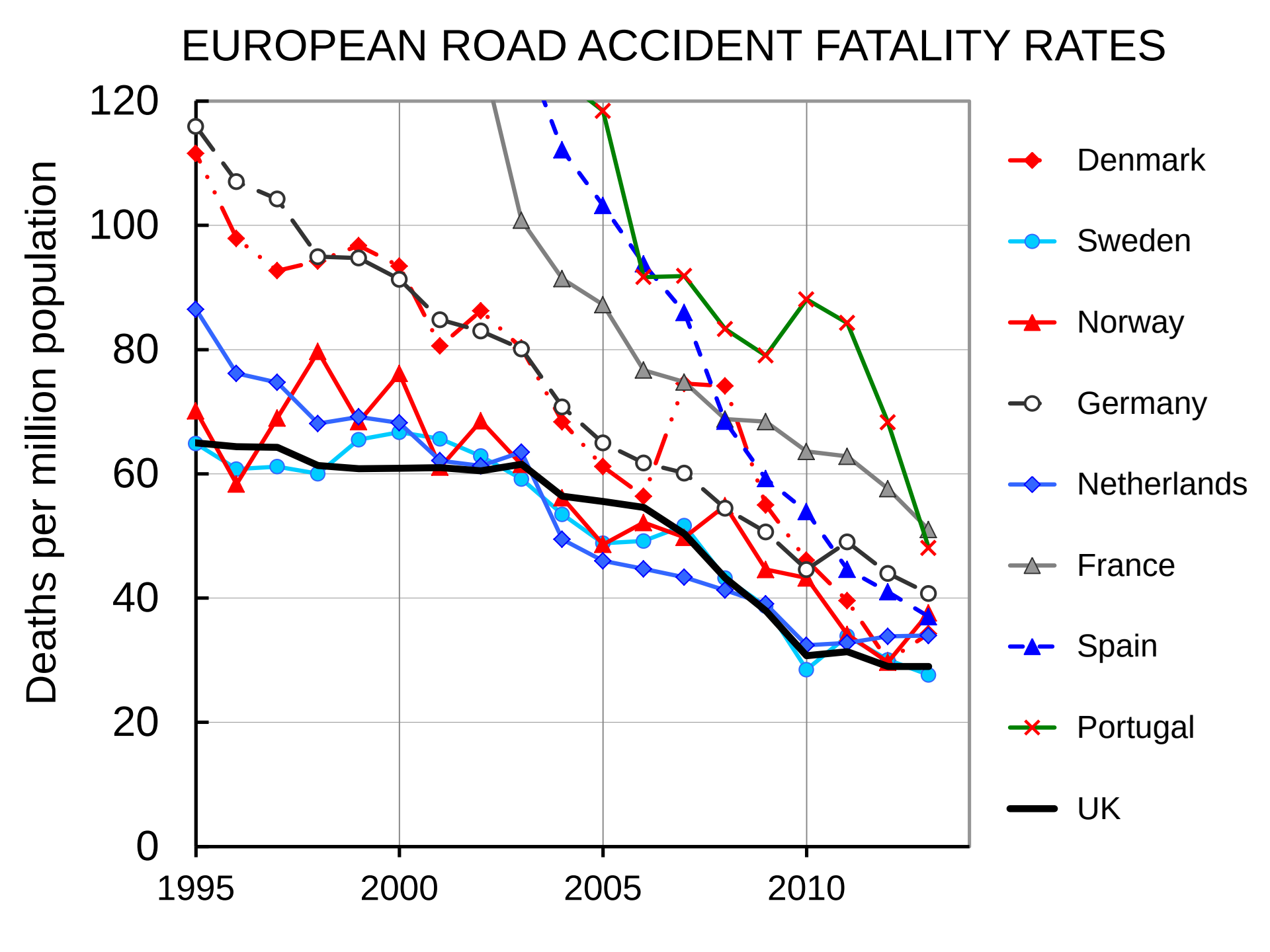
ROAD FATALITY RATE

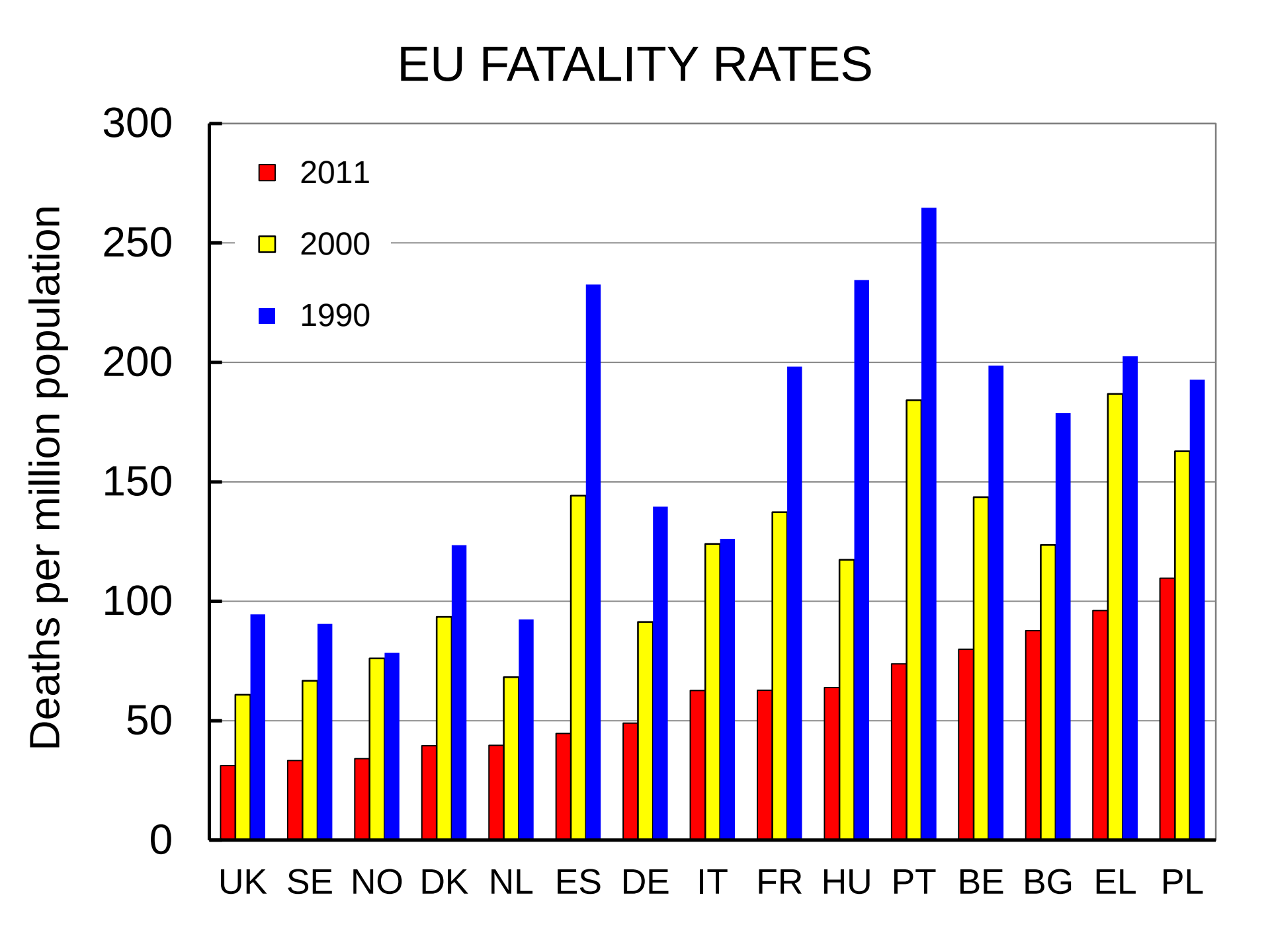


The runaway bus

Cartoon, mid 19th century (from Burke, Streets of London)

How does Britain compare with other countries?


EUROPEAN ROAD ACCIDENT FATALITY RATES
Deaths per million population
120
100
80
60
40
20
0
1995
2000
2005
2010
Denmark
Sweden
Norway
Germany
Netherlands
France
Spain
Portugal
UK

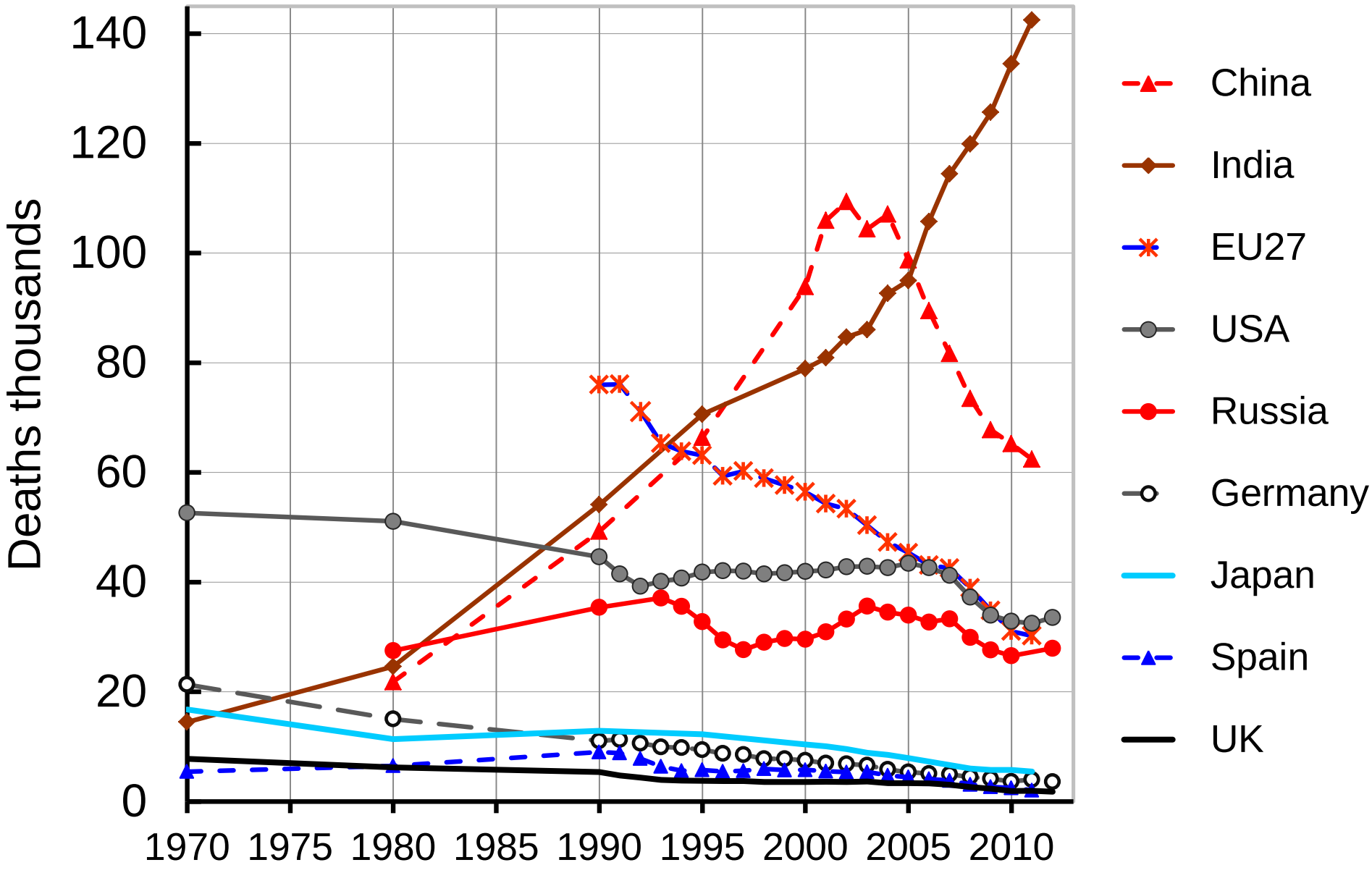

EU FATALITY RATES
Deaths per million population
300
250
200
150
100
50
0
2011
2000
1990
UK
SE
NO
DK
NL
ES
DE
IT
FR
HU
PT
BE
BG
EL
PL

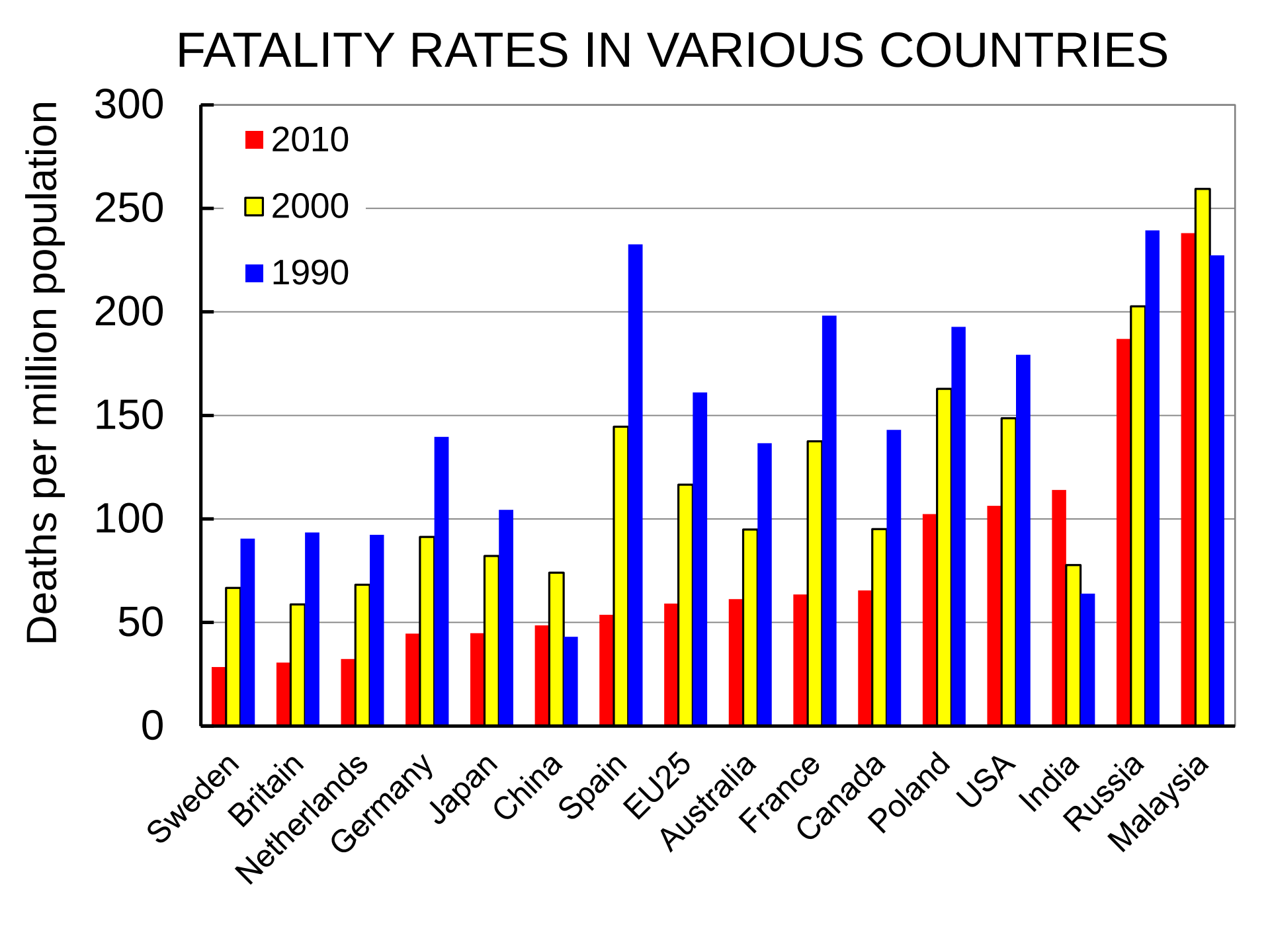
Looking further afield

Road safety world wide

- Road deaths are already around 1.25 million, more than a major disease such as malaria
- Over 90% occur in lower income countries
- Most involve young people
- Deaths are expected to increase as car and motorcycle ownership rises
- World Bank predicts a 66% increase in deaths between 2000 and 2020

ROAD DEATHS – VARIOUS COUNTRIES

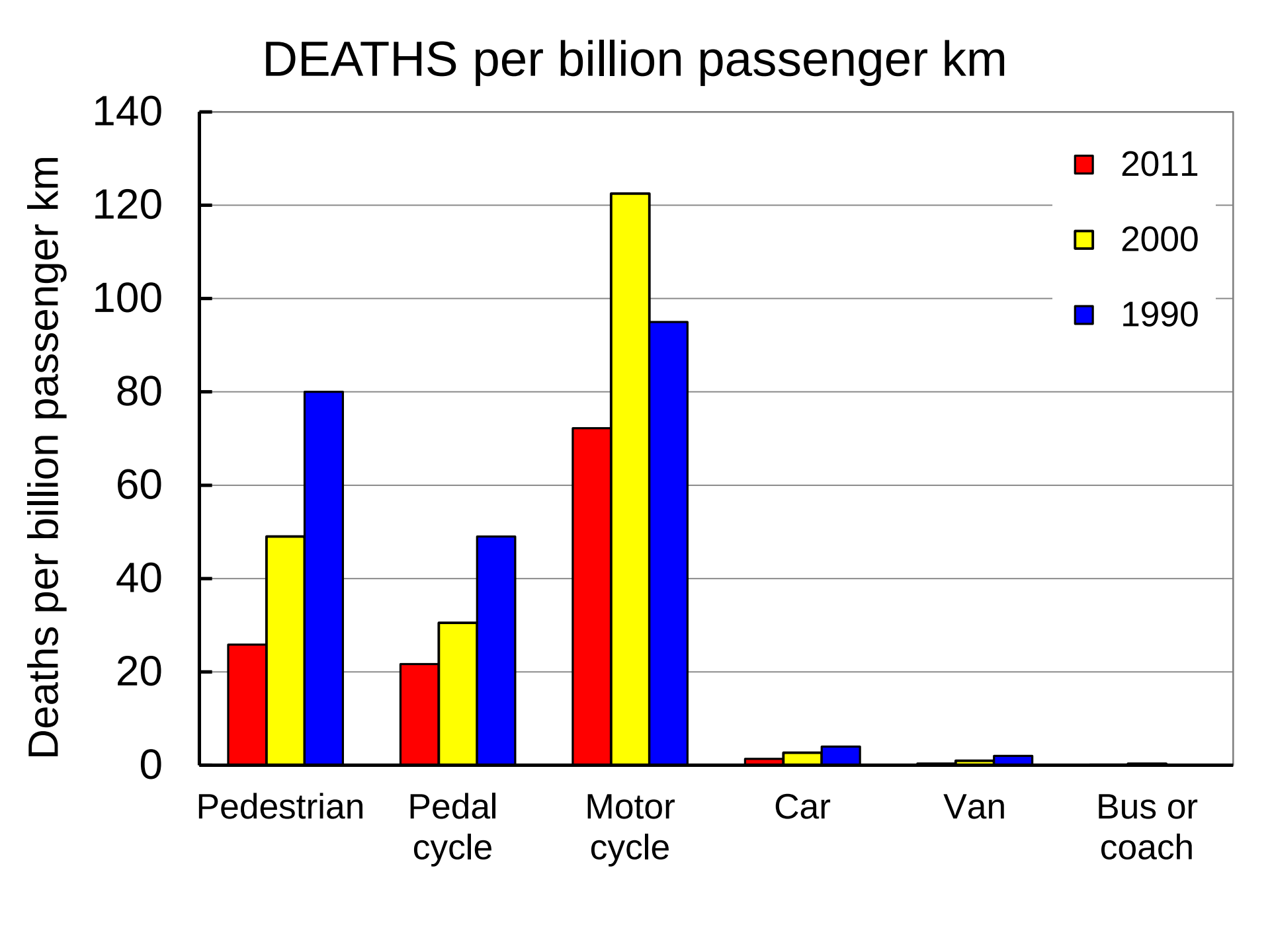


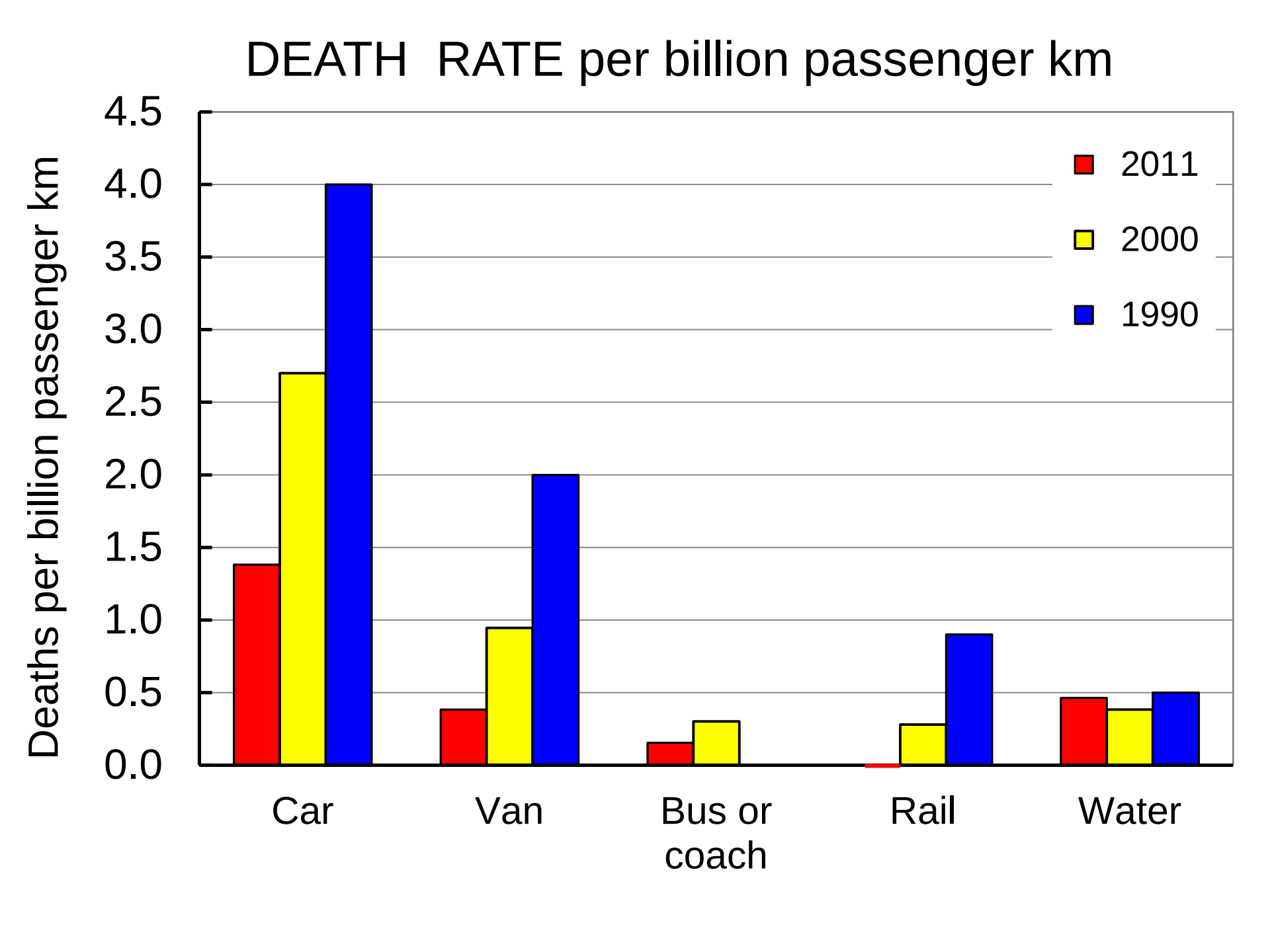

FATALITY RATES IN VARIOUS COUNTRIES
Deaths per million population
300
250
200
150
100
50
0
2010
2000
1990
Sweden
Britain
Netherlands
Germany
Japan
China
Spain
EU25
Australia
France
Canada
Poland
USA
India
Russia
Malaysia

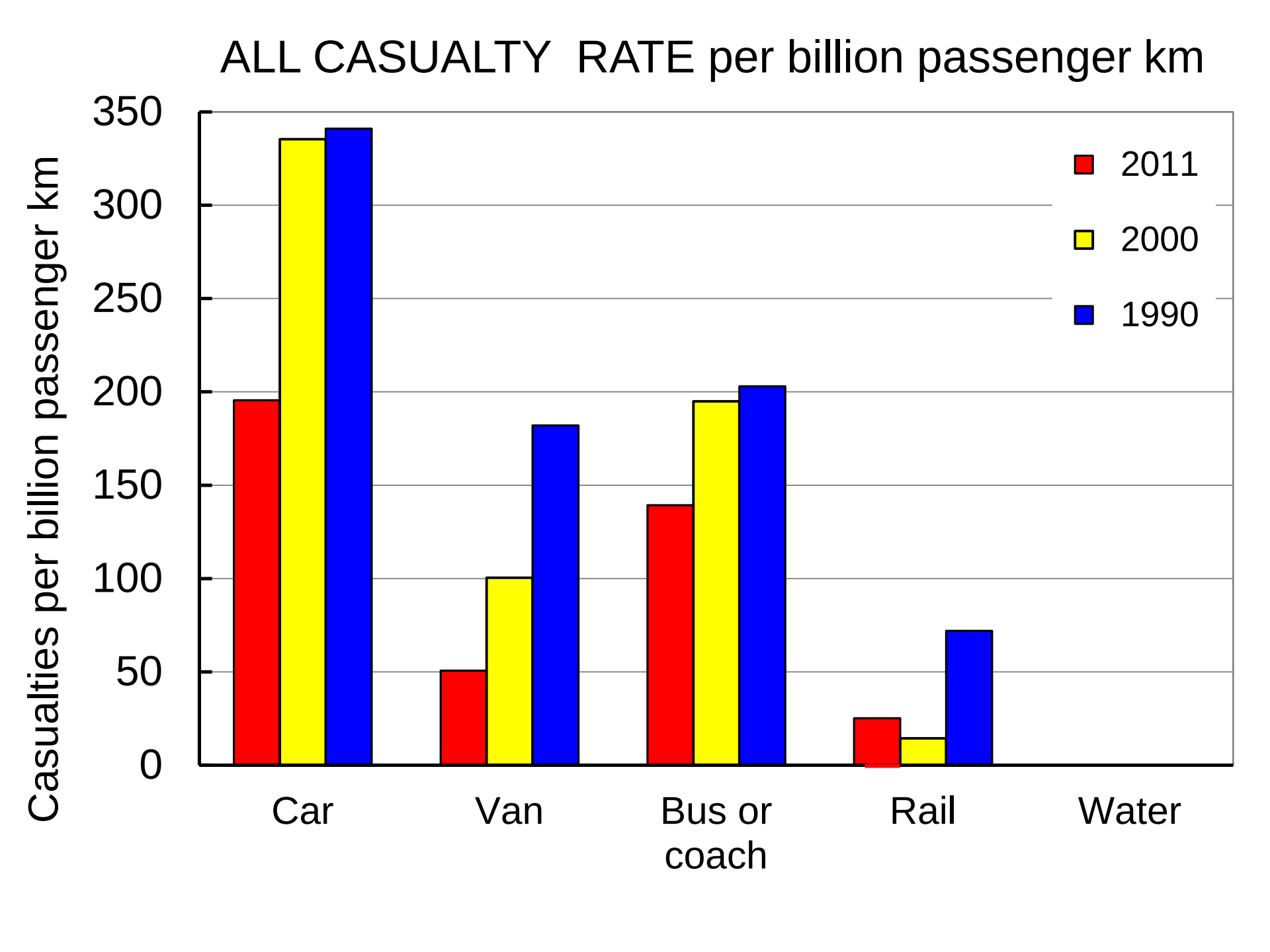
Who is involved in road accidents in Britain?

Road user type, age and gender

Risk of injury or death by mode

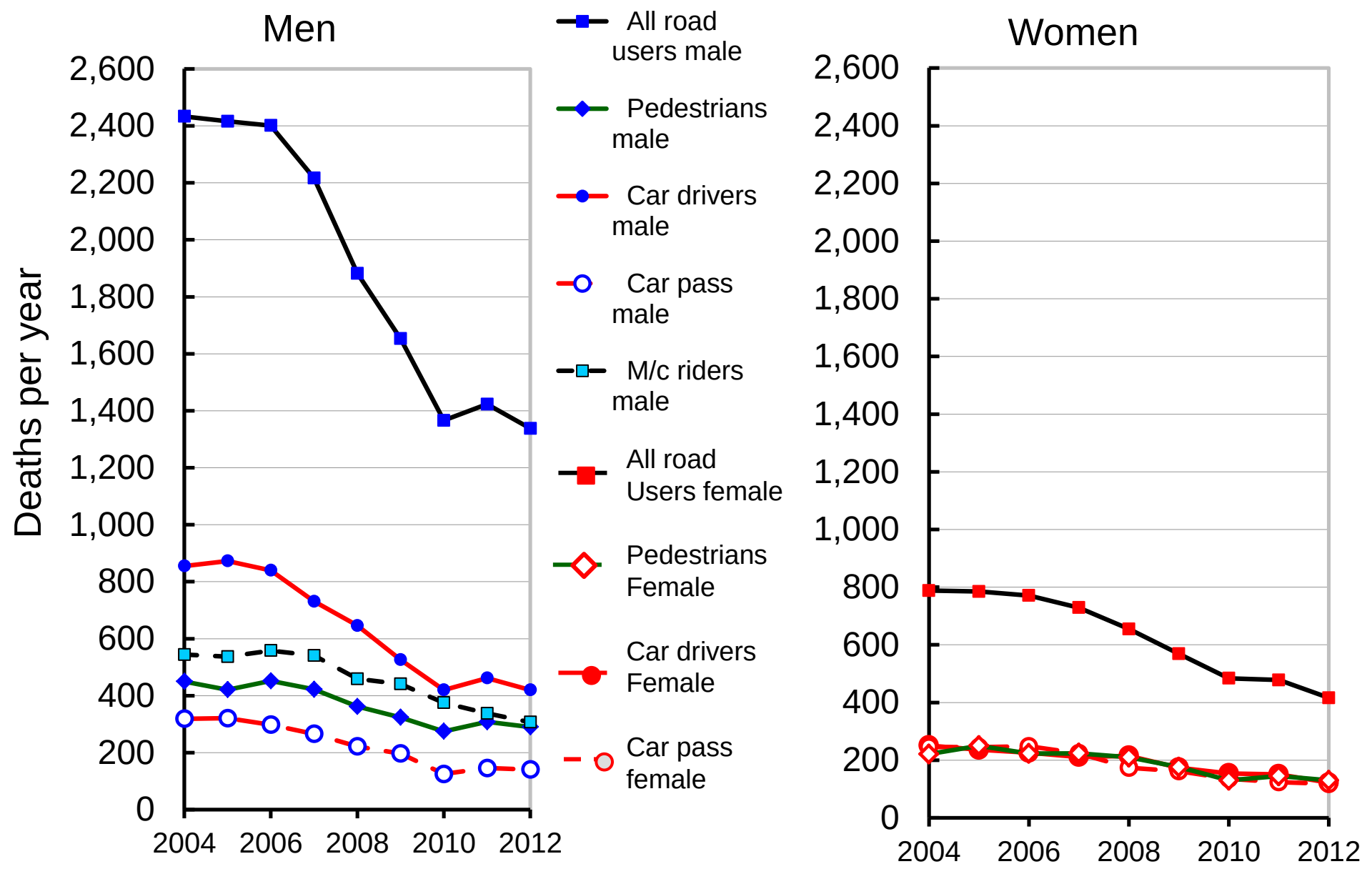

DEATHS per billion passenger km
Deaths per billion passenger km
140
120
100
80
60
40
20
0
2011
2000
1990
Pedestrian
Pedal cycle
Motor cycle
Car
Van
Bus or coach

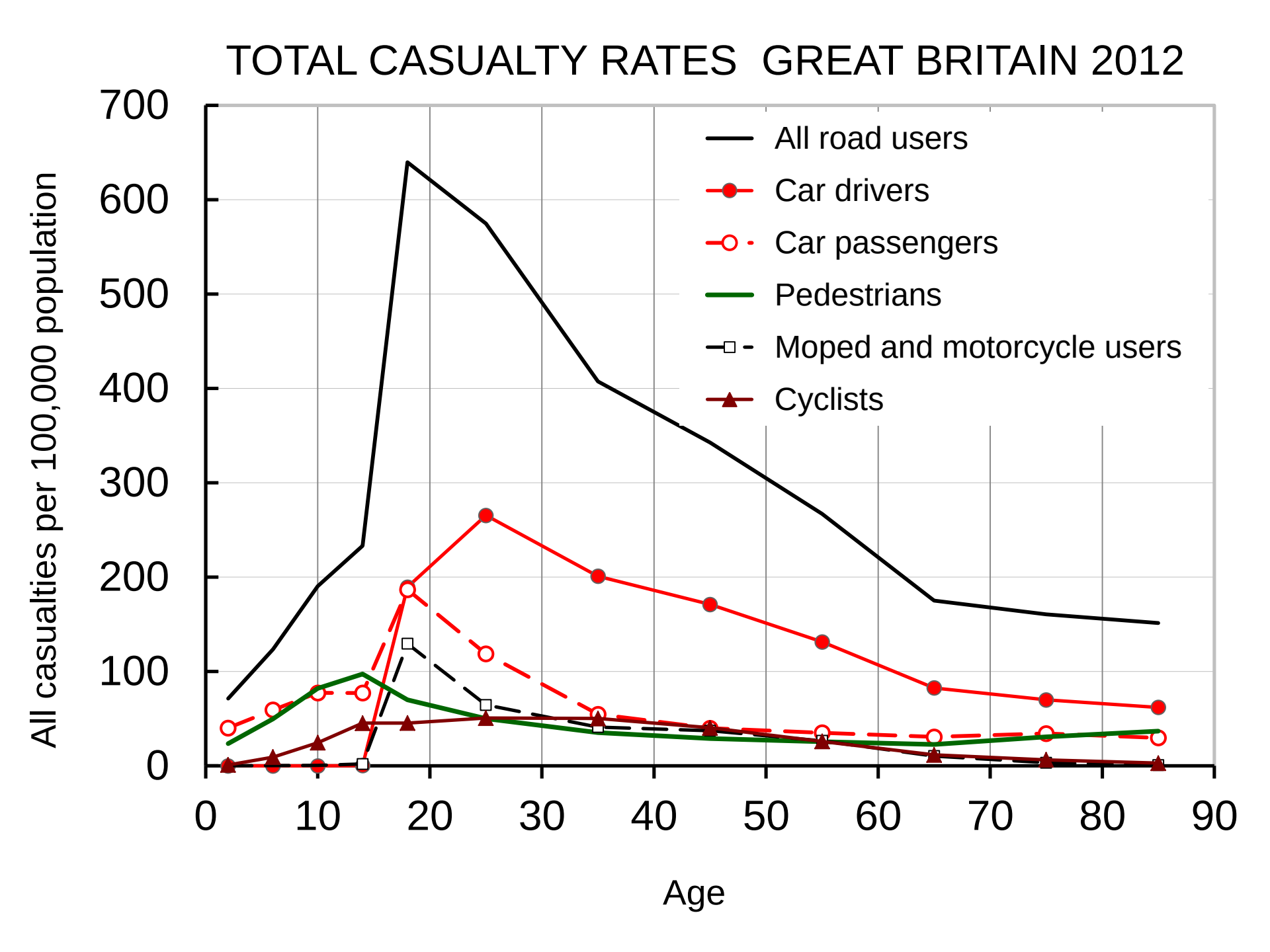

DEATH RATE per billion passenger km
Deaths per billion passenger km
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2011
2000
1990
Car
Van
Bus or coach
Rail
Water

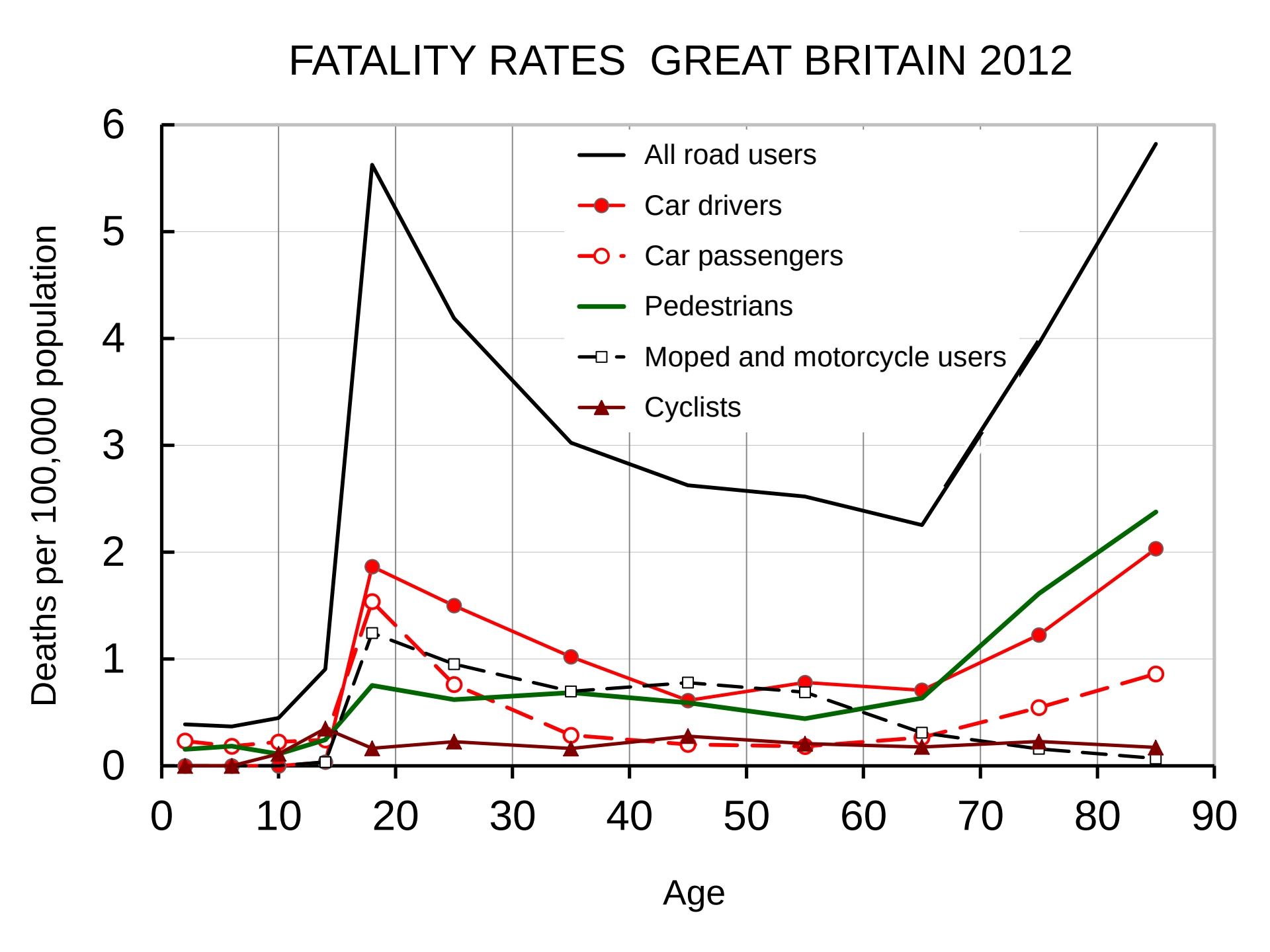

ALL CASUALTY RATE per billion passenger km
Casualties per billion passenger km
350
300
250
200
150
100
50
0
2011
2000
1990
Car
Van
Bus or coach
Rail
Water

Casualties by age and gender

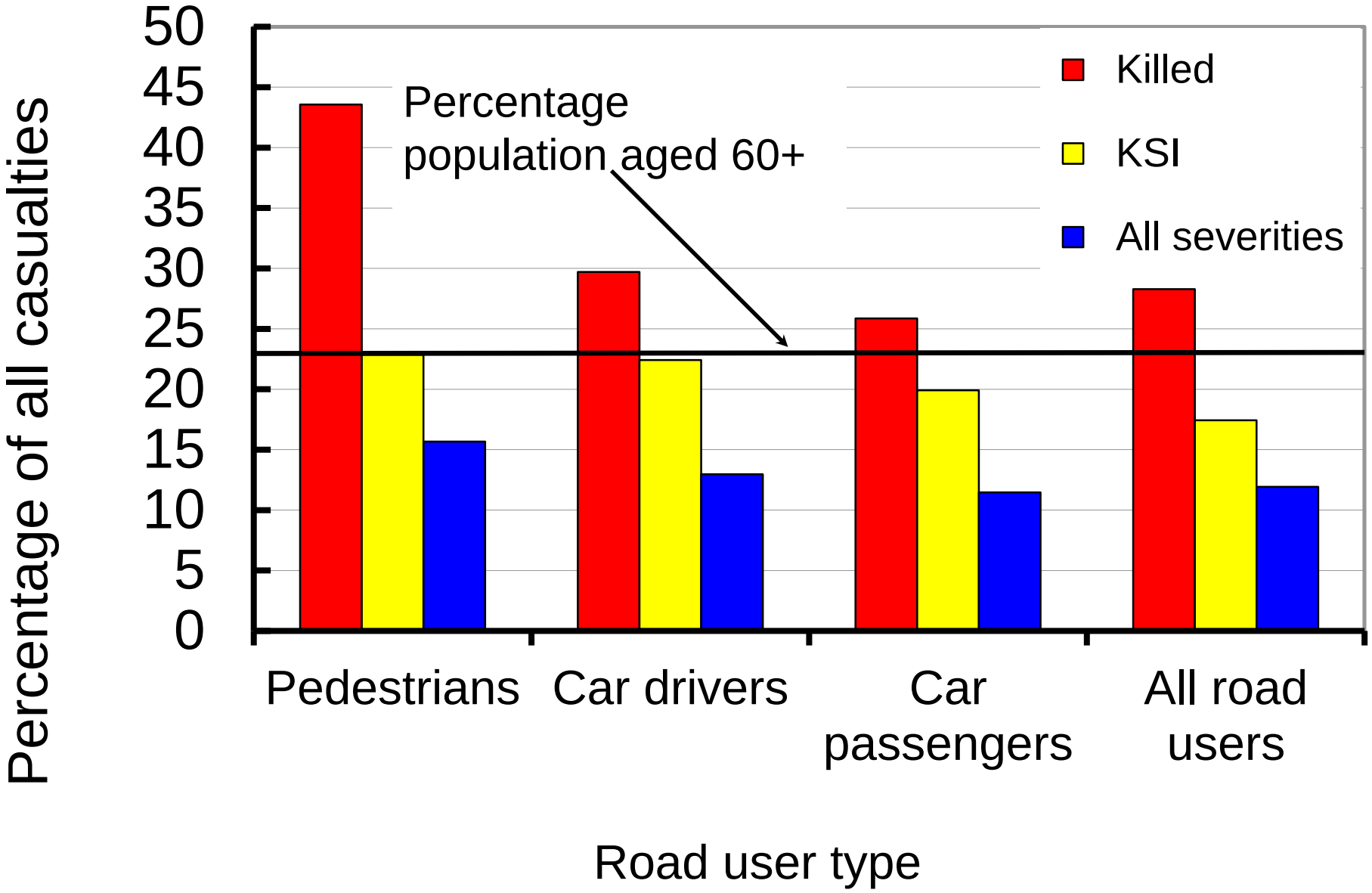
MALE AND FEMALE FATAL CASUALTIES

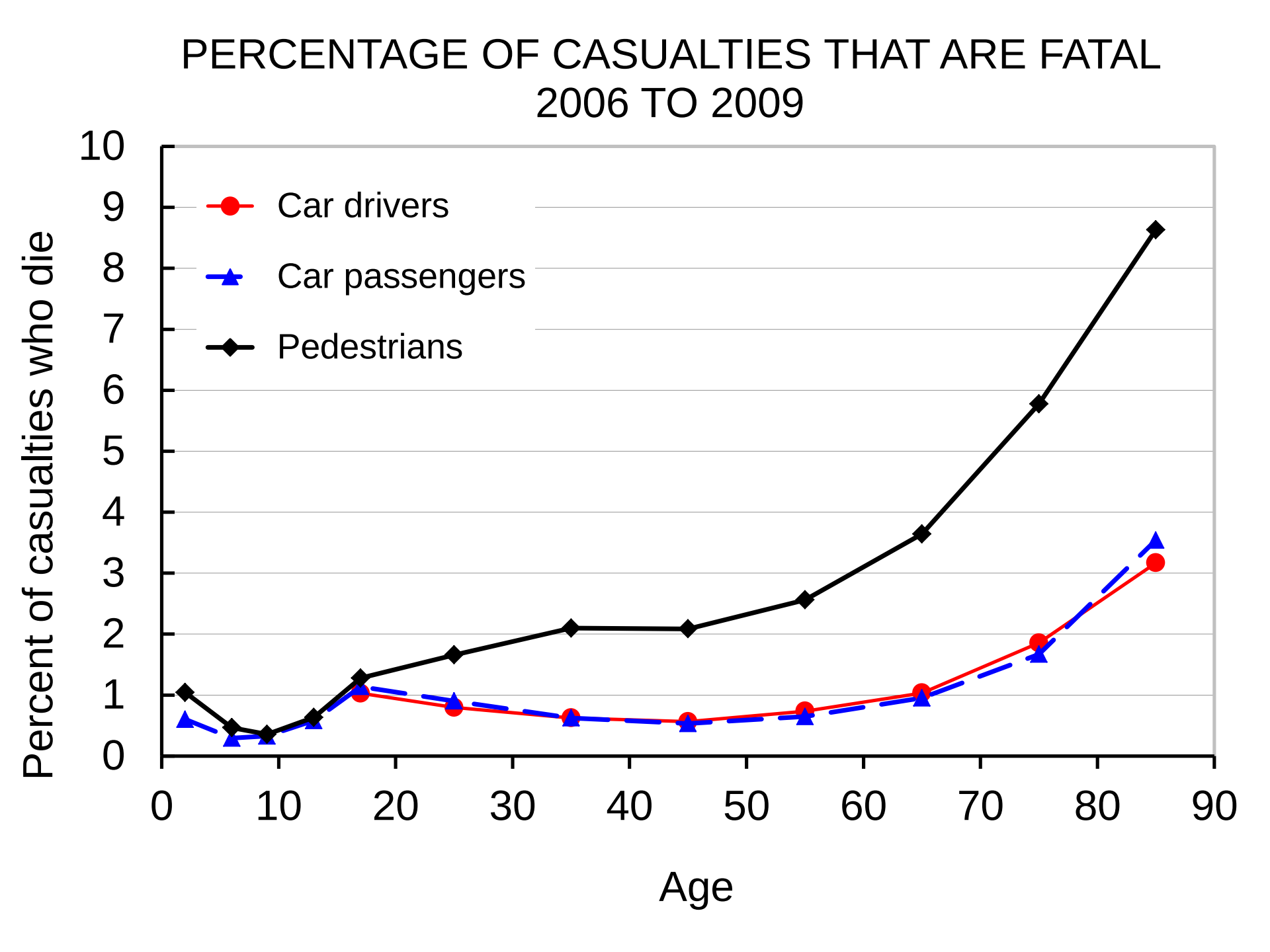



TOTAL CASUALTY RATES GREAT BRITAIN 2012
All casualties per 100,000 population
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
Age
All road users
Car drivers
Car passengers
Pedestrians
Moped and motorcycle users
Cyclists


FATALITY RATES GREAT BRITAIN 2012
Deaths per 100,000 population
Age
All road users
Car drivers
Car passengers
Pedestrians
Moped and motorcycle users
Cyclists
0
1
2
3
4
5
6
0
10
20
30
40
50
60
70
80
90

PERCENT CASUALTIES AGED 60+, 2012

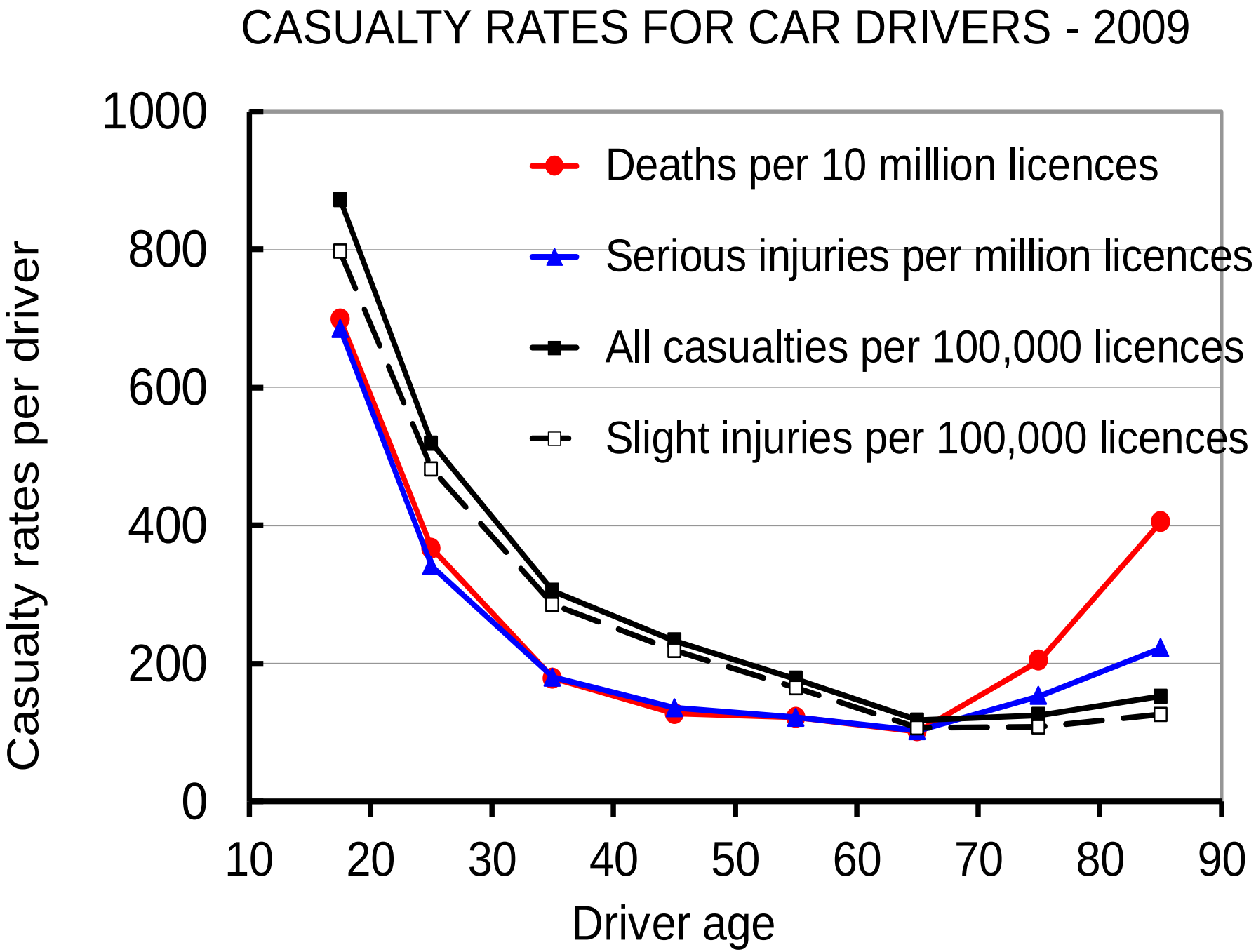


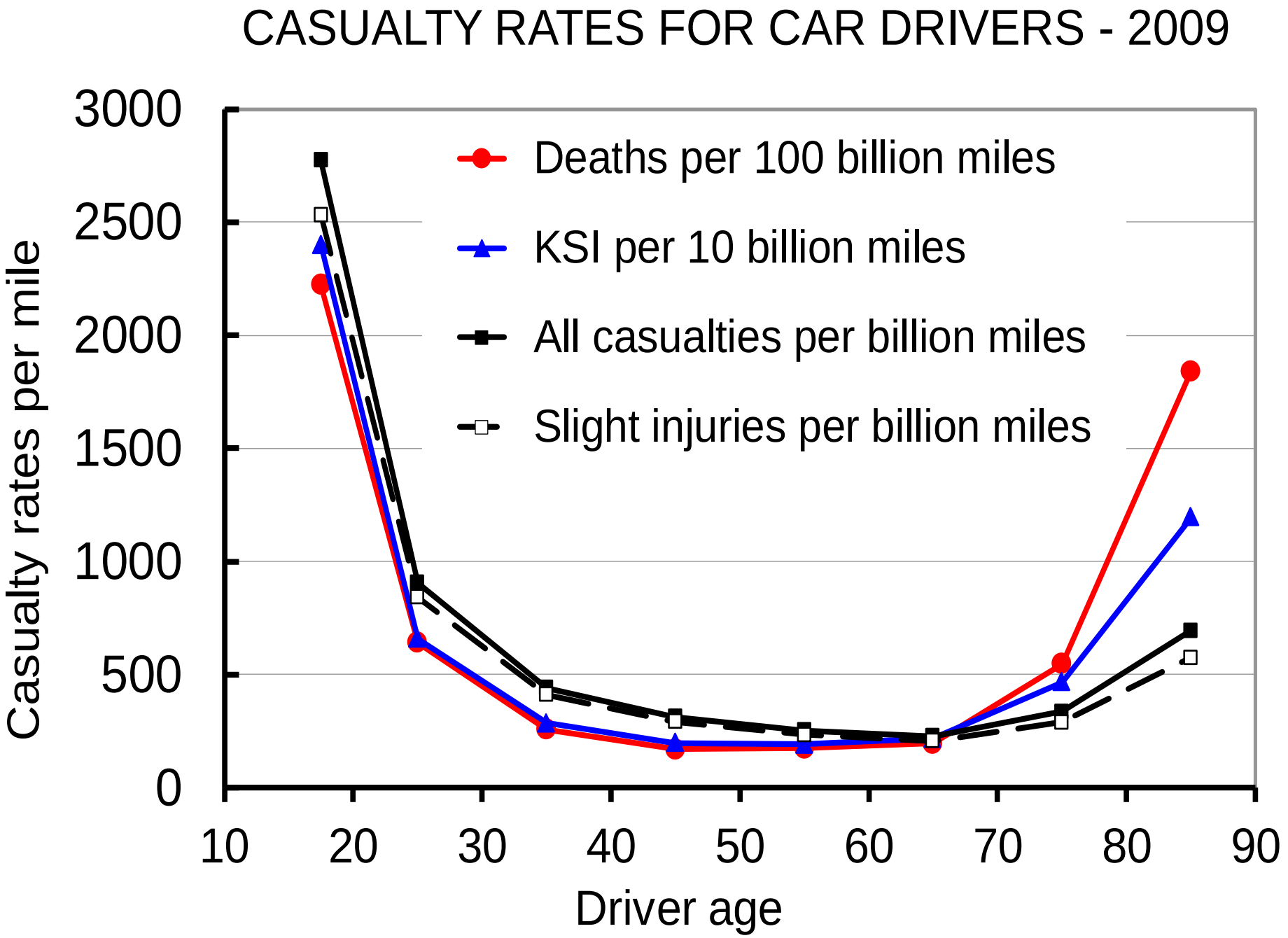

PERCENTAGE OF CASUALTIES THAT ARE FATAL
2006 TO 2009
Percent of casualties who die
0
1
2
3
4
5
6
7
8
9
10
Car drivers
Car passengers
Pedestrians
0
10
20
30
40
50
60
70
80
90
Age

Casualty rates for car drivers

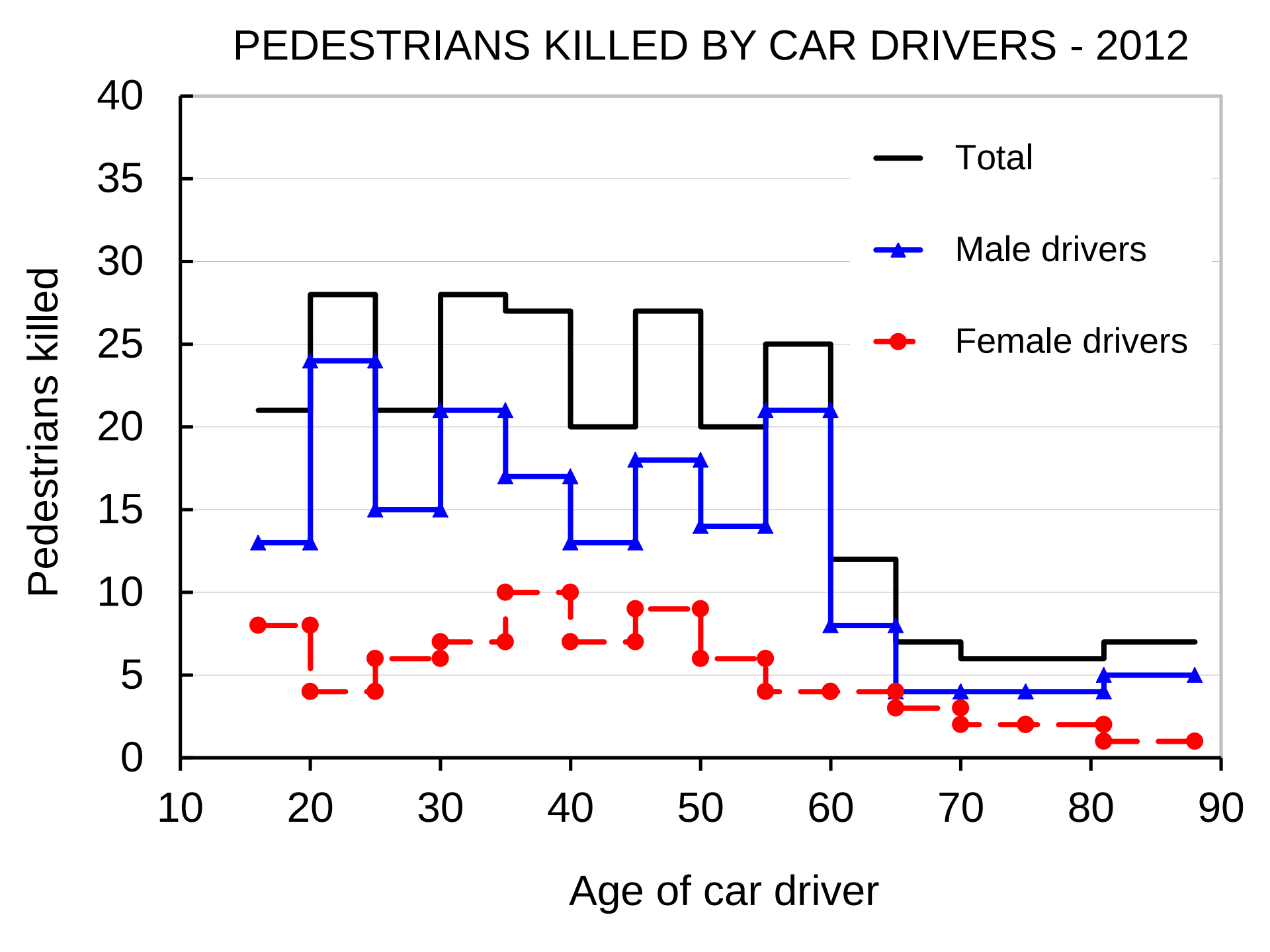
Young drivers have the highest casualty rates

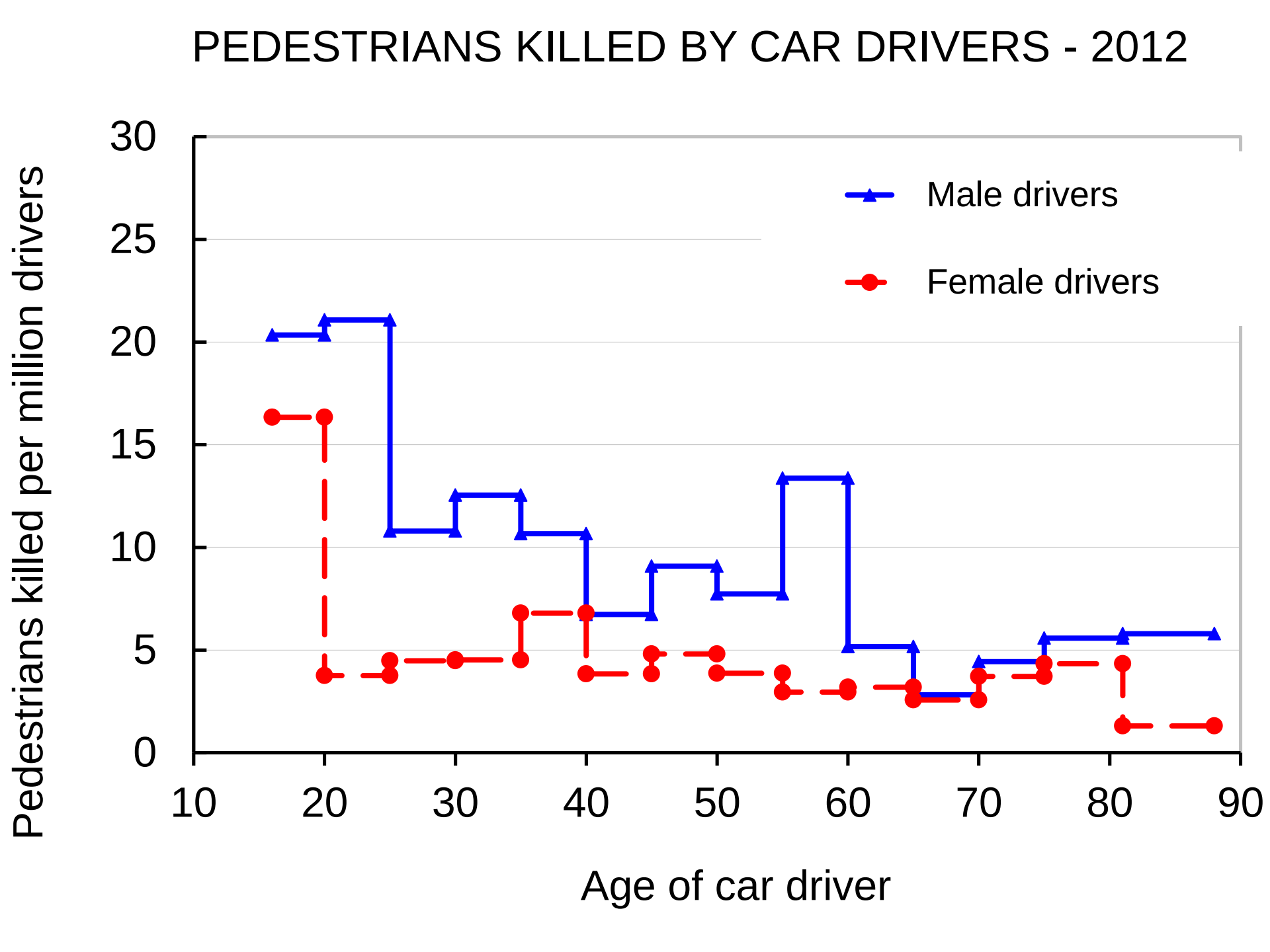
For older drivers, casualty rates per driver start to increase after age 80, per mile driven after age 70

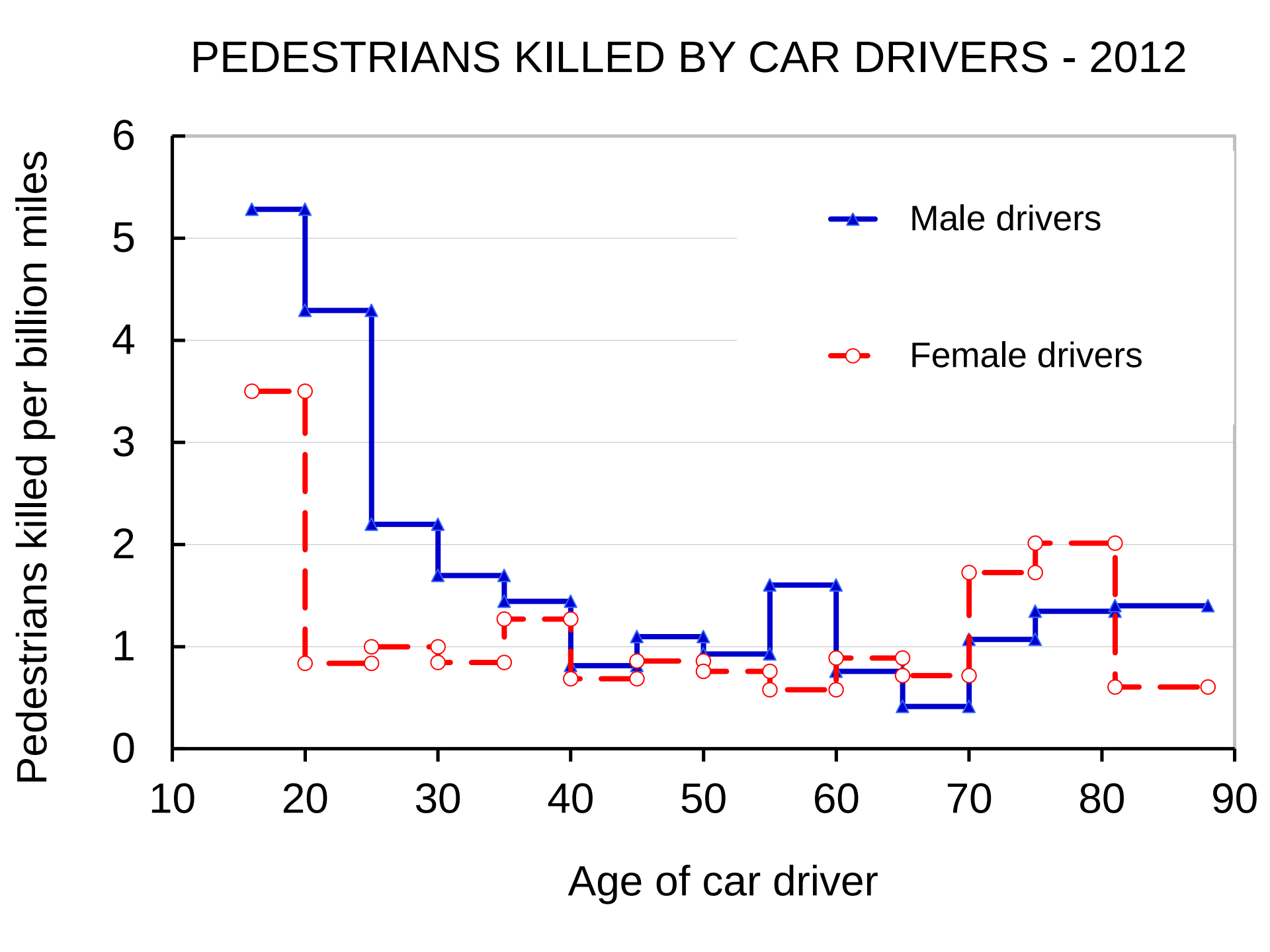

CASUALTY RATES FOR CAR DRIVERS - 2009
Casualty rates per driver
1000
800
600
400
200
0
10
20
30
40
50
60
70
80
90
Driver age
Deaths per 10 million licences
Serious injuries per million licences
All casualties per 100,000 licences
Slight injuries per 100,000 licences

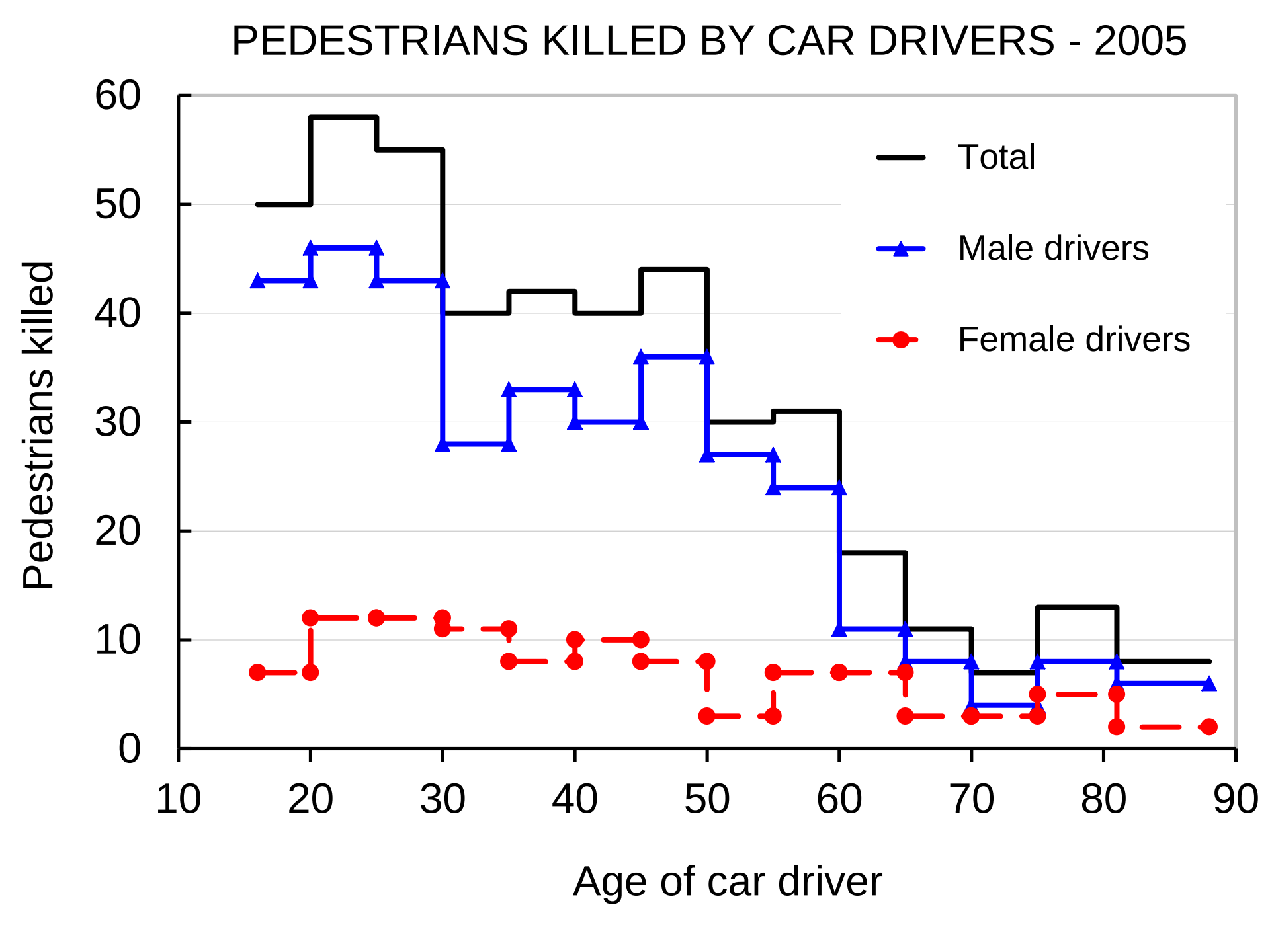

CASUALTY RATES FOR CAR DRIVERS - 2009
Casualty rates per mile
3000
2500
2000
1500
1000
500
0
10
20
30
40
50
60
70
80
90
Driver age
Deaths per 100 billion miles
KSI per 10 billion miles
All casualties per billion miles
Slight injuries per billion miles

Older drivers are less of a danger to other road users than younger drivers


PEDESTRIANS KILLED BY CAR DRIVERS - 2012
Pedestrians killed
0
5
10
15
20
25
30
35
40
10
20
30
40
50
60
70
80
90
Age of car driver
Total
Male drivers
Female drivers


PEDESTRIANS KILLED BY CAR DRIVERS - 2012
Pedestrians killed per million drivers
30
25
20
15
10
5
0
10
20
30
40
50
60
70
80
90
Age of car driver
Male drivers
Female drivers


PEDESTRIANS KILLED BY CAR DRIVERS - 2012
Pedestrians killed per billion miles
0
1
2
3
4
5
6
10
20
30
40
50
60
70
80
90
Age of car driver
Male drivers
Female drivers

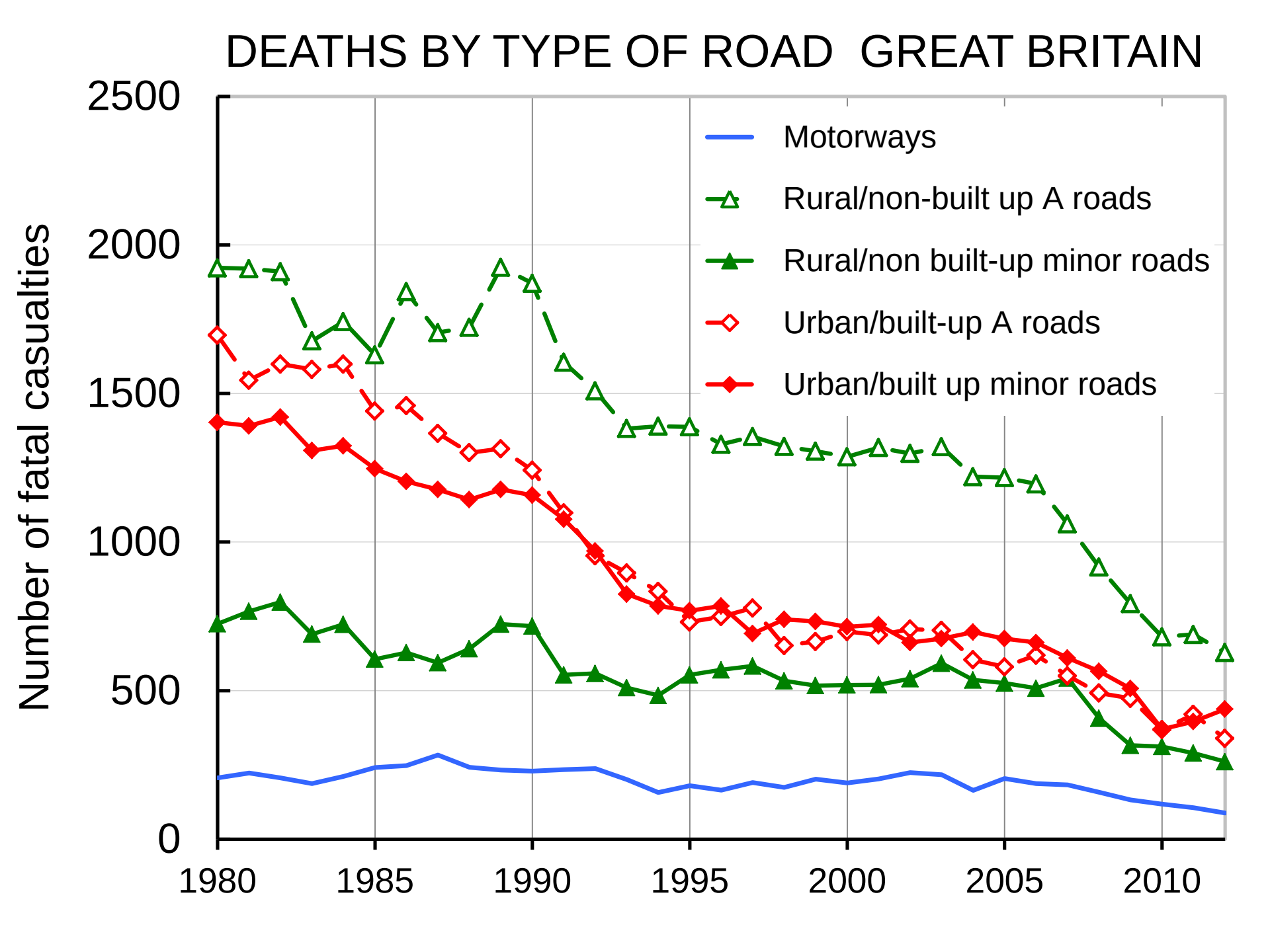

PEDESTRIANS KILLED BY CAR DRIVERS - 2005
Pedestrians killed
0
10
20
30
40
50
60
10
20
30
40
50
60
70
80
90
Age of car driver
Total
Male drivers
Female drivers

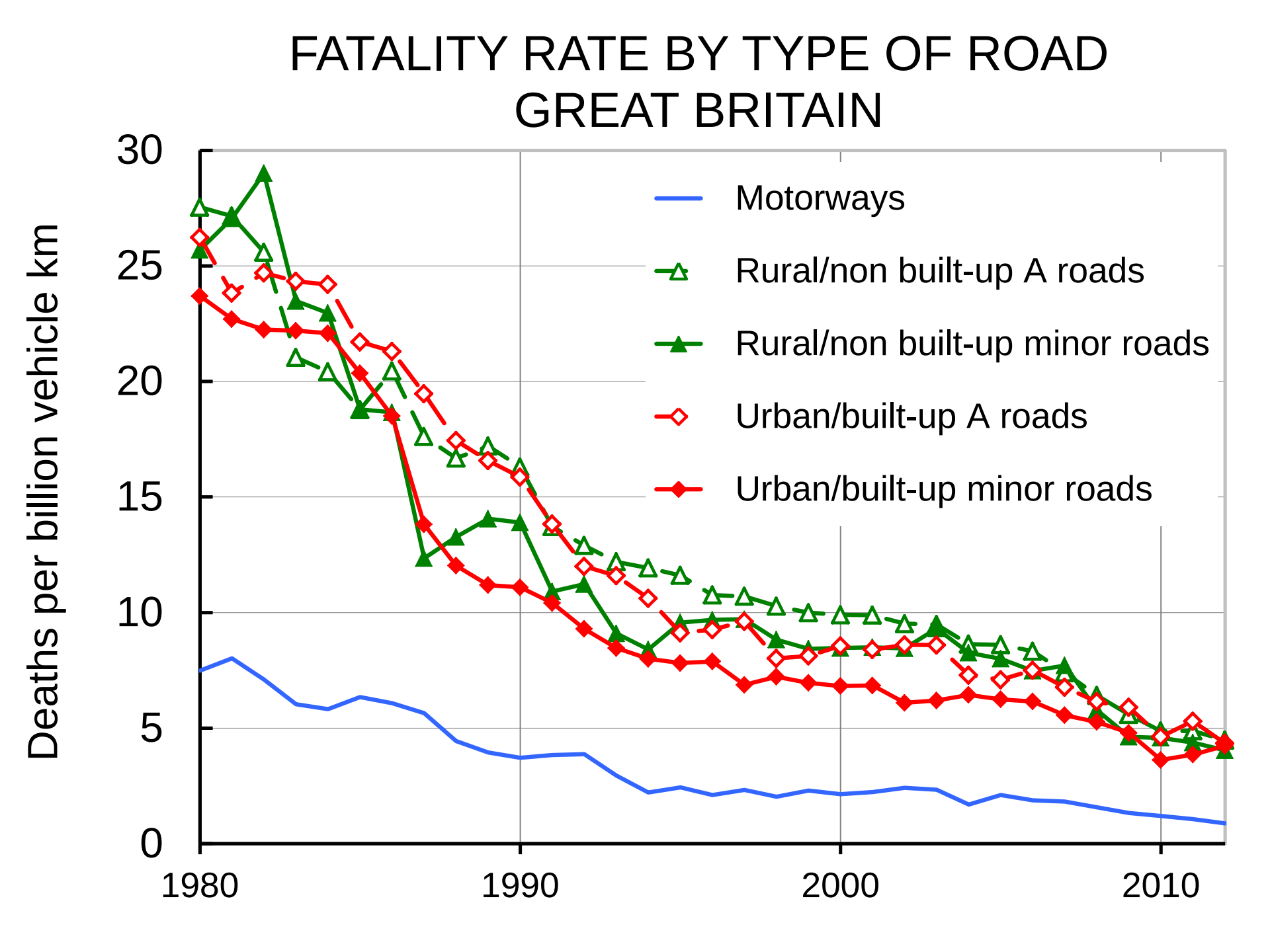
Some factors affecting casualties

- Road design and provision;
- Vehicle design;
- Speed;
- Drink and drugs;
- Distraction and fatigue; and
- Rescue and medical services.

Type of road

Motorways are about four times as safe as all-purpose roads


DEATHS BY TYPE OF ROAD GREAT BRITAIN
Number of fatal casualties
2500
2000
1500
1000
500
0
1980
1985
1990
1995
2000
2005
2010
Motorways
Rural/non-built up A roads
Rural/non built-up minor roads
Urban/built-up A roads
Urban/built up minor roads

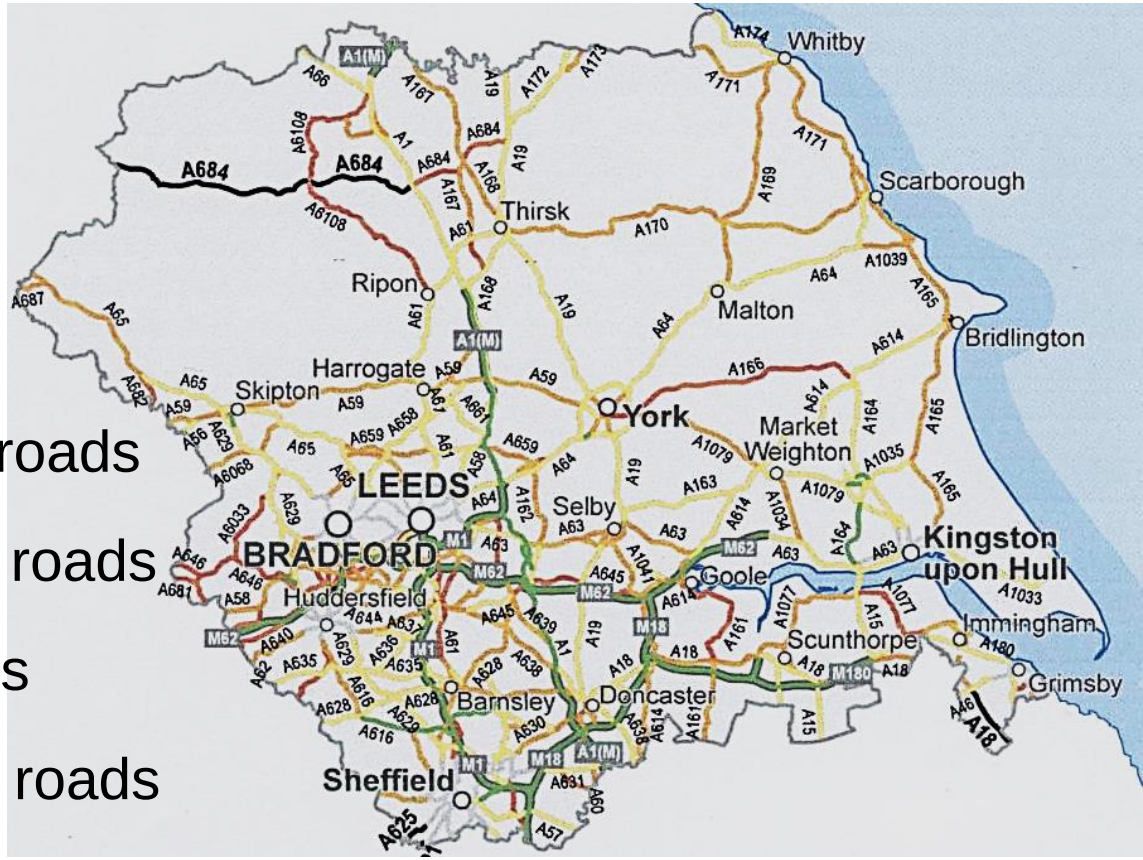

FATALITY RATE BY TYPE OF ROAD
GREAT BRITAIN
Deaths per billion vehicle km
30
25
20
15
10
5
0
1980
1990
2000
2010
Motorways
Rural/non built-up A roads
Rural/non built-up minor roads
Urban/built-up A roads
Urban/built-up minor roads

IRAP Risk mapping

Rating is based on the number of fatal or serious crashes per unit traffic

Road Assessment Programme Risk Rating

- Low risk (safest) roads
- Low-medium risk roads
- Medium risk roads
- Medium-high risk roads
- High risk roads



A 537 road

Knutsford - Buxton

517 KSI crashes per billion vehicle km

M1 in Yorkshire

22 KSI crashes per billion vehicle km

SAFER ROADS SAVE LIVES

IRAP Star rating roads

How well do roads protect users?

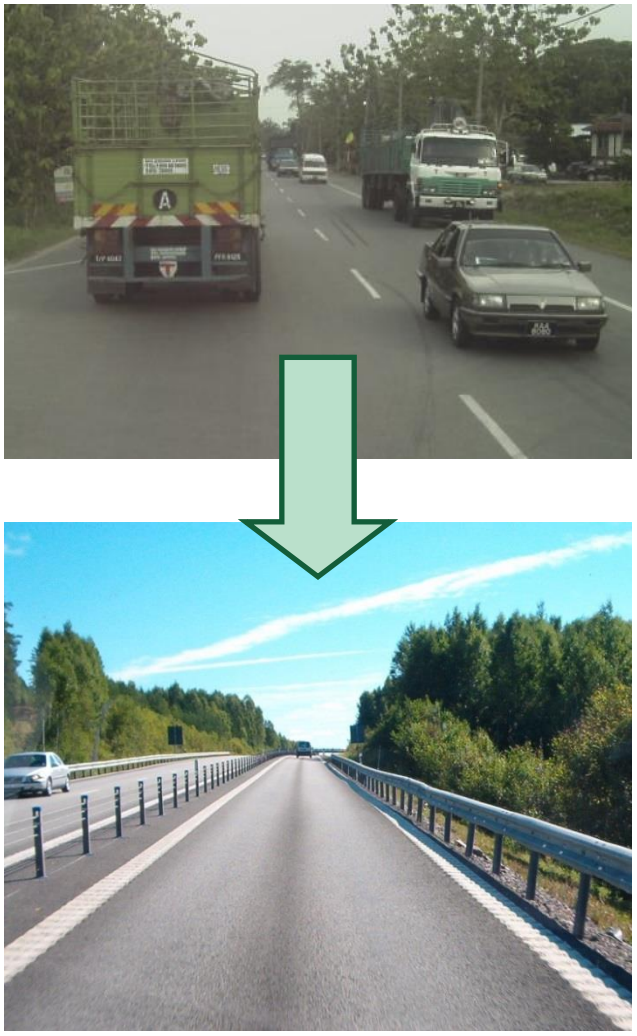
60% of deaths are outside urban areas.

Four types of accident account for most deaths

- Head-on collisions
- Side impacts at junctions
- Collisions with roadside objects
- Collisions with pedestrians

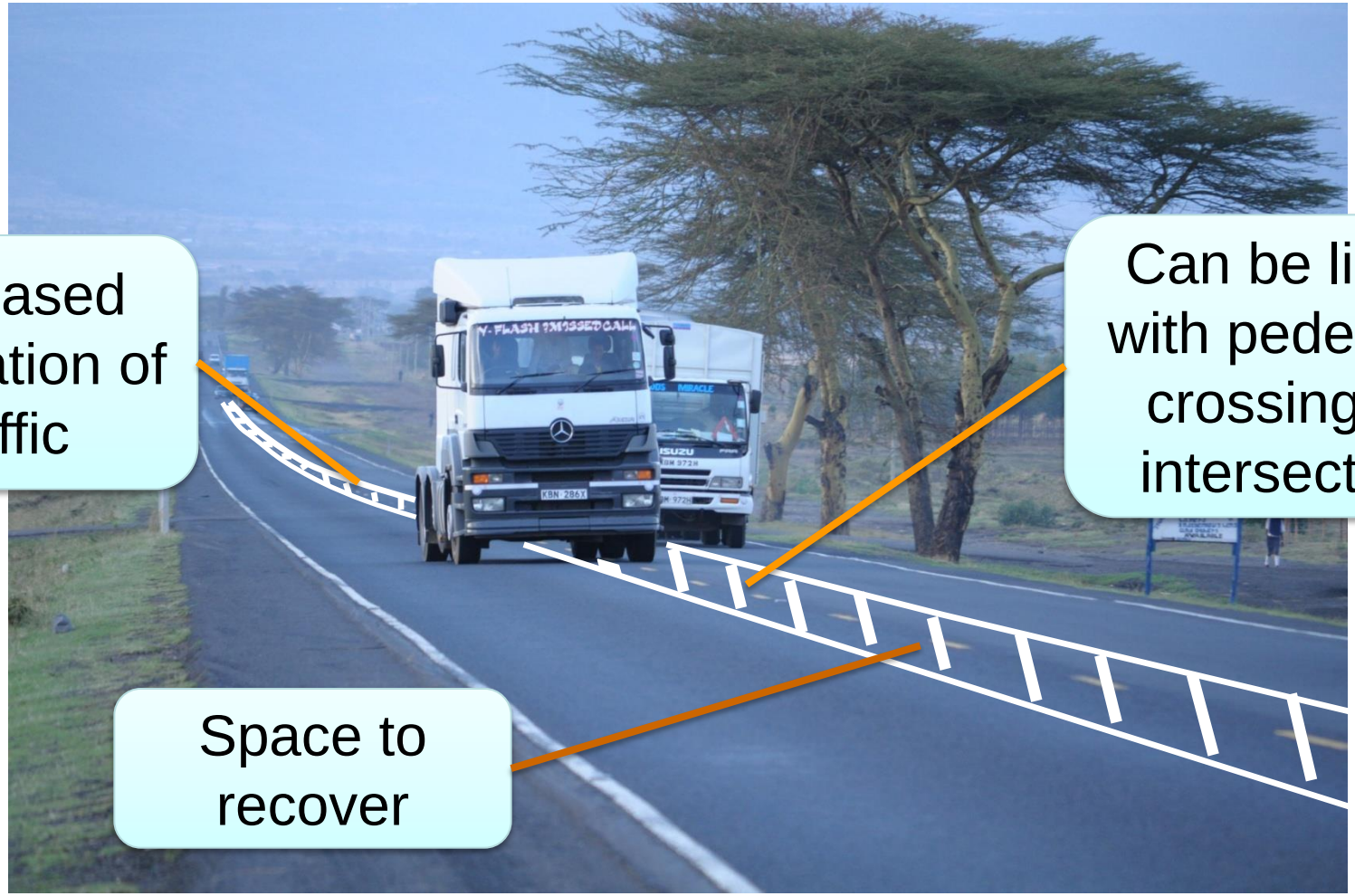
iRAP Safer Roads Investment Plans

- 69 proven countermeasures
- 300+ engineering triggers
- Calculate potential lives saved
- Minimum BCR criteria



SAFER ROADS SAVE LIVES

Central Hatching



SAFER ROADS SAVE LIVES

Barriers to prevent vehicles hitting trees

Junction box to protect turning vehicles

Vehicle design

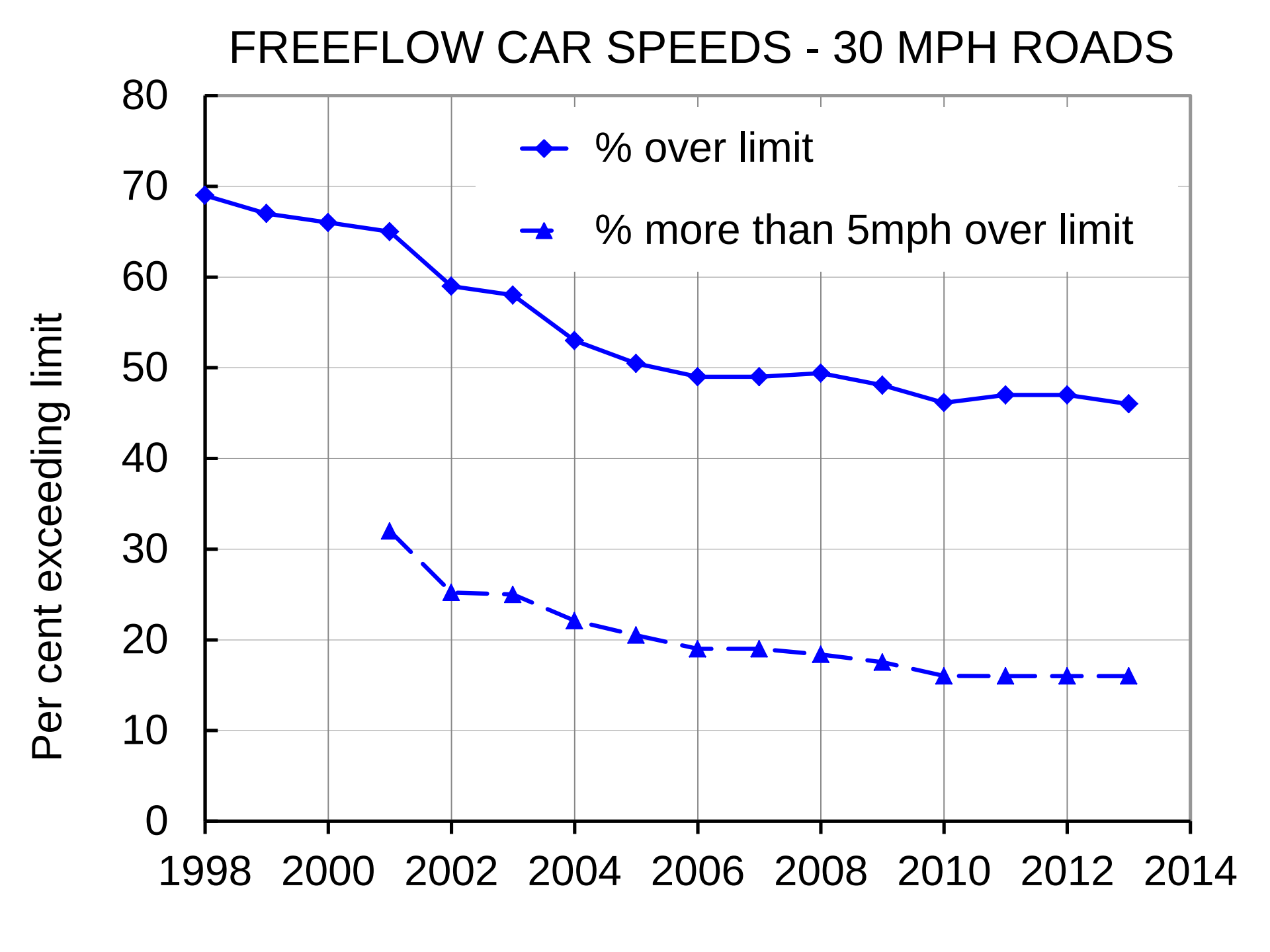
Since NCAP was introduced in 1997, car occupant protection has improved greatly

Protection of pedestrians has not increased much

Speed

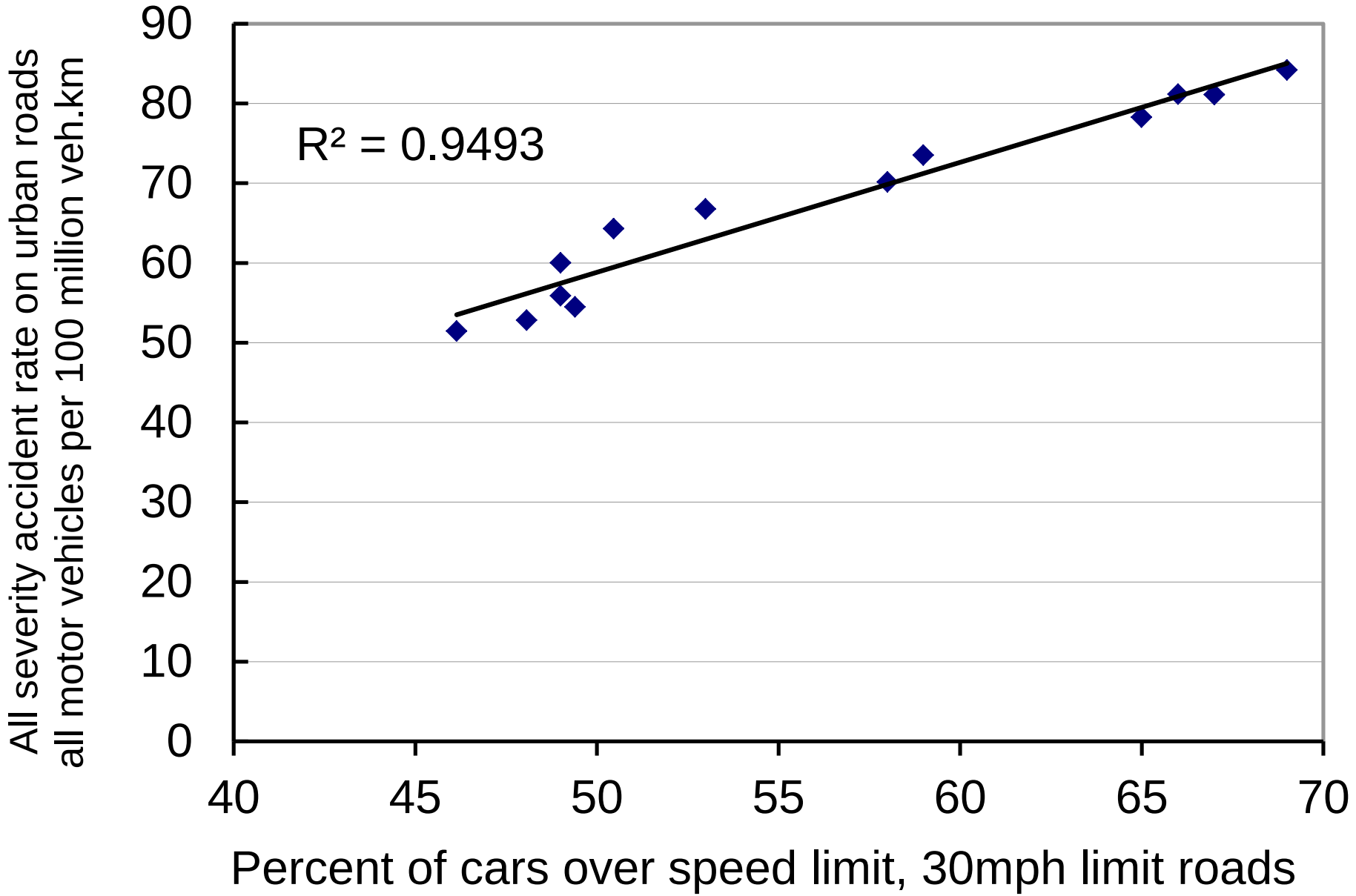
Speed is cited as a contributory factor in 23% of fatal accidents

Compliance with speed limits has improved

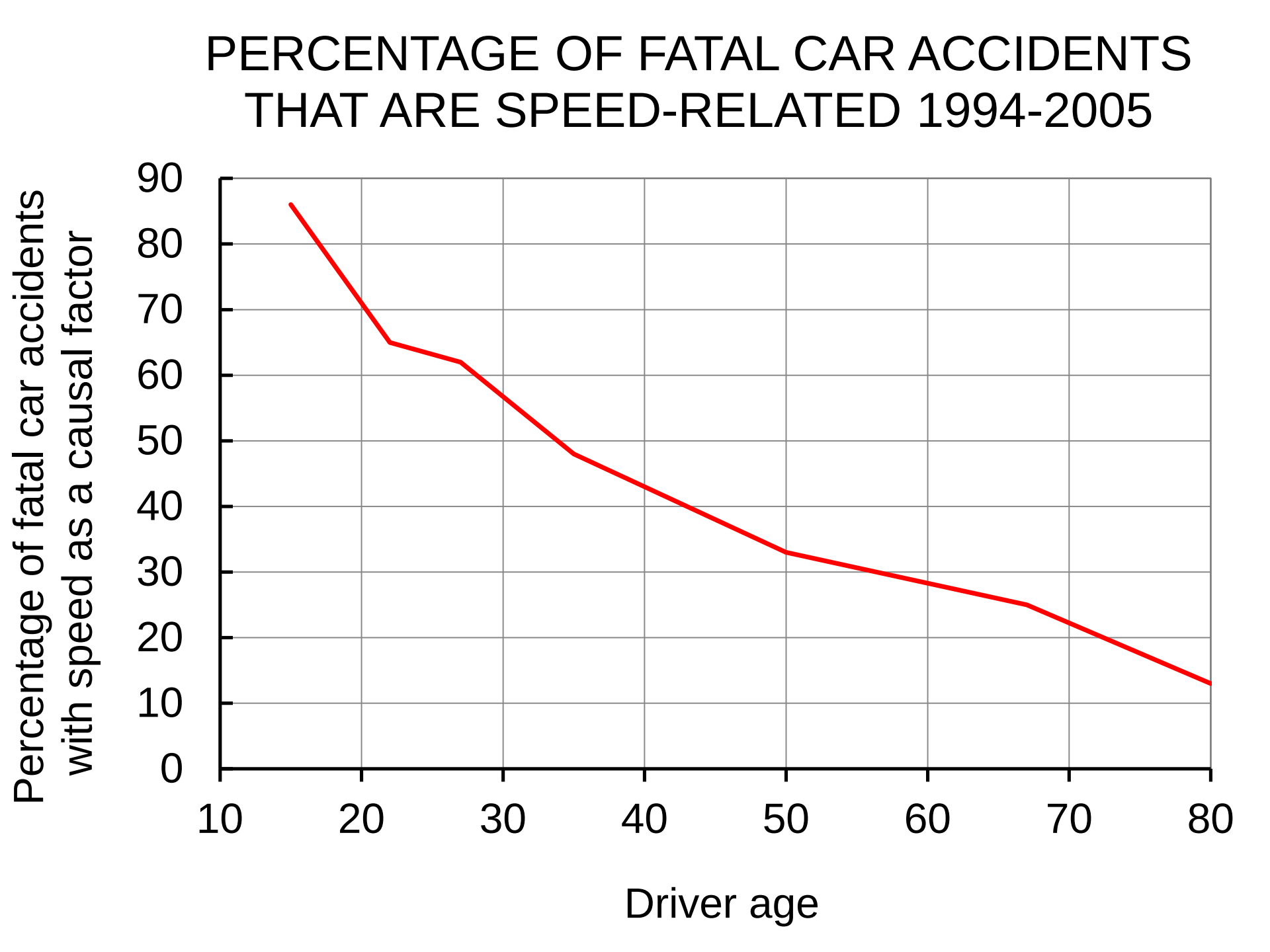

FREEFLOW CAR SPEEDS - 30 MPH ROADS
% over limit
% more than 5mph over limit
Per cent exceeding limit
80
70
60
50
40
30
20
10
0
1998
2000
2002
2004
2006
2008
2010
2012
2014

There are fewer accidents when fewer cars exceed the 30 mph speed limit in urban areas

SPEED LIMIT EXCEEDANCE AND ALL ACCIDENT RATE



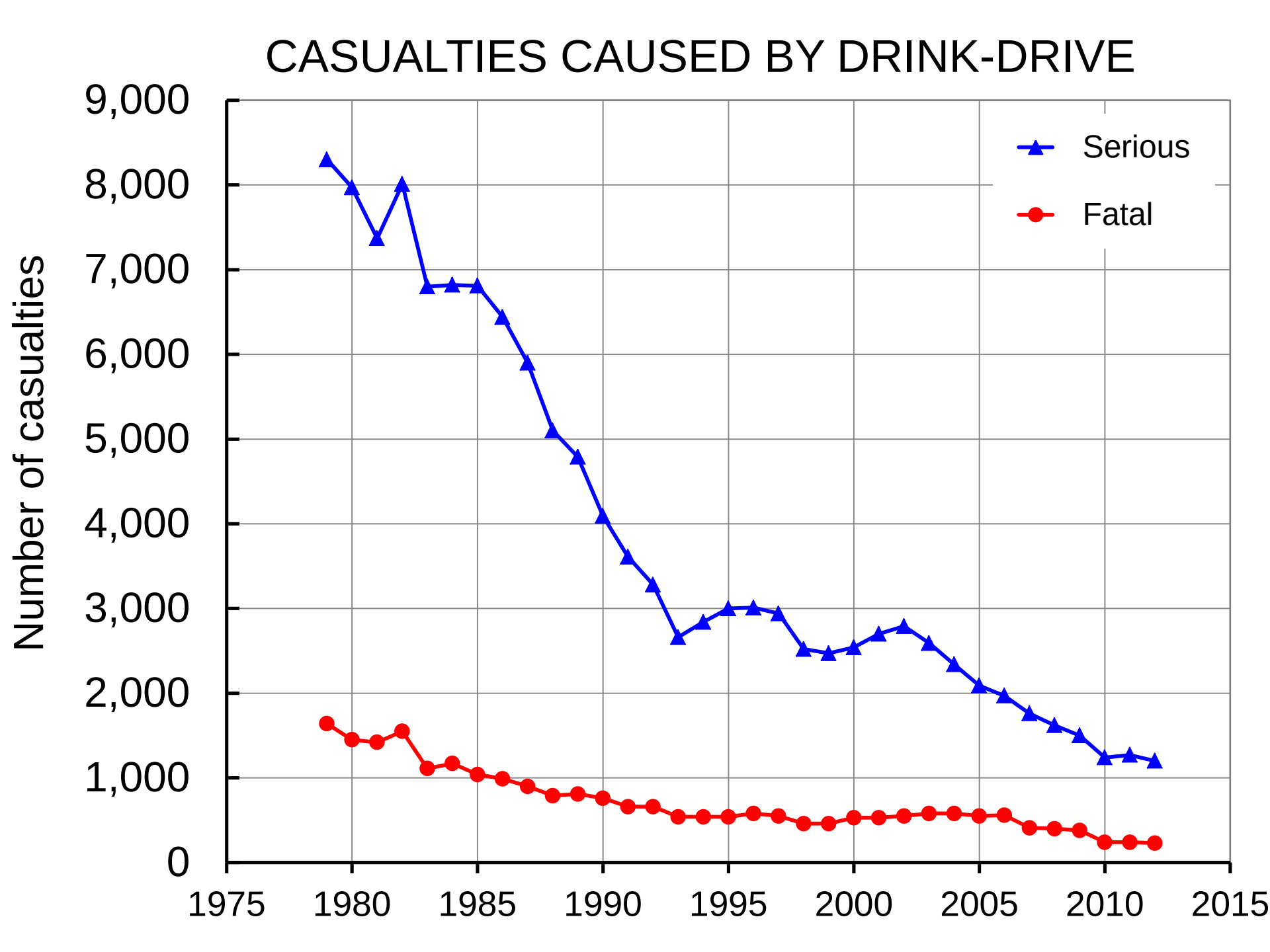
Speed is a particular issue for young drivers


PERCENTAGE OF FATAL CAR ACCIDENTS
THAT ARE SPEED-RELATED 1994-2005
Percentage of fatal car accidents
with speed as a causal factor
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
Driver age

Drink and drugs

Drink-drive casualties have fallen by almost a factor of six since 1979.

2010 and 2011 had the fewest deaths since records started


CASUALTIES CAUSED BY DRINK-DRIVE
Number of casualties
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1975
1980
1985
1990
1995
2000
2005
2010
2015
Serious
Fatal

Safety of pedal cyclists

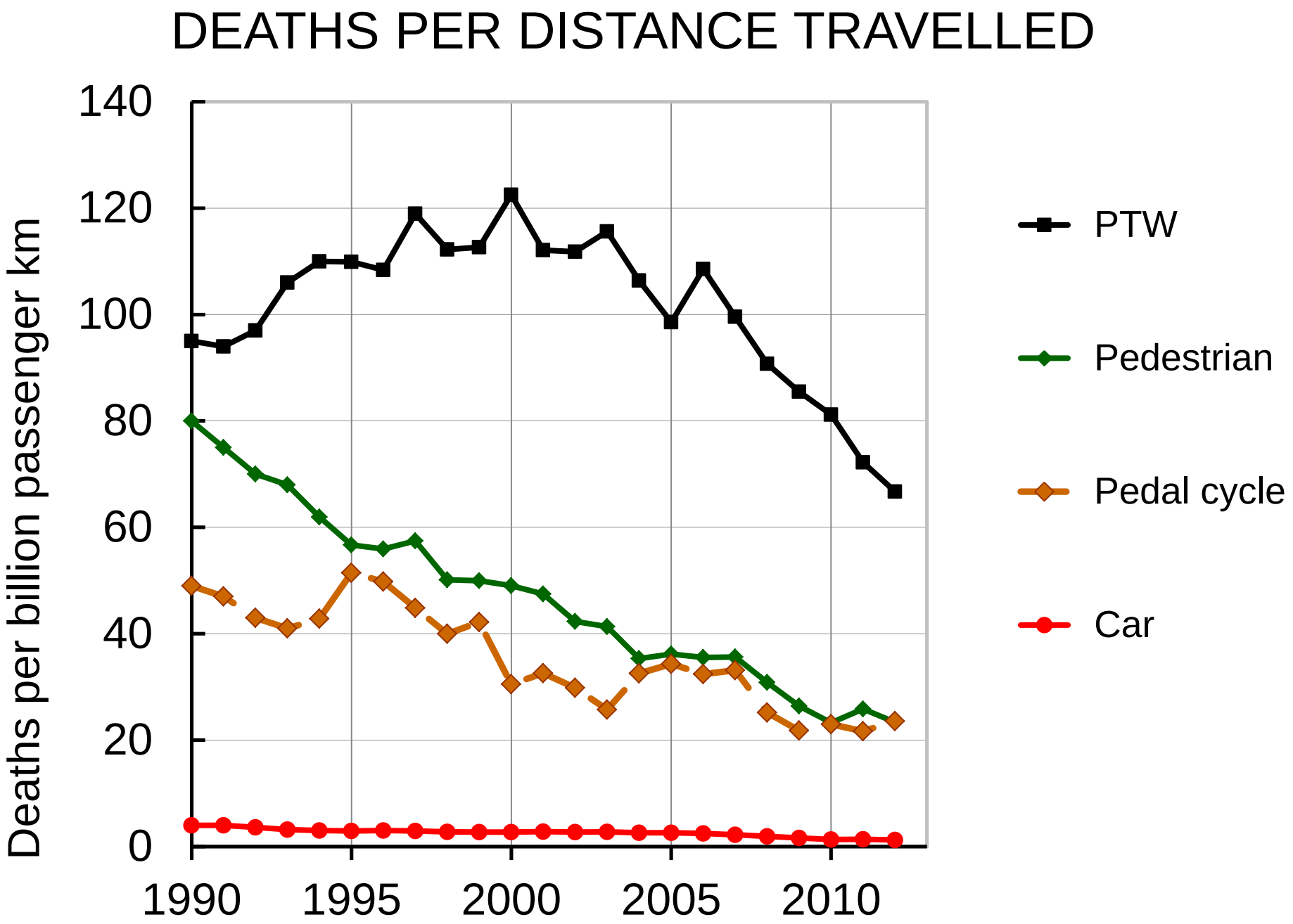
Cycling is a relatively unsafe means of travel (figures for 2012)

- Casualties per km similar to PTW, 20x those for car, 2.7x pedestrians
- Deaths per km 18x those for car

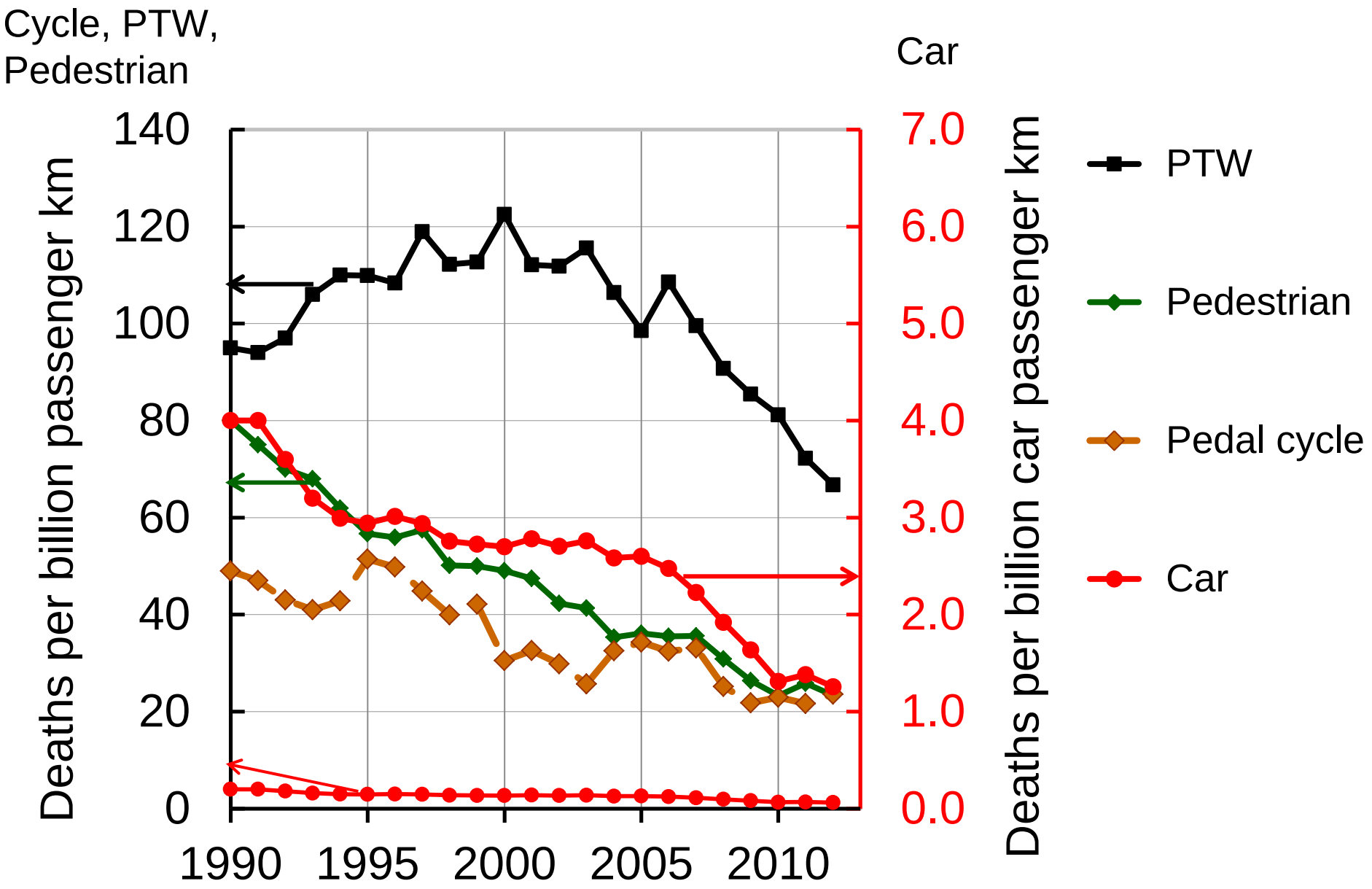
Casualties per billion passenger kilometres

Mode of travel	Car	Powered 2 wheeler	Pedal cycle	Pedestrian
Killed	1.3	67	24	23
KSI	14	1,094	668	333
All	188	3,929	3,816	1,403

Safety has improved, but not as fast as for pedestrians or car occupants


DEATHS PER DISTANCE TRAVELLED
Deaths per billion passenger km
140
120
100
80
60
40
20
0
1990
1995
2000
2005
2010
PTW
Pedestrian
Pedal cycle
Car

DEATHS PER DISTANCE TRAVELLED

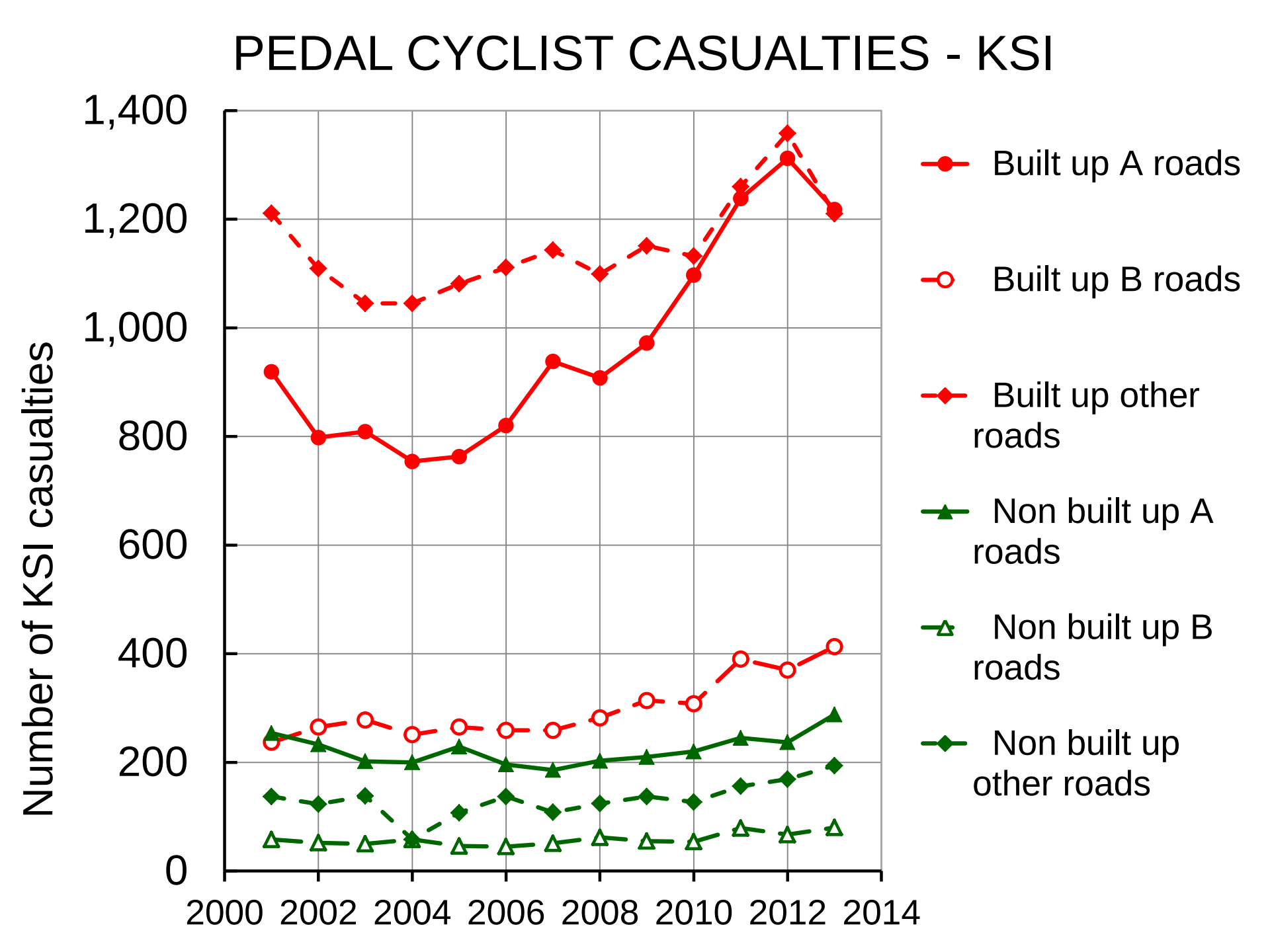


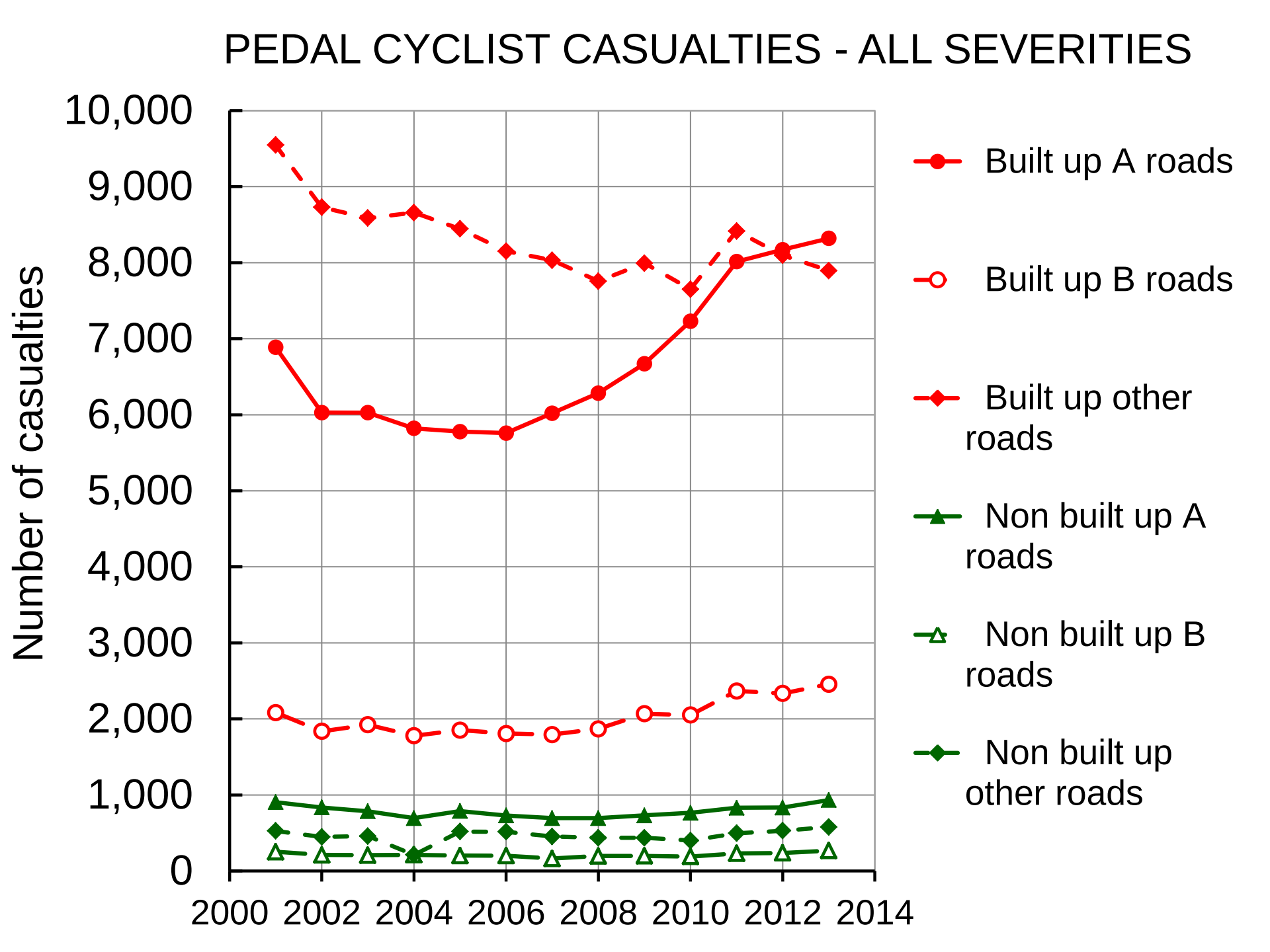
Pedal cycle casualty rates are much higher on some roads than others

Pedal cyclist casualties

Casualty rate per billion cycle km

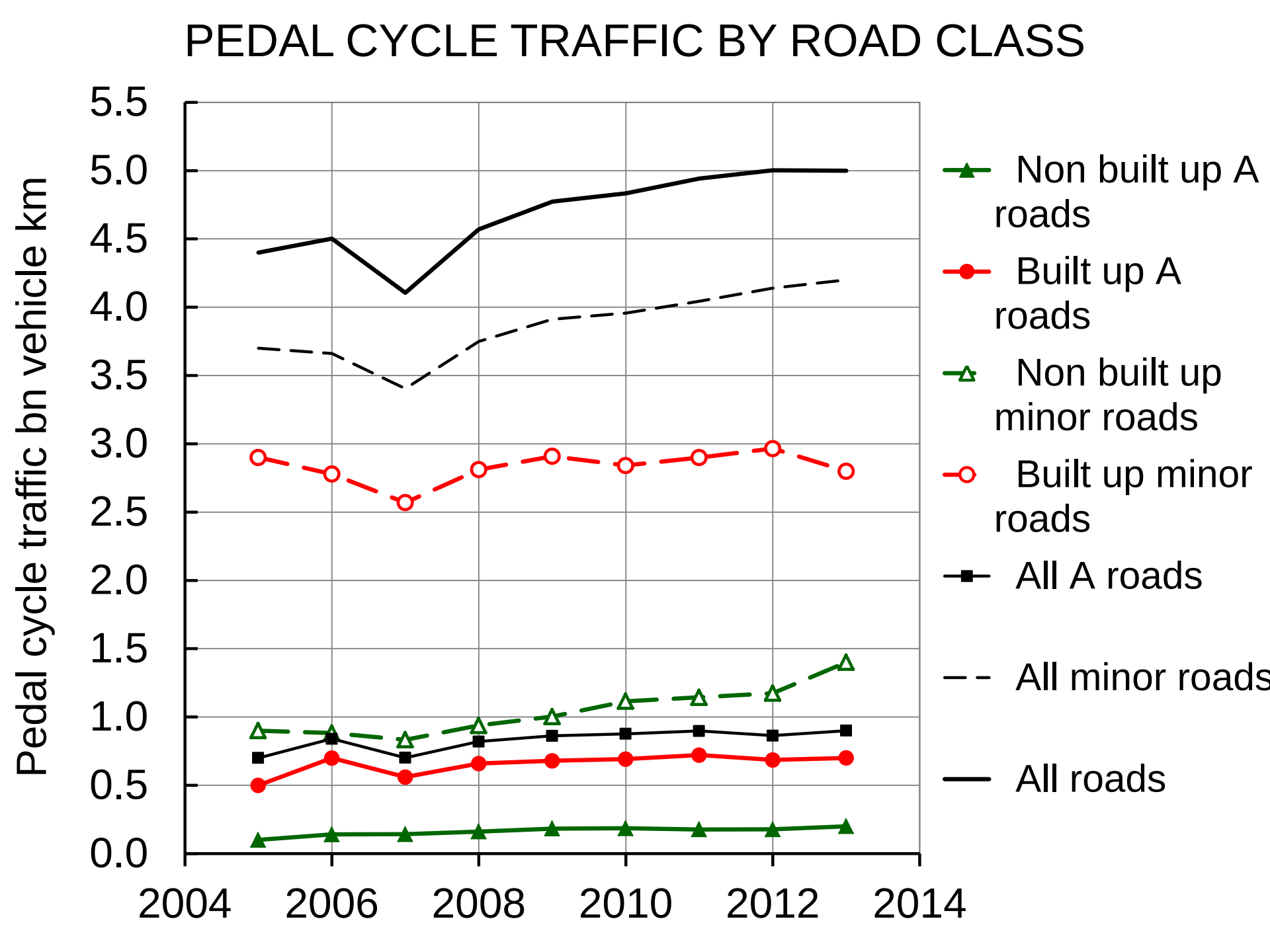
	2005			2012		
	Deaths	KSI	All	Deaths	KSI	All
Built up roads	25.0	590	4,469	18.4	791	4,816
Non built up roads	63.0	352	1,362	37.7	335	1,112


PEDAL CYCLIST CASUALTIES - KSI
Number of KSI casualties
1,400
1,200
1,000
800
600
400
200
0
2000
2002
2004
2006
2008
2010
2012
2014
Built up A roads
Built up B roads
Built up other roads
Non built up A roads
Non built up B roads
Non built up other roads


PEDAL CYCLIST CASUALTIES - ALL SEVERITIES
Number of casualties
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2002
2004
2006
2008
2010
2012
2014
Built up A roads
Built up B roads
Built up other roads
Non built up A roads
Non built up B roads
Non built up other roads

About 60% of all cycling is on minor urban roads, and another 20% on minor rural roads

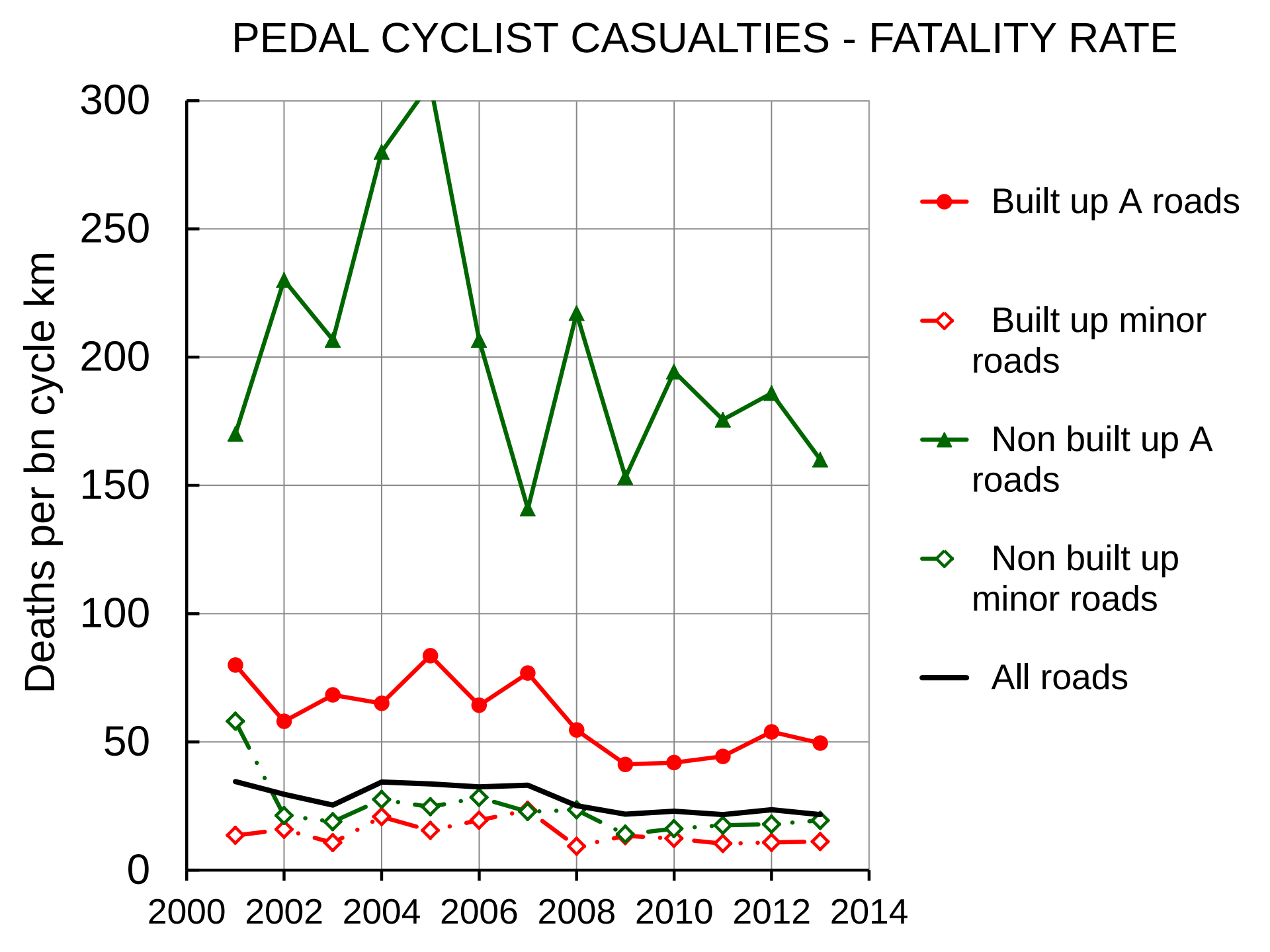
All the growth in cycle traffic since 2004 has been on minor roads

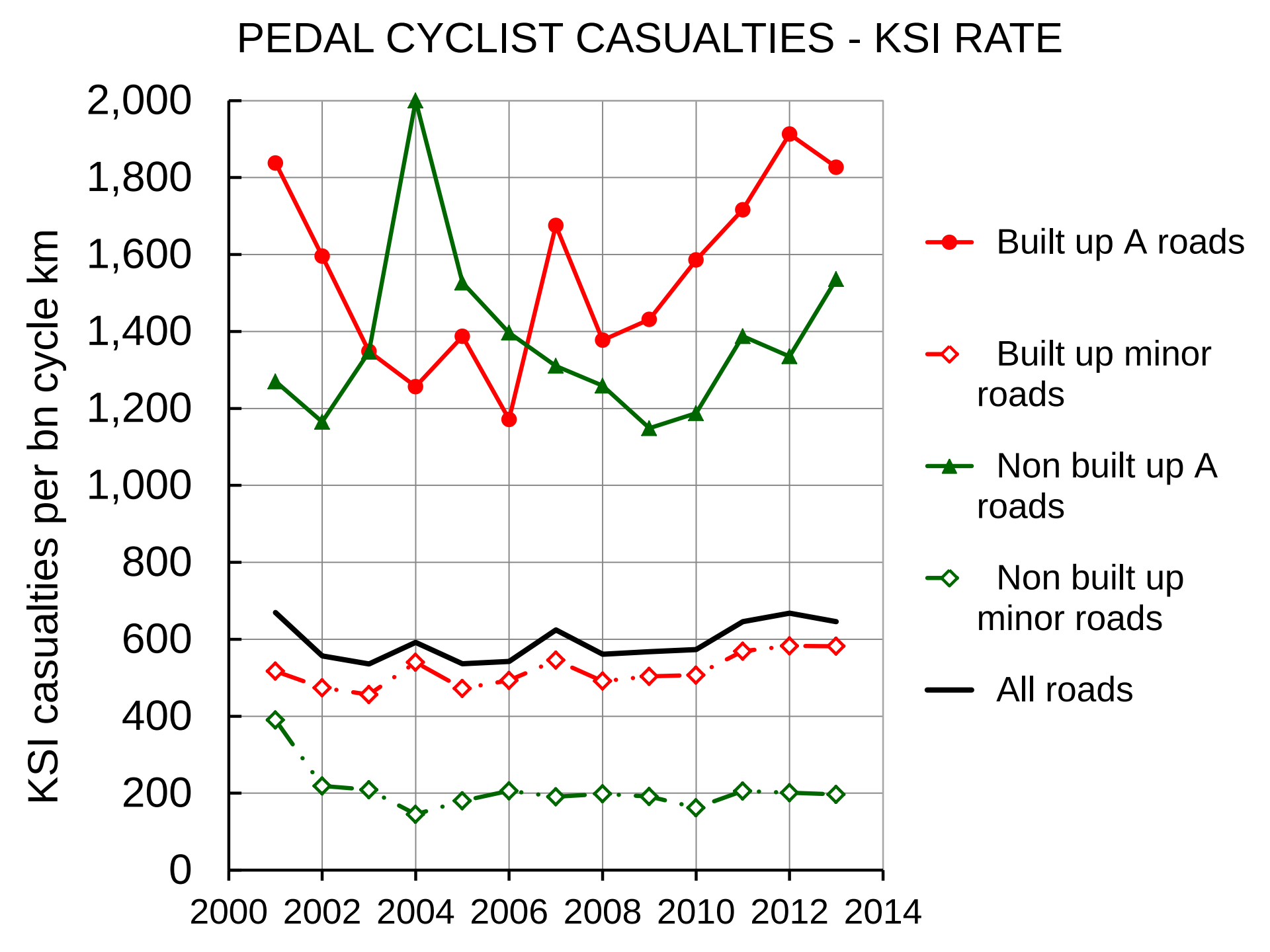

PEDAL CYCLE TRAFFIC BY ROAD CLASS
Pedal cycle traffic bn vehicle km
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2004
2006
2008
2010
2012
2014
Non built up A roads
Built up A roads
Non built up minor roads
Built up minor roads
All A roads
All minor roads
All roads

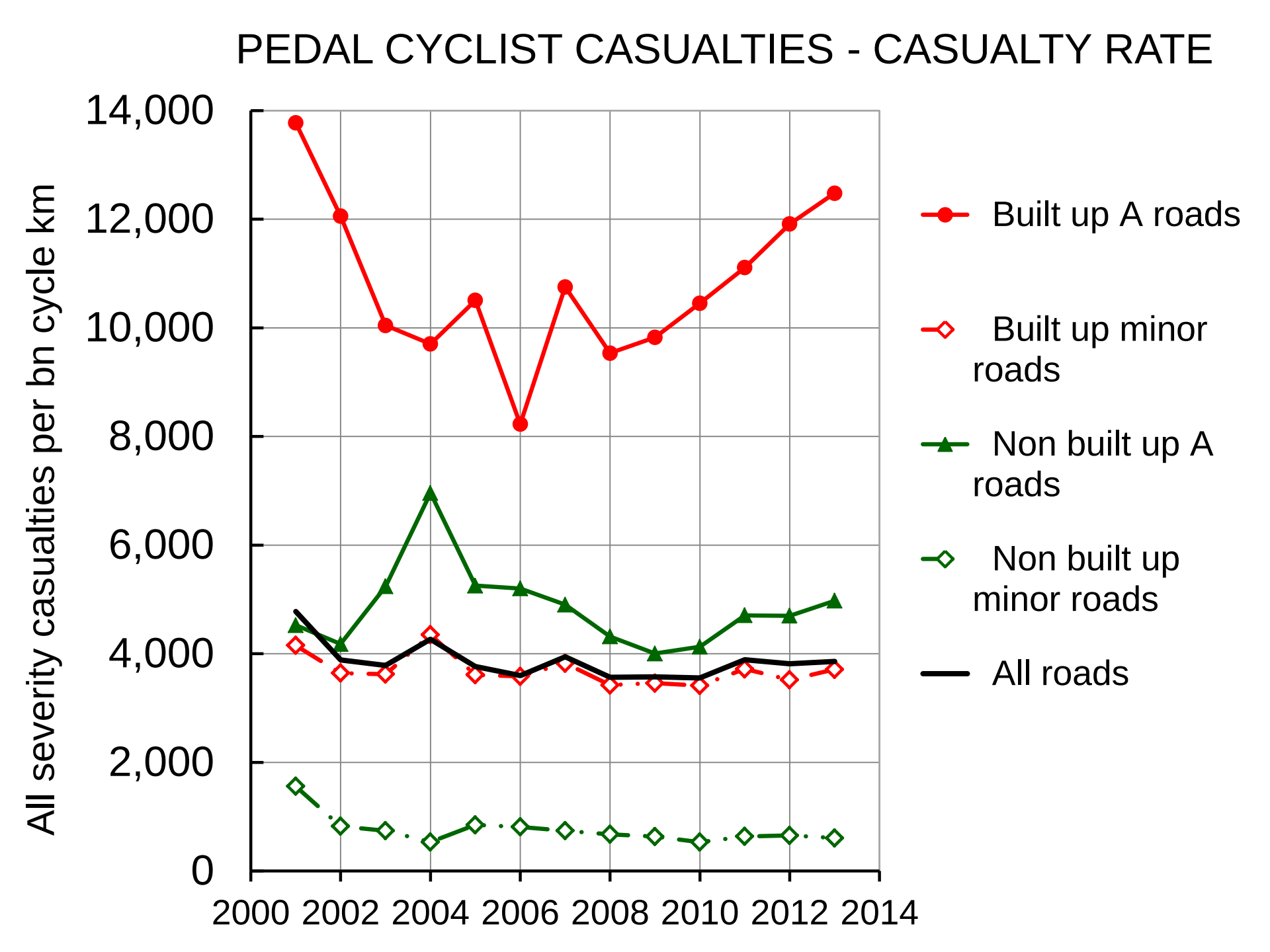
Estimated pedal cyclist casualty rate by road class

Casualties per billion km cycle traffic

	2008			2013		
	Deaths	KSI	All	Deaths	KSI	All
	Built up roads					
A roads	55	1,378	9,537	49	1,827	11,913
Minor roads	9	491	3,423	11	582	3,860
	Non built up roads					
A roads	217	1,261	4,323	160	1,536	4,975
Minor roads	23	198	676	22	197	608


PEDAL CYCLIST CASUALTIES - FATALITY RATE
Deaths per bn cycle km
300
250
200
150
100
50
0
2000
2002
2004
2006
2008
2010
2012
2014
Built up A roads
Built up minor roads
Non built up A roads
Non built up minor roads
All roads


PEDAL CYCLIST CASUALTIES - KSI RATE
KSI casualties per bn cycle km
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2000
2002
2004
2006
2008
2010
2012
2014
Built up A roads
Built up minor roads
Non built up A roads
Non built up minor roads
All roads


PEDAL CYCLIST CASUALTIES - CASUALTY RATE
All severity casualties per bn cycle km
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2000
2002
2004
2006
2008
2010
2012
2014
Built up A roads
Built up minor roads
Non built up A roads
Non built up minor roads
All roads

The high casualty rates on A roads suggests:-

- The 20% of cycle traffic on A roads should be encourage to divert onto minor roads wherever possible;

- Where cyclists have to use A roads, particularly in rural areas, segregated cycle routes are needed.

International comparisons

Distance cycled per person per year, 2000

kilometres

State	km cycled		State	km cycled
Denmark	936		Netherlands	848
Belgium	322		Germany	291
Sweden	271		Finland	251
Ireland	184		Italy	154
Austria	136		Greece	76
France	75		UK	75
Portugal	29		Luxembourg	23
Spain	20		EU15	188

Approximate pedal cyclist fatality rates

around 10-15 per billion km

Denmark, Sweden, Netherlands (and Ireland?);

15-20 for Germany and Finland;

25-35 per billion km

Belgium, Greece, France, Italy and UK;

Over 35 for Spain, Austria and Portugal

Returning to general road safety, what can be done to further reduce casualties?

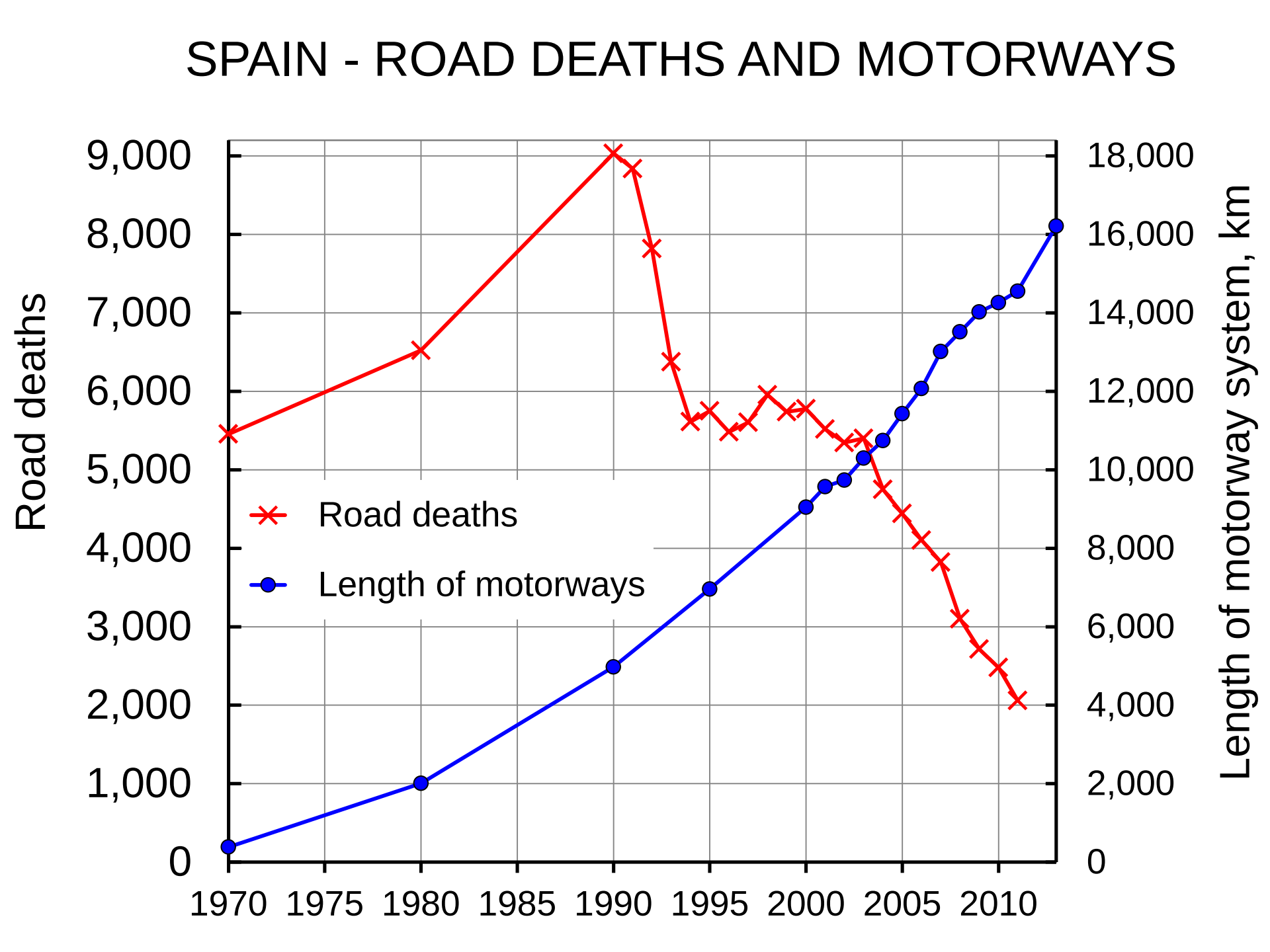
Reducing casualties

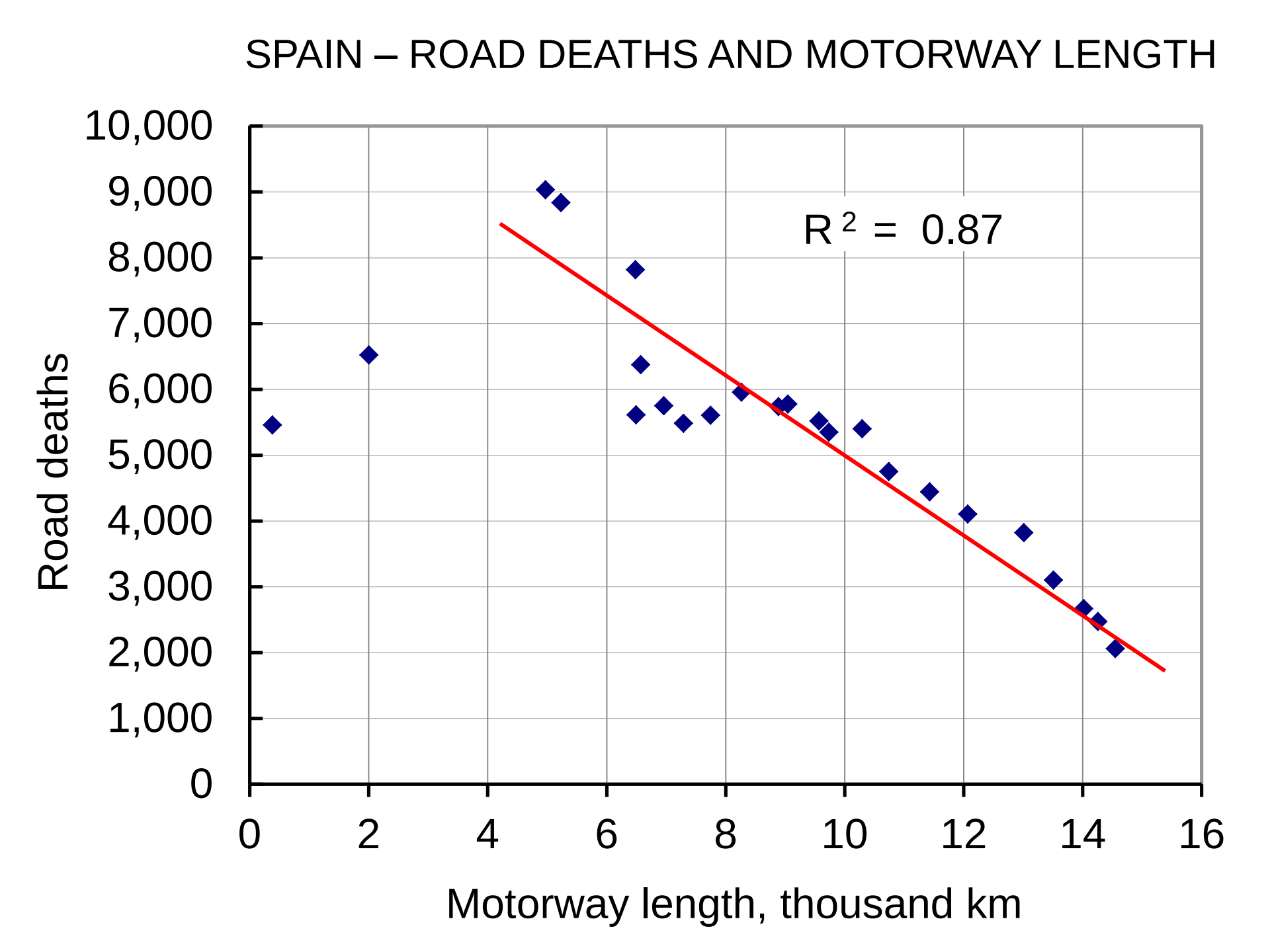
Experience, particularly in France and Spain, shows that a package of measures reduces casualties.

- Building safe motorways;
- IRAP improvements to other roads;

Reducing casualties (continued)

- Enforce speed limits with cameras;
- Reduce speed limits;
- Enforce drink-drive;
- Visible traffic policing; and
- Enforce seat-belt use.


SPAIN - ROAD DEATHS AND MOTORWAYS
Road deaths
Length of motorways
Road deaths
Length of motorway system, km
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1970
1975
1980
1985
1990
1995
2000
2005
2010

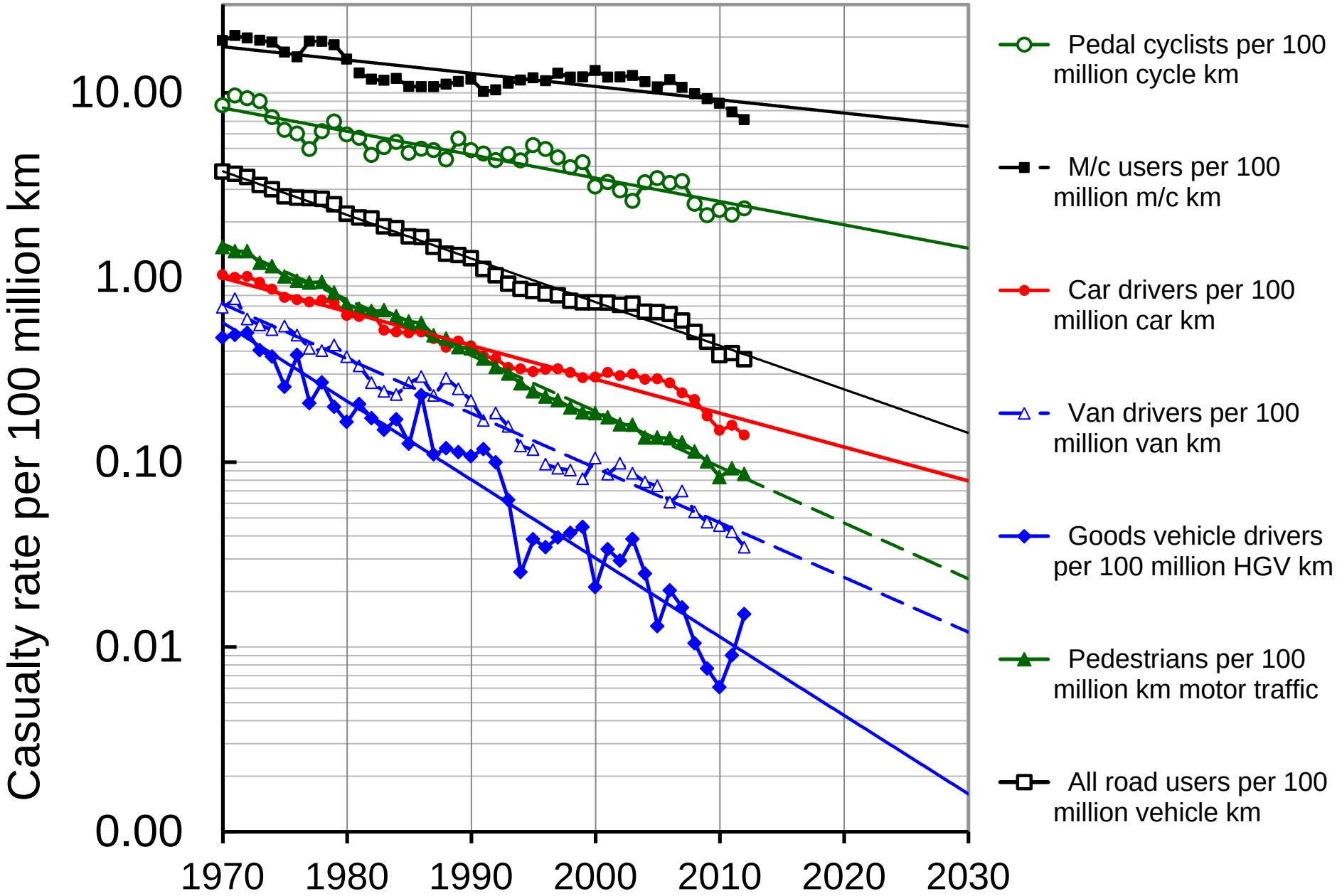

SPAIN – ROAD DEATHS AND MOTORWAY LENGTH
Road deaths
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
2
4
6
8
10
12
14
16
Motorway length, thousand km
R 2 = 0.87

The future

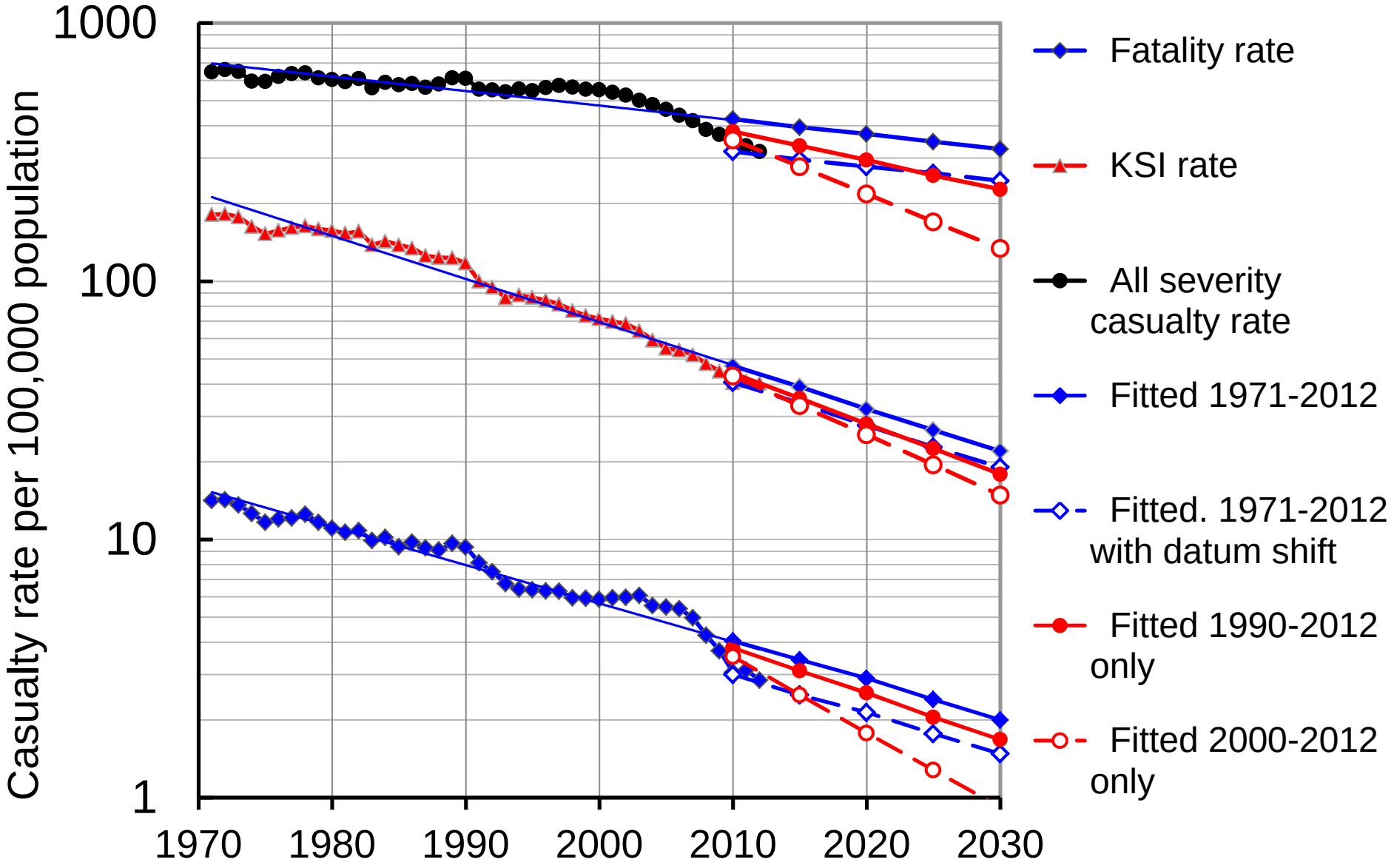
- Technology will improve vehicles (electronic stability, intelligent speed control, lane following, automated lane changing, night vision, better information and warnings)
- IRAP road improvements
- Casualty reductions will continue

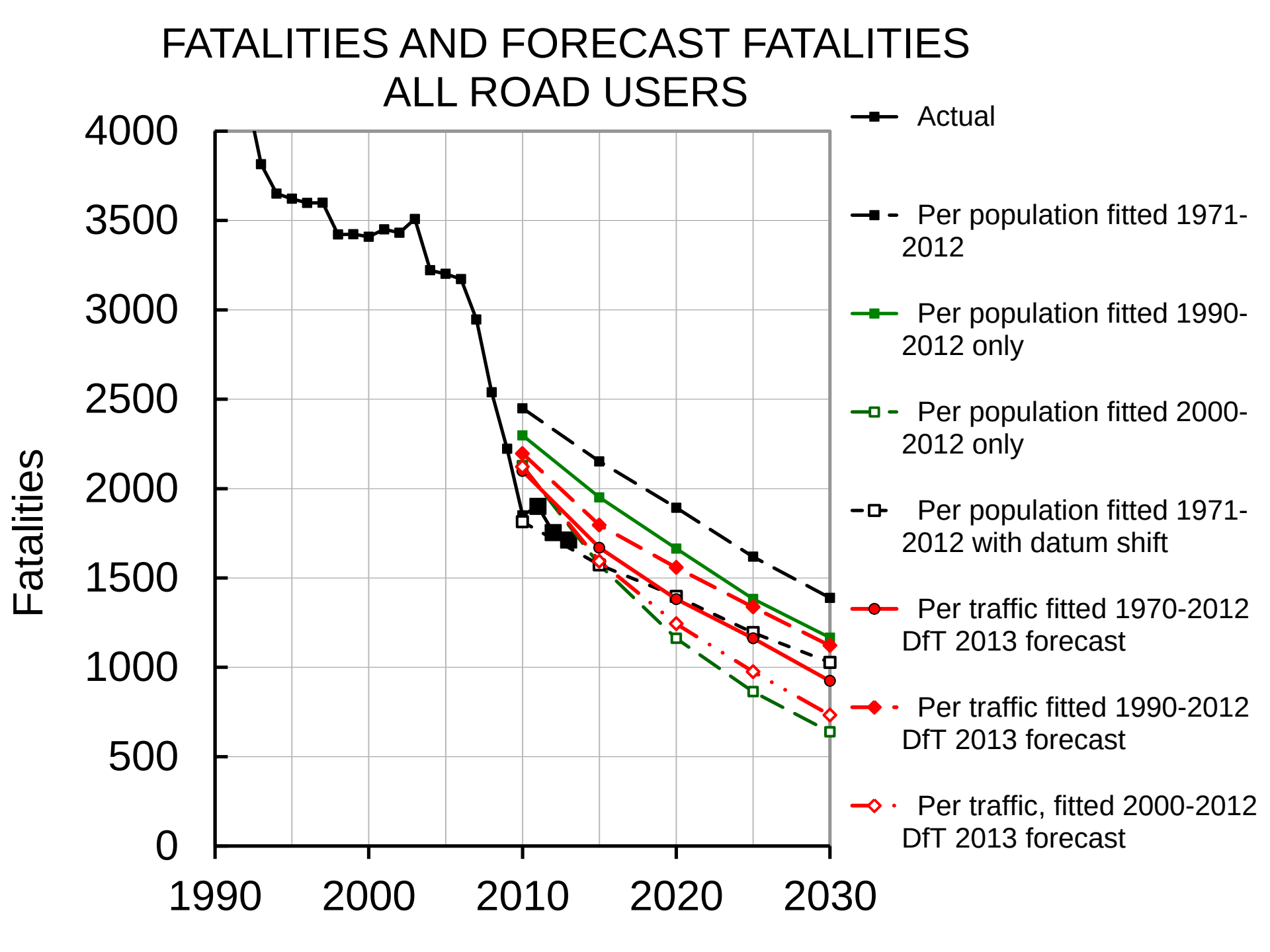
It is possible to fit trend curves to casualty rates and use these to forecast the implied casualties if current trends continue

FATAL CASUALTY RATES PER UNIT TRAFFIC



EXTRPOLATED CASUALTY RATES
ALL ROAD USERS




FATALITIES AND FORECAST FATALITIES
ALL ROAD USERS
Fatalities
4000
3500
3000
2500
2000
1500
1000
500
0
1990
2000
2010
2020
2030
Actual
Per population fitted 1971-2012
Per population fitted 1990-2012 only
Per population fitted 2000-2012 only
Per population fitted 1971-2012 with datum shift
Per traffic fitted 1970-2012 DfT 2013 forecast
Per traffic fitted 1990-2012 DfT 2013 forecast
Per traffic, fitted 2000-2012 DfT 2013 forecast

But worryingly, in the first half of 2014

- Deaths +45 (+5.8%) relative to 2013
- KSI +1,205 (+11.4%) relative to 2013
- All +9,619 (+11.5%) relative to 2013

- For cyclists, all casualties +1,935 (+23.6%) relative to 2013; KSI +296 (+21.7%).

It does seem likely that road safety will continue to improve.

But the figures for the first half of 2014 are very worrying