



# Lifelong disability after traffic injuries *estimating the number of casualties that do not cure*

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# Lifelong disability

Next to the number of traffic fatalities and serious injuries, it is of relevance how many traffic casualties experience Lifelong disability

Two years after the crash a stable situation is achieved and not much cure is to be expected after that

Many casualties experience physical and/or mental disability (EQ5D) at one or more levels:

- Mobility (difficulties to walk)
- Self care
- Common activities (work, study, leisure activities),
- Pain or discomfort
- Fear or depression

# Definition

- Uncured injury sustained in a traffic crash, 2 years after the crash
- In order to count the number of disabled persons after a traffic crash in year  $x$ 
  - it takes a long time
  - much registration is needed

Characteristics of the person or injury can help to estimate the number of Lifelong disabled casualties - statistically

# Injury treatment

Research or Survey among previous casualties, find determinants that project later disability

For individual actual patients, see which of the determinants found are present

- Too weak to really forecast lifelong disability at case level
- Sufficient to calculate group sizes

# Integris Method

- In the EU project Integris (Polinder et al, 2007), the disability weights of different injuries were determined and the proportion of casualties to apply these weights to, in order to calculate Disability Adjusted Life Years (DALY)
- Proportions were estimated from a survey among 8.564 persons at the Accident & Emergency department of 17 Dutch hospitals in 2002/2003. EQ5D questionnaire at 2.5, 5, 9 and 24 month after treatment
- 39 injury groups (EuroCost)
- All external causes (traffic, home & leisure, etc)
- Multiple injury accounted implicitly by prioritising the Injury Group

Injury group	DW for acute phase		Proportion with lifelong consequences (%)		DW for lifelong consequences
	ED	HDR	ED	HDR	
Concussion	0.015	0.100	4	21	0.151
Other skull-brain injury	0.090	0.241	13	23	0.323
Open wound on head	0.013	0.209	–	–	–
Eye injury	0.002	0.256	0	0	–

# Malm method

- In Sweden, a large group of injured car-occupants (20.484 during 1995-2001) were examined by the health insurance and their injuries and impairment level were scored by insurance doctors, using the e.g. Leg with AIS3 (60% chance) + Face with AIS2 (28% chance) leads to a 71,2% chance of lifelong disability (at 5% level)

$$1 - \prod(1 - r_i)$$

Grading Medical Impairment method (Folksam)

- E.g. missing tip of ring-finger = 2%
- Proportions of Casualties to 1%, 5%, 10% and 30% level (RPMI Risk of Permanent Medical Impairment)
- 10 injury groups \* 5 AIS levels, e.g. RPMI-5%

	AIS				
Body Region	1	2	3	4	5
Head	8	15	30	80	100
Cervical spine	17	61	80	100	100
Face	5,8	<b>28</b>	80	80	80
Upper extremities	17	35	85	100	100
Lower extremities & Pelvis	18	50	<b>60</b>	60	100
Thorax	2,6	4	4	30	30
Thoracic spine	4,9	45	90	100	100
Abdomen	0	2,4	10	20	20
Lumbar spine	5,7	55	70	100	100
External (skin) & thermal injuries	1,7	20	50	50	100

# Application of both methods

- NL data
  - 1993-2014: 337,000 hospitalised traffic casualties with at least one AIS=2 injury (MAIS2+), not died within 30 days
  - ICD9 derived AIS<sup>®</sup> scores (ICDmap90) and AIS-body regions
  - All injuries of a casualty were used to determine
    - the prioritised injury group (EuroCost) → applied the Integris proportions to estimate the number of lifelong disabilities
    - the highest AIS for each of the 10 AIS-body regions → applied the 3 Malm RPMI-matrices and the product rule to make three estimates of the number of lifelong disabilities

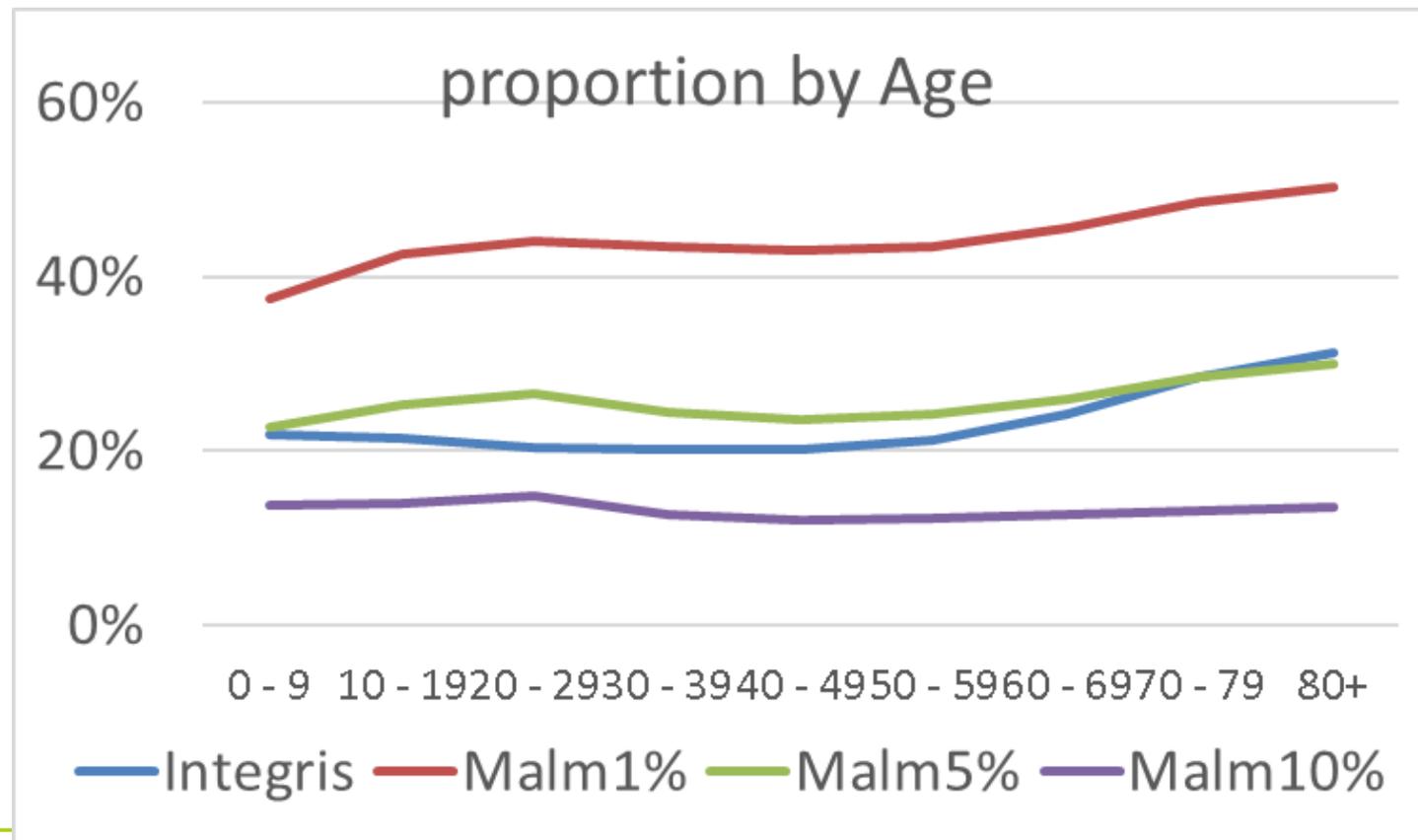
# Results

- The highest proportion of lifelong disability was found with the Malm method at 1% level (almost all injuries count): 44%
- Omitting less impairing injuries, the number of lifelong disabilities is 3 times lower at the 10% level.
- Integris compares best to the Malm5% proportions

Proportion of lifelong disability (%)					
Gender	cases	Method			
	MAIS2+	Integris	Malm1%	Malm5%	Malm10%
Male	205.021	21,7%	43,7%	25,6%	13,7%
Female	132.221	24,1%	44,9%	25,5%	12,5%
SUM	337.242	22,7%	44,2%	25,6%	13,2%

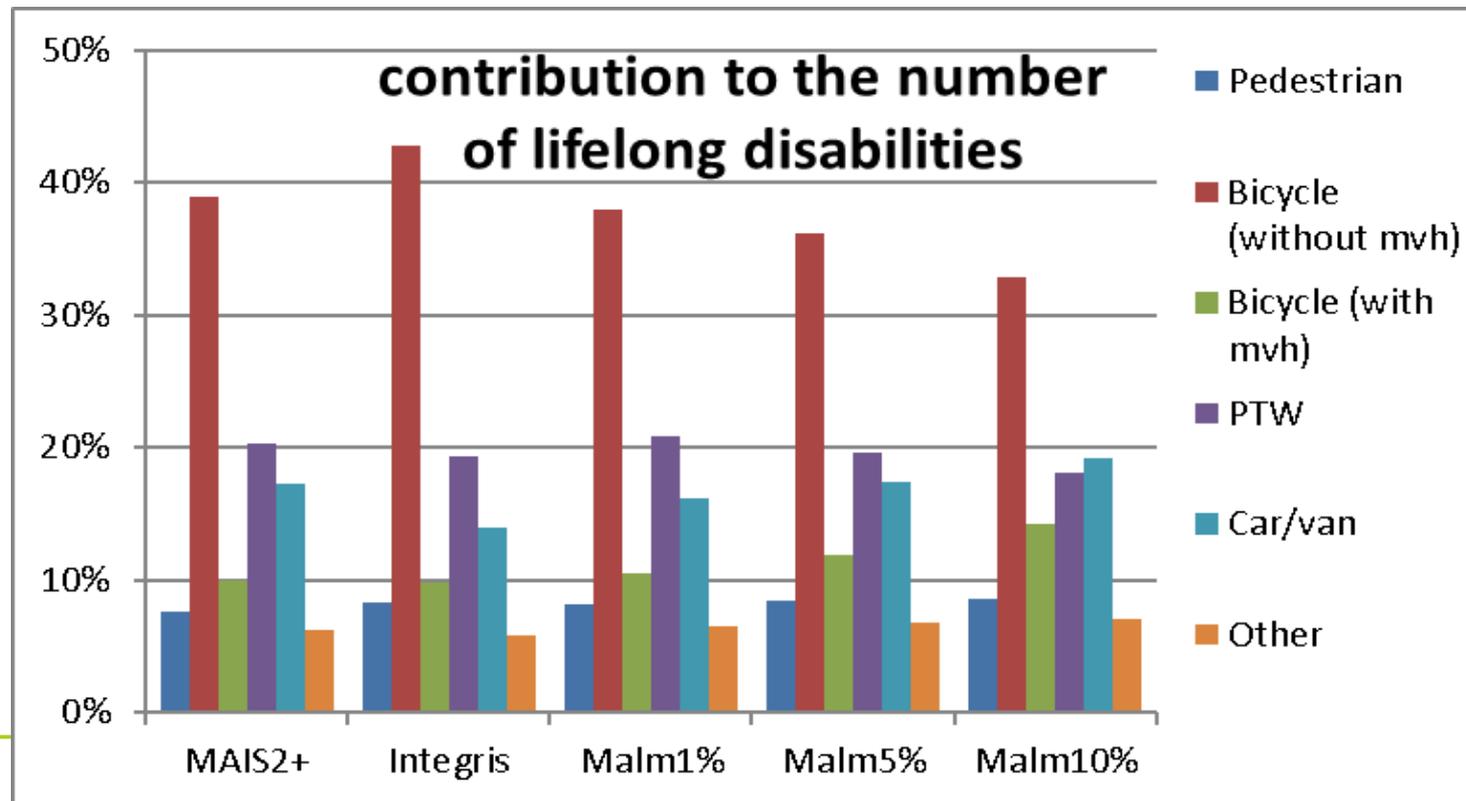
## Results per age group

- Elderly have a injuries that more often lead to lifelong disability
- Comparable pattern of age dependency



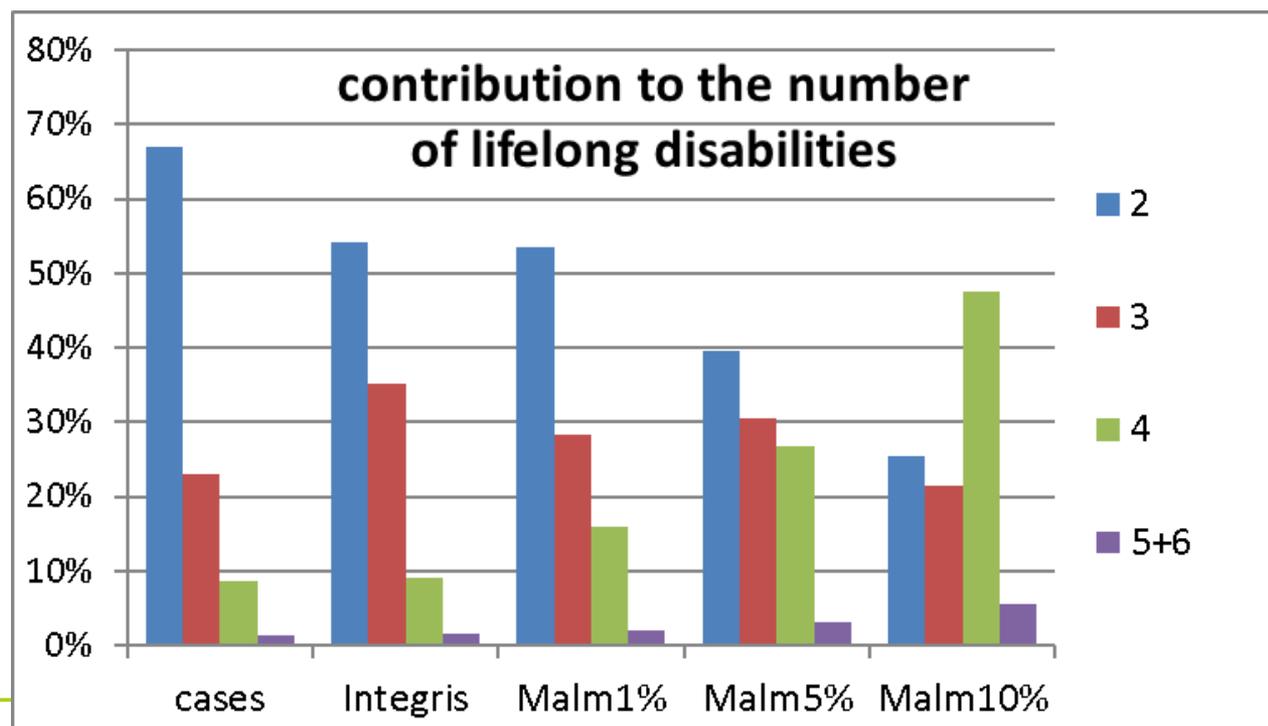
# Results per mode

- Pedestrians and bicyclists (in collision with a motor vehicle) have injuries with the highest proportion of lifelong disability
- Differences are small; powered two wheelers have slightly lower proportions of lifelong disability
- Bicyclists generate the highest number of lifelong disabilities in NL (>45%)

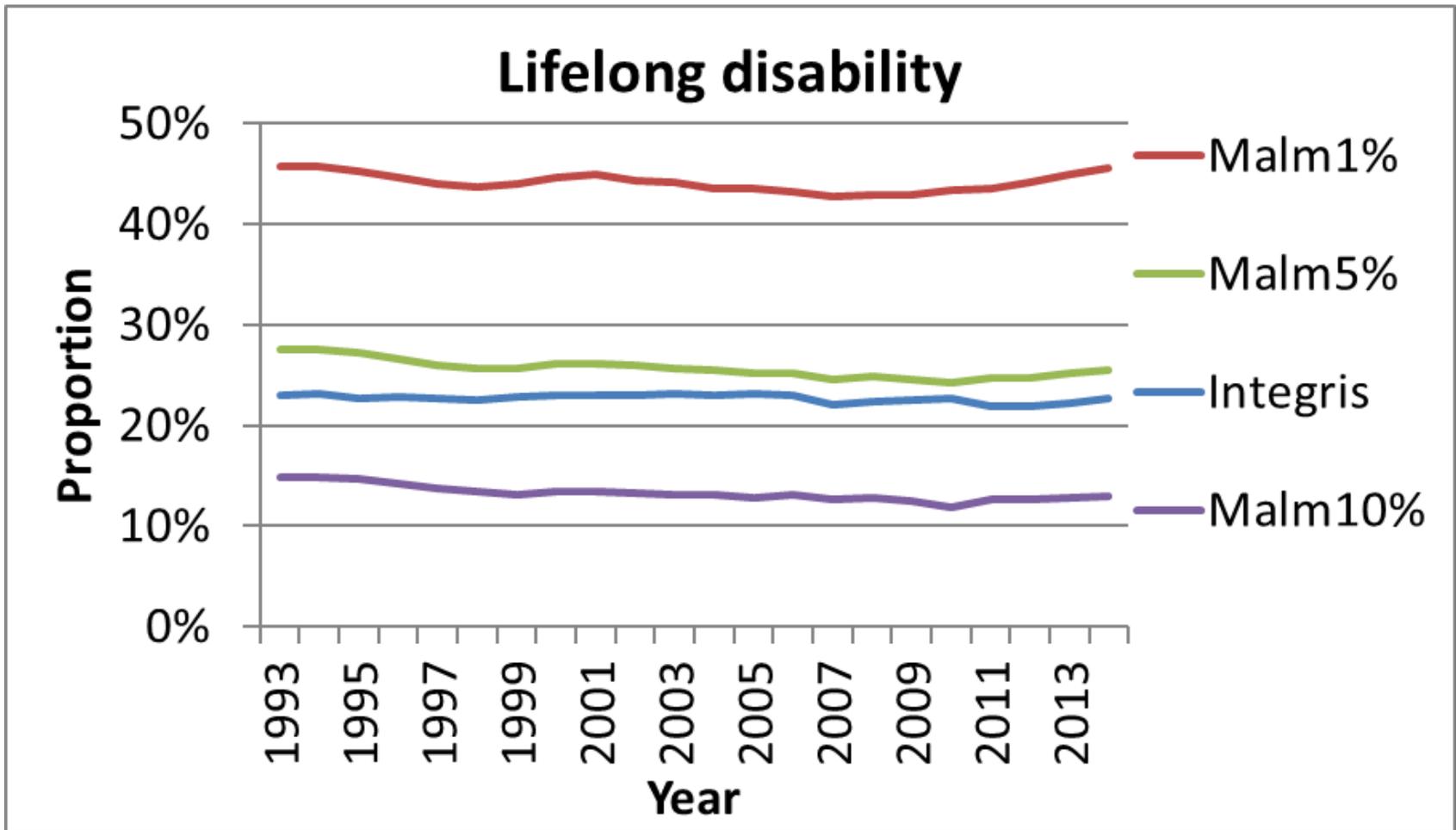


## Results per severity

- As AIS is one of the components of the Malm method, a strong dependency on the MAIS level is seen
- Integris method shows lower proportions for MAIS4+
- Two third of MAIS2+ casualties has MAIS=2. They contribute 25%-50% to the number of lifelong disabilities



# Results per year



# Limitations

- Integris proportions were derived from all cause injuries. Elderly falls (with hip injuries) dominate this group. It is questioned if the factors derived are valid for traffic casualties
- The Malm RPMI matrices were derived from car occupants. The method should have been applied to AIS2005<sup>®</sup> injury severity. Instead AIS1990<sup>®</sup> was used in our data

# Conclusions

- Integris method gives comparable proportions of lifelong disability as the Malm 5% level
- When road safety policy is focussed to groups with high proportions of lifelong disability, it does not really matter which method is used. All methods give a similar ordering of the groups of road users
- Pedestrians and bicyclists give the highest contributions to the number of lifelong disabilities

# Prevalence

After many years of unsafety of traffic, the number of persons in the Netherlands with impairment caused by traffic accidents, has reached a share between 1% and 2% of the population

A paper will be submitted later this year

– cure  
and  
death

**Prevalence**  
impaired persons  
after traffic injury

+new  
cases

# Questions?

Thank you for your attention

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