The Value of a Statistical Life: Is Cost-Effectiveness a Useful Tool in Travel Medicine?

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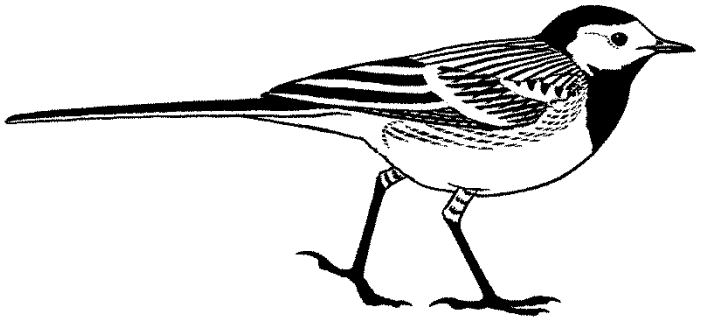
Reiseklinikken®



The art of travel medicine

- Give evidence based advice and provide reasonable measures
- Handle the patients' perceptions of risk
  - How do the patients handle their own perception of risk? By performing rituals?

Dancing before a dangerous enterprise, Trobriand Islands

http://www.remotelands.com/

Is the travel medicine consultation a modern safety ritual?

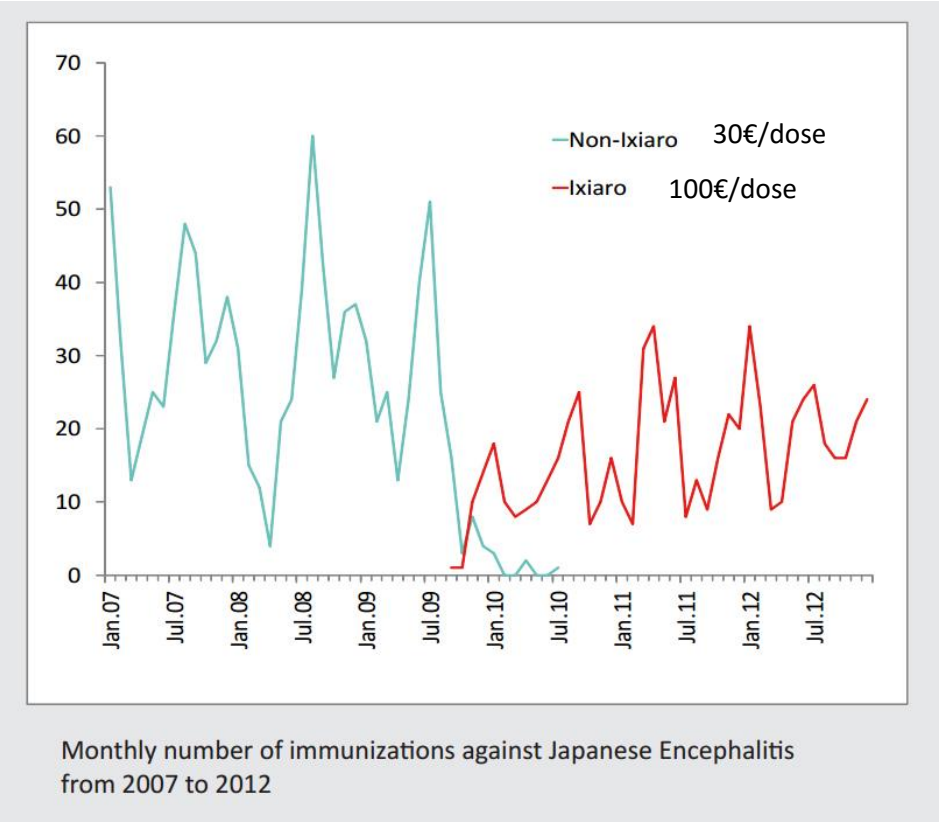
Is the travel medicine consultation a modern safety ritual?

- It will, to a very low degree, increase the chance of surviving the trip

The Value of a **Statistical Life** is the amount of money a person (or society) is willing to spend to save a **life**.

The price is crucial:

We saw a 40% reduction of sold JE-vaccine when we changed from the old, cheap, JE vaccine to Ixiaro (*P*=0,018)



Monthly number of immunizations against Japanese Encephalitis from 2007 to 2012

Ixiaro: No risk of serious adverse effects (larynx edema or urticaria), that with the old vaccine might outweigh the risk of Japanese encephalitis in a very low risk context.

Poster PO14.02. Raastad R, Heier L, Hasle G. Reduced vaccination rate against Japanese encephalitis at a Norwegian vaccination clinic after introduction of Ixiaro®. Poster PO14.02. 13th Conference of the International Society of Travel medicine. Maastricht, May 19-23 2013.

Most of humans decisions are made on an intuitive basis.

Willingness to pay to save migratory birds from drowning (Desvouges et al. , 1993)

Number of birds to save	Amount the households were willing to pay
2,000	$80
20,000	$78
200,000	$88

Willingness to pay for travel vaccines

- This is much more a question of psychology than of the individual traveller's risk assessments.
- The question for the patients will be:
  - "What is a fair price for a vaccine?"

  not:
  - "How much would it cost to save my statistical life with a certain vaccine?

Does life have an unlimited value?

Not when the decision makers in the society decide to make constructions to protect pedestrains and bicyclists in the traffic, or when implementing any prophylactic measure in the society

SINTEF (the largest independent research organisation in Scandinavia) postulated the value of a statistical life in Norway to be:

€3,4 million

To spread the cost

- If a vaccine costs €100 and the risk of dying from the disease is 1/50,000, the price of saving your life would be €5 million
- This is «inverse gambling»

A statistical life is an abstract concept

- When people's own concrete life is at stake they may pay huge amounts of money at cancer clinics abroad, according to what they can afford.
- Companies or governments may pay large amounts to free hostages

Most people cannot afford to pay €3,4 million for their life, even at a gunpoint

When getting travel vaccines we actually pay much more to save our statistical lives

Calculated cost per life saved for one 4 weeks trip to a «non-western» country:

Disease	Brand name	Price €	Protection %	Risk %	Mortality %	Cost mill. €
Hepatitt B	**Engerix B, two doses**	**81**	**90**	**0,005**	**1**	**179**
Japansk encefalitt all travellers in Asia	**Ixiaro**	**209**	**100**	**0,0001**	**30**	**695**
Japansk encefalitt, rural Indochina	**Ixiaro**	**209**	**100**	**0,01**	**30**	**7**
Kolera	**Dukoral, two doses**	**52**	**70**	**0,0003**	**4**	**614**
Meningokokk ACWY	**Menveo/Nimenrix**	**60**	**100**	**0,00006**	**10**	**994**
Rabies	**Rabies Imovax, three doses**	**219**	**100**	**0,0000054**	**100**	**4048**
Typhoid fever SE Asia and Africa	**Typherix/Typhim Vi**	**31**	**70**	**0,02**	**1**	**22**
Typhoid fever other countries	**Typherix/Typhim Vi**	**31**	**70**	**0,002**	**1**	**219**

Steffen, R., Behrens, R.H., Hill, D.R., Greenaway, C. and Leder, K., 2015. Vaccine-Preventable Travel Health Risks: What Is the Evidence—What Are the Gaps?. *Journal of travel medicine*, *22*(1), pp.1-12.

LeGuerrier, P., Pilon, P.A., Deshaies, D. and Allard, R., 1996. Pre-exposure rabies prophylaxis for the international traveller: a decision analysis.*Vaccine*, *14*(2), pp.167-176.

Cheap, established vaccines from the EPI program:

Vaccines against diphteria, tetanus, polio and measles cost less than €1000 per life saved

www.reiseklinikken.no

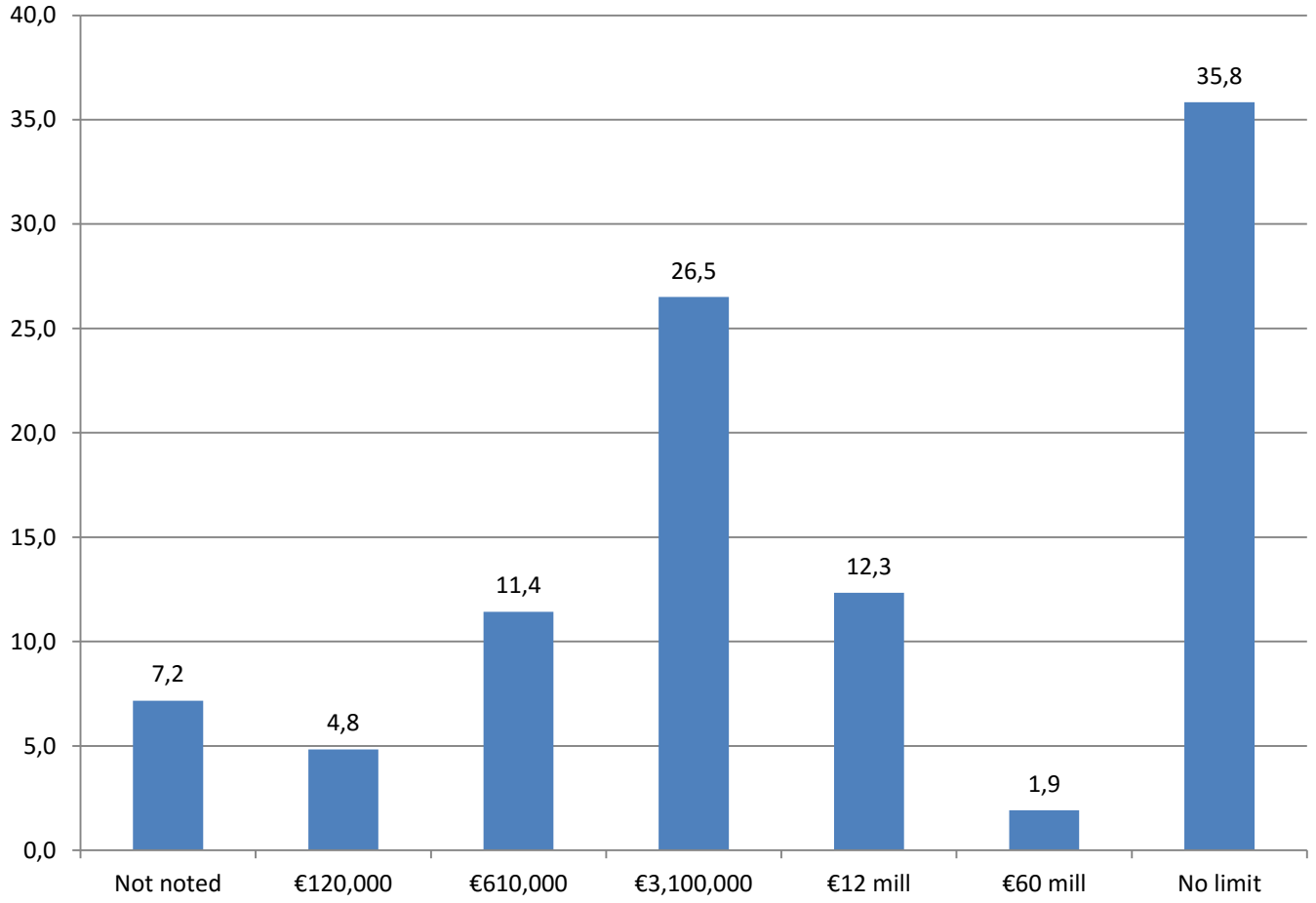
What do you think is the value of a statistical human life?

- 1200 patients, out of 2900 who visited Reiseklinikken during the study period, filled a form, after being explained what is a «statistical life»
- What do you mean a statistical life is worth?
  - In the society
  - Your own life
  - Your own children's lives

The value of a statistical life in the society

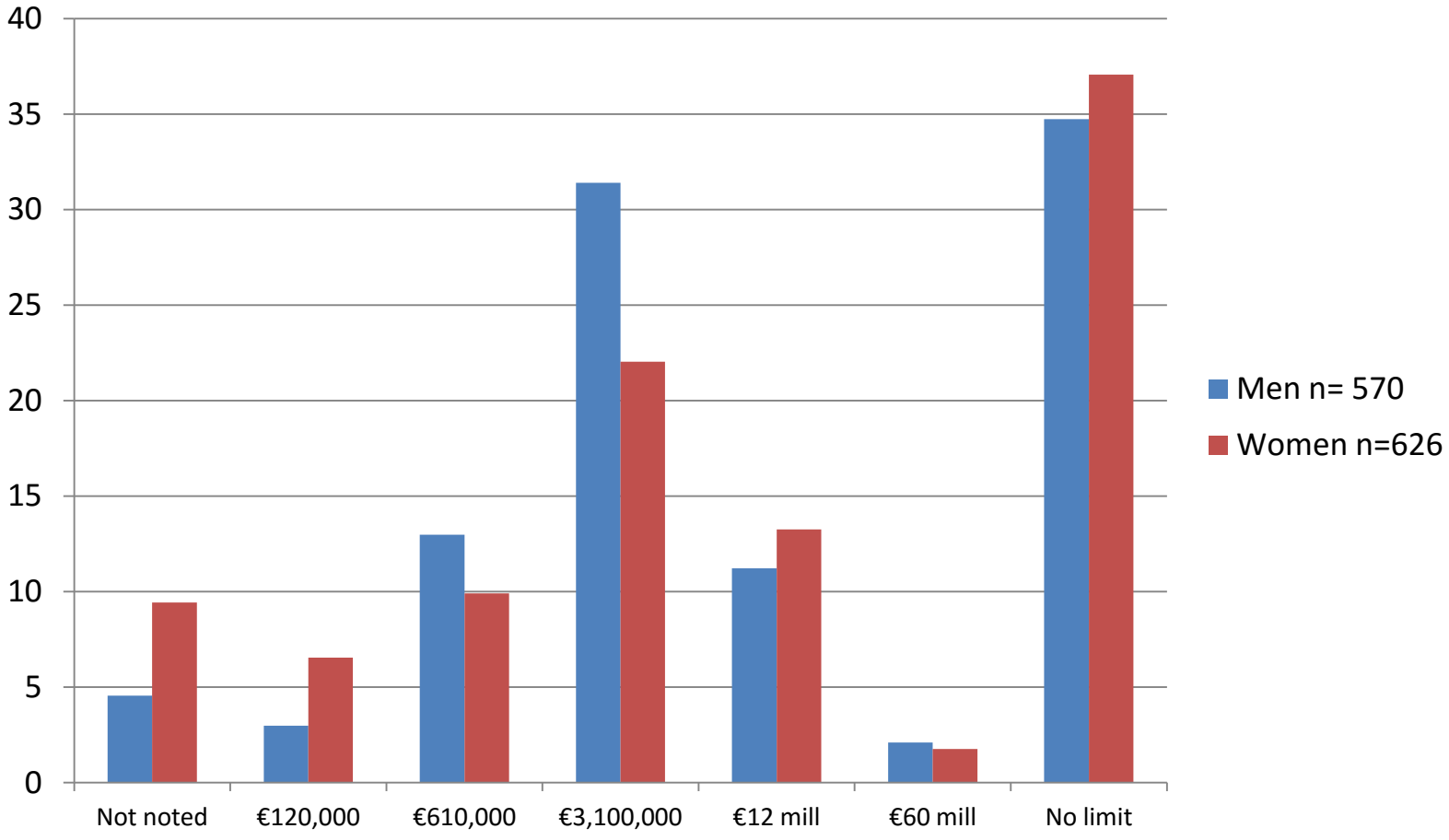
n=1200

%

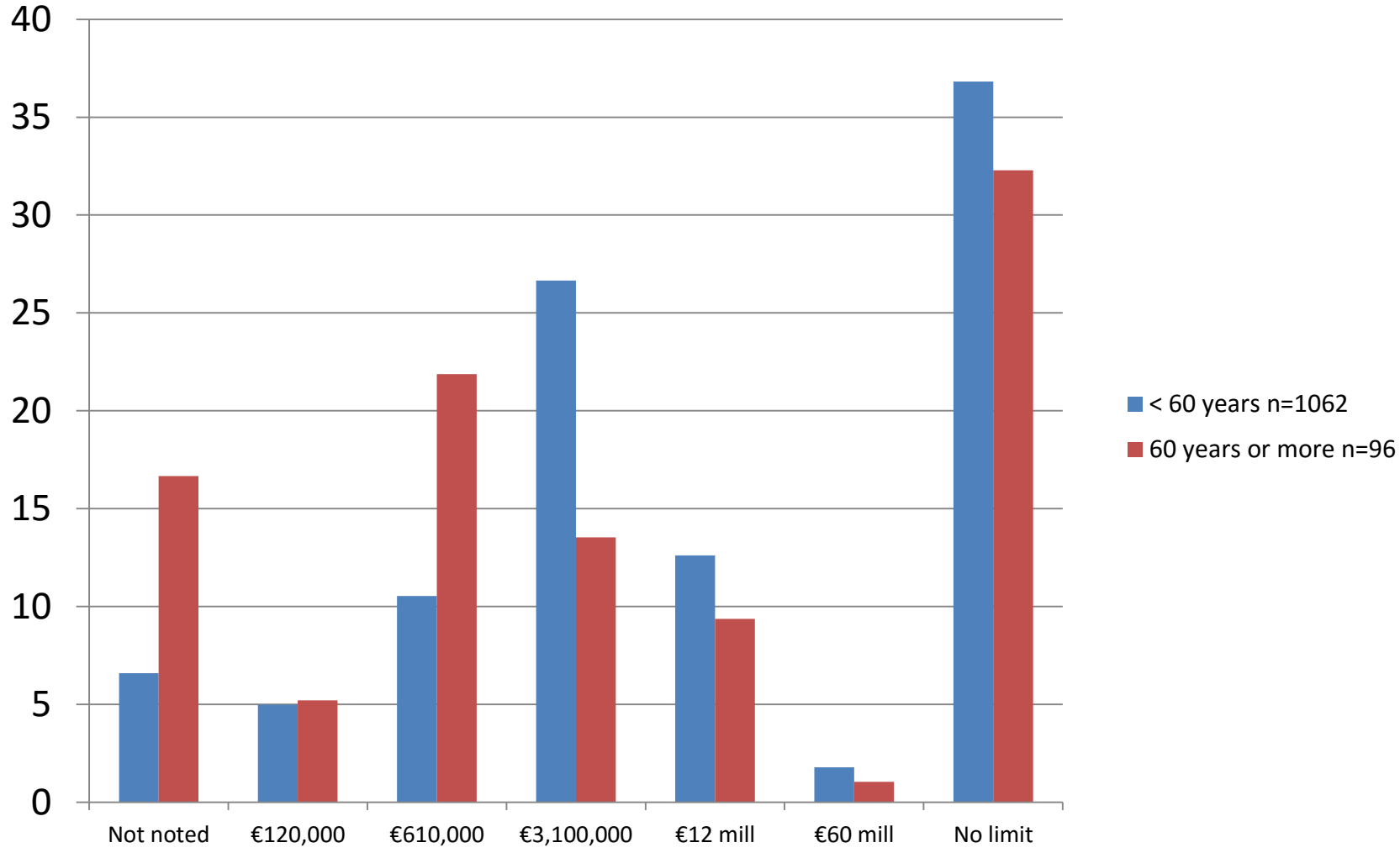


Personal income did not influence the view of the value of a statistical life

Neither did gender



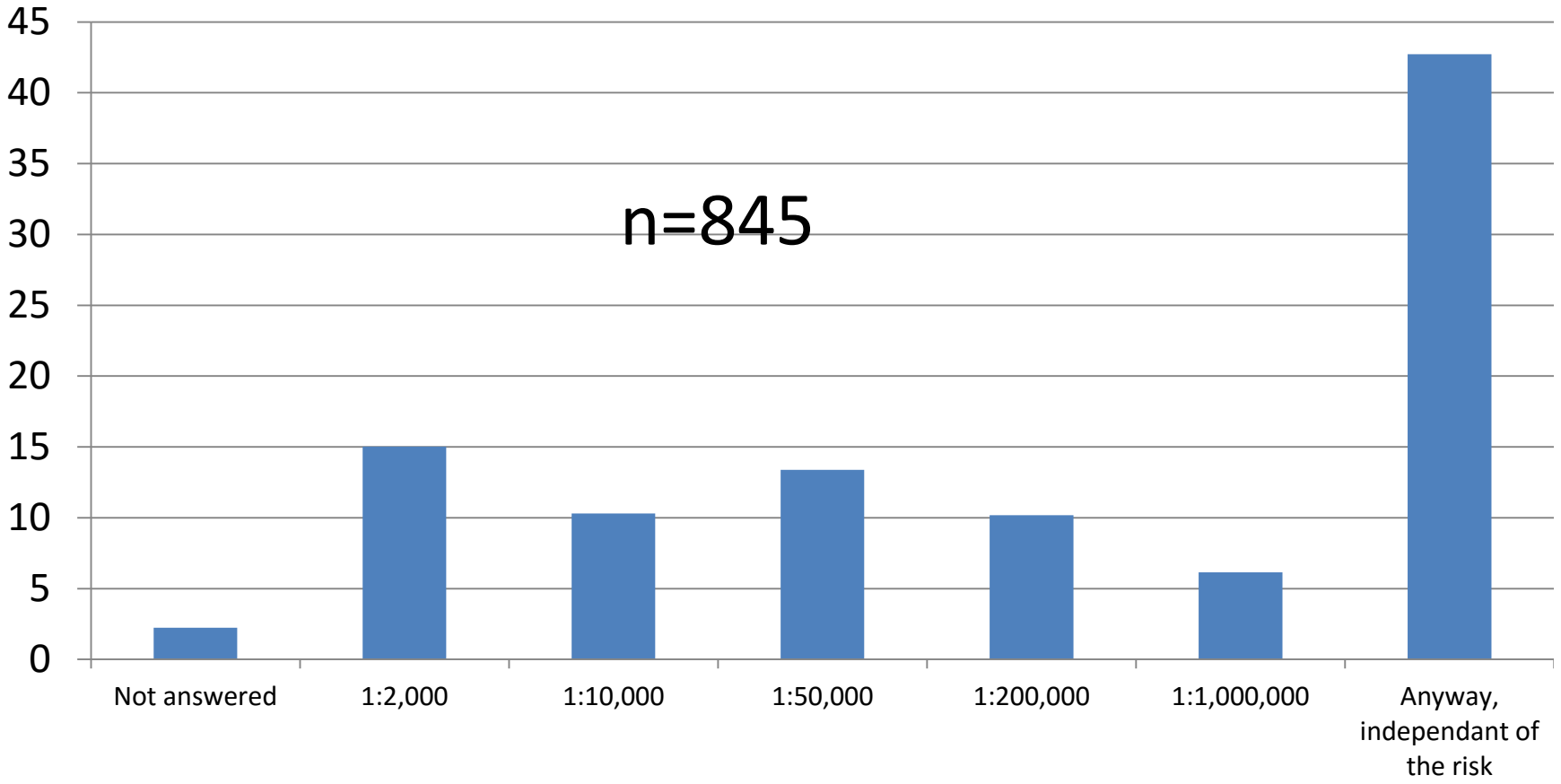
The elderly put a lower value of a statistical life in the society *P*=0,0073



Asking about your own life:

- Instead of a price for the life we expressed the same values as the price of a hypothetical vaccine and the risk of dying from the disease the vaccine was supposed to prevent.

If you were offered a vaccine that costs €54: Would you take it if the risk was at least:



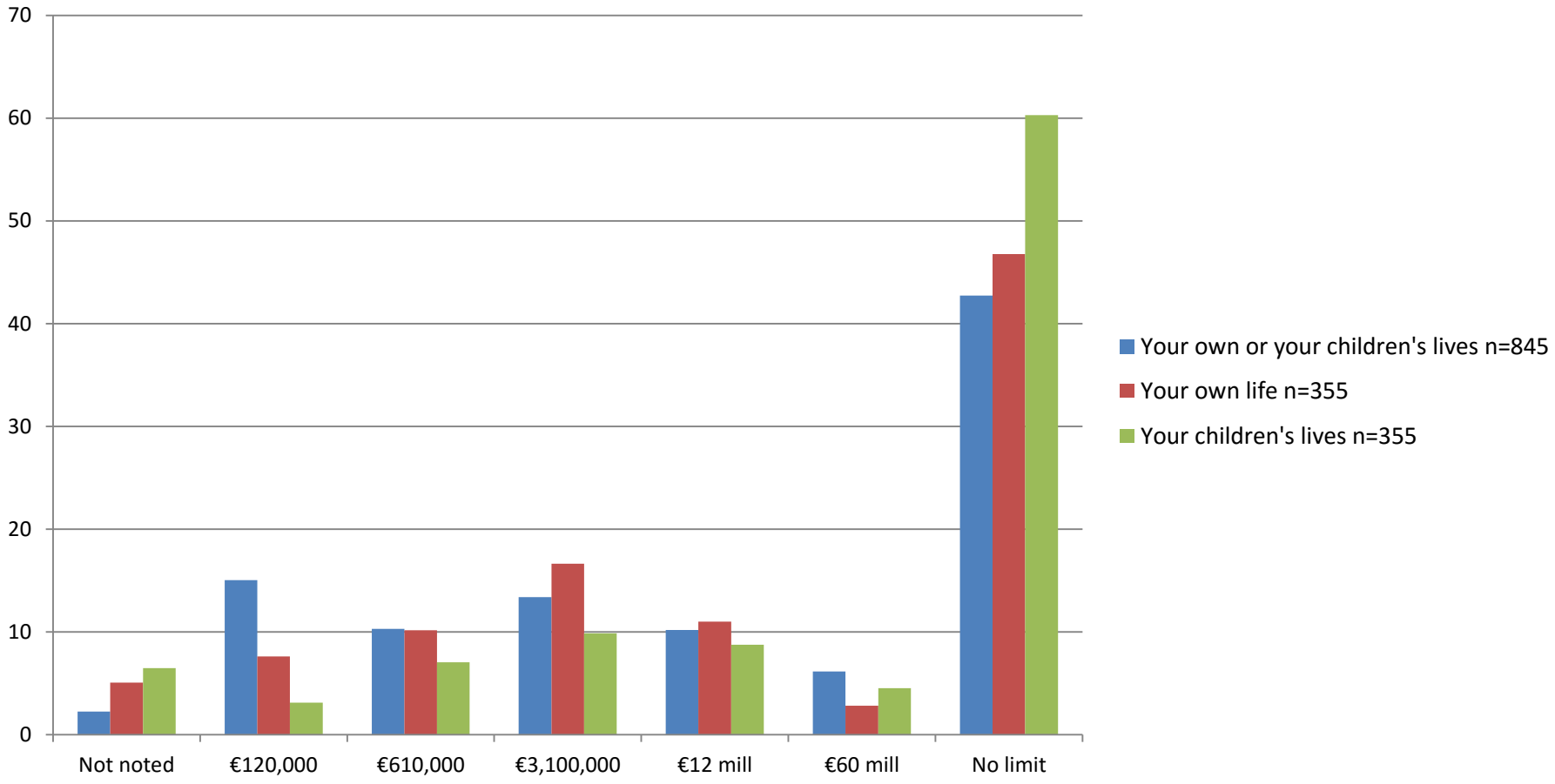
Does 43% of the polulation mean that life has an unlimited value?

Fewer people may have answered

«I would have taken the vaccine, no matter how low the risk of dying from the disease was»

if the price of the hypothetical vaccine was, e.g., €5000.

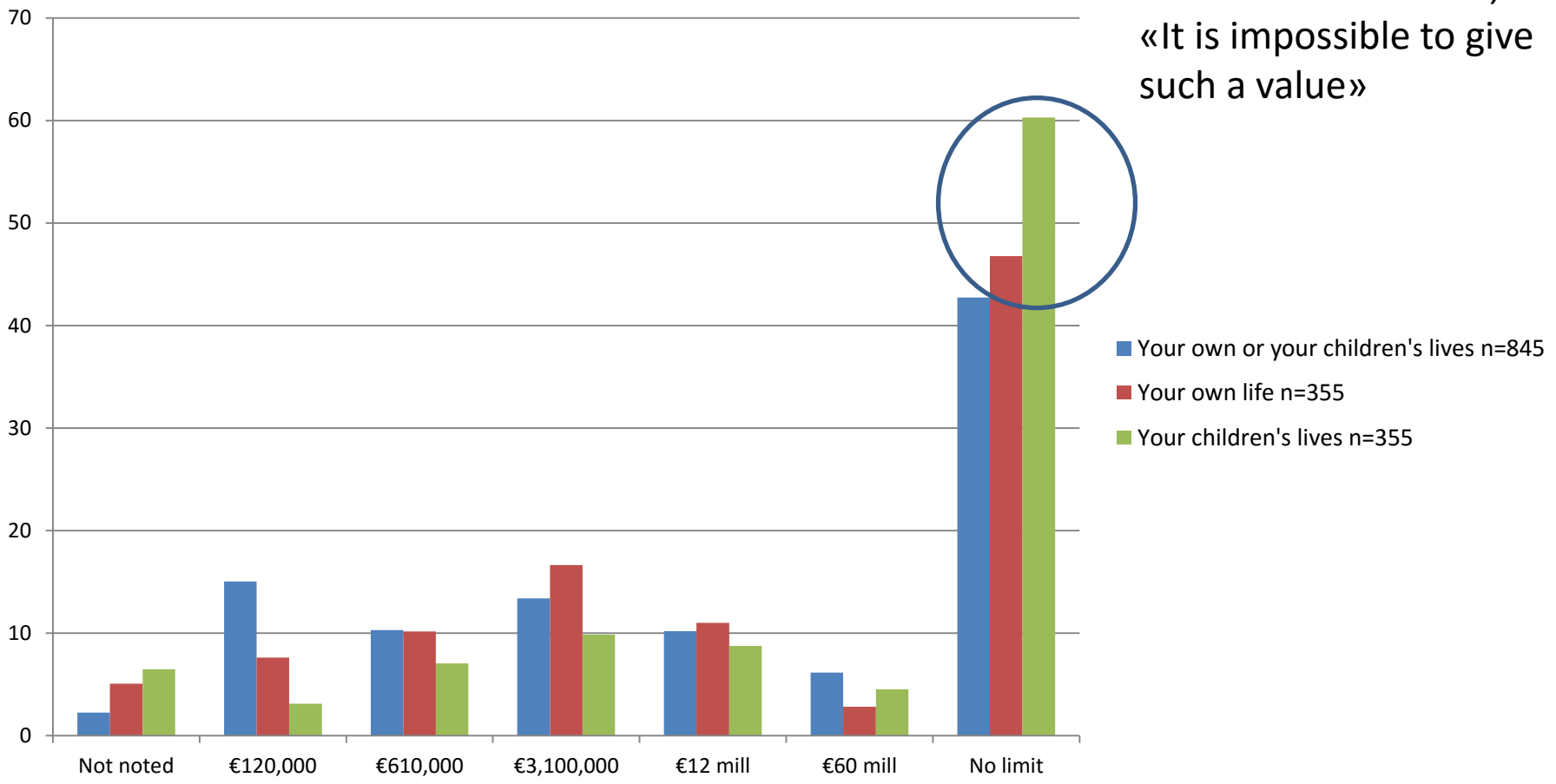
Does it make a difference if it is your own statistical life or your children's statistical lives you want to pay for saving?



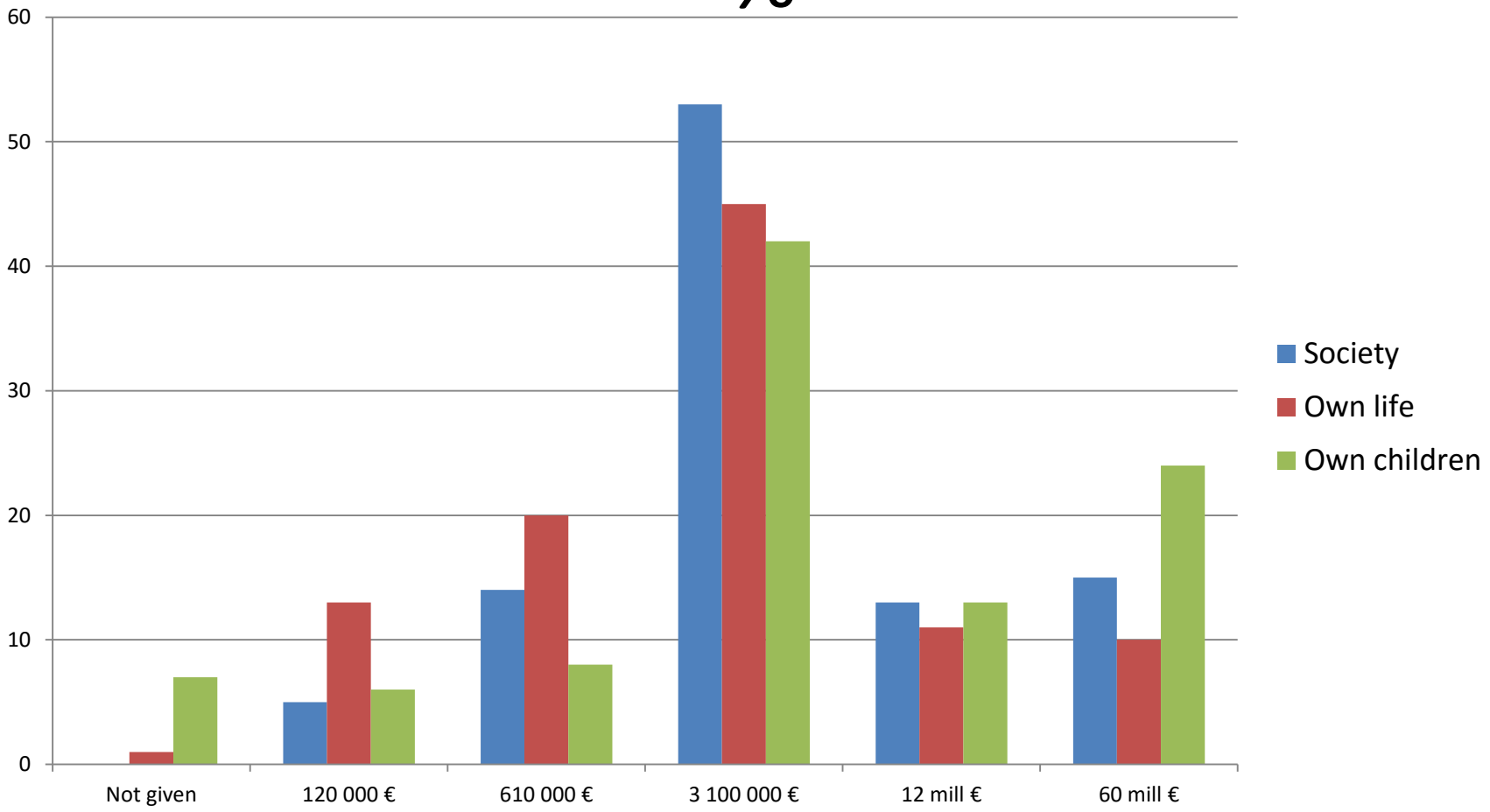
The respondents were more like to write «no limit» for the value of their children's statistical life (59,3%) than their own life (46,0%) *P*=0,00045

Does it make a difference if it is your own statistical life or your children's statistical lives you want to pay for saving?

This may mean: «The life has unlimited value», or «It is impossible to give such a value»



The value of a statistical life, if you have to choose one option n=100 %



What may influence the answers?

Willingness to pay is not necessarily linearly related to the risk and gain:

- In a game where total ruin (or even your own death) is a possible outcome, that would overrun the mathematics:

***That is why it is possible to sell insurances*.**

The way you pose a question may influence the answer:

- Framing effect: We asked about «risk», the result might have been different if we had asked about «survival». 99,99% survival is less threatening than 0,01% mortality.
- The succession of the questions may influence the answers: First the respondents were explained the decision-makers' view of a statistical life, then they made a decision for their view of the value of a statistical life in the society, and then they were asked for the value of their own statistical life

Perhaps the alternatives «invited» to peak around the decisionmakers value:

- Not noted €120,000 €610,000 €3,100,000 €12 mill. €60 mill. No limit

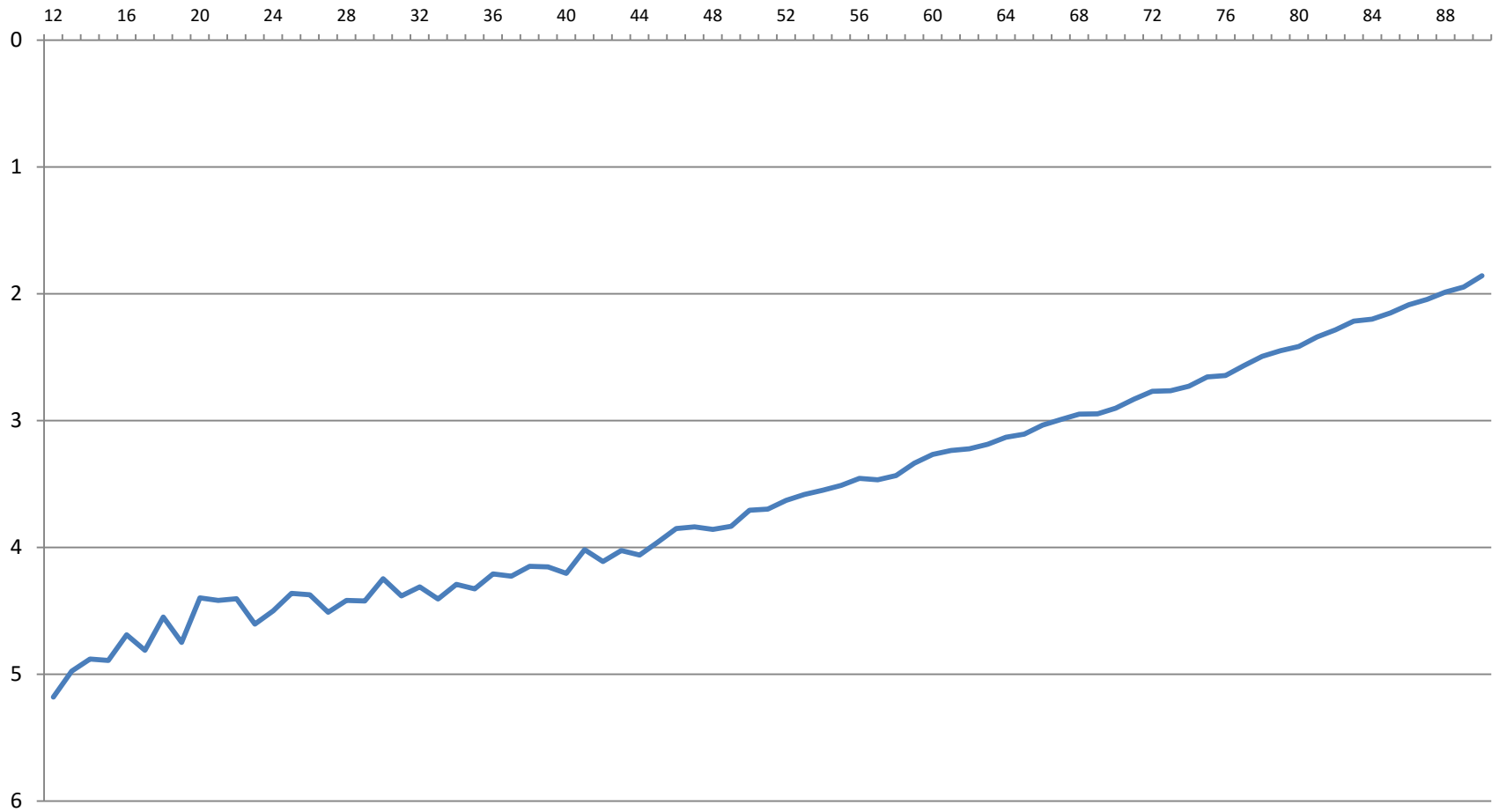
The answers could have been different if the alternatives were:

- Not noted €12 mill. €60 mill. €310 mill. €1,200 mill. €6,000 mill. No limit

Dilemma:

If the patients mean that their lives are worth €3.1 million, should we then promote vaccines that would imply a cost of more than €100 million per life saved?

The monthly background risk of dying in Norway: $1/10^{y}$



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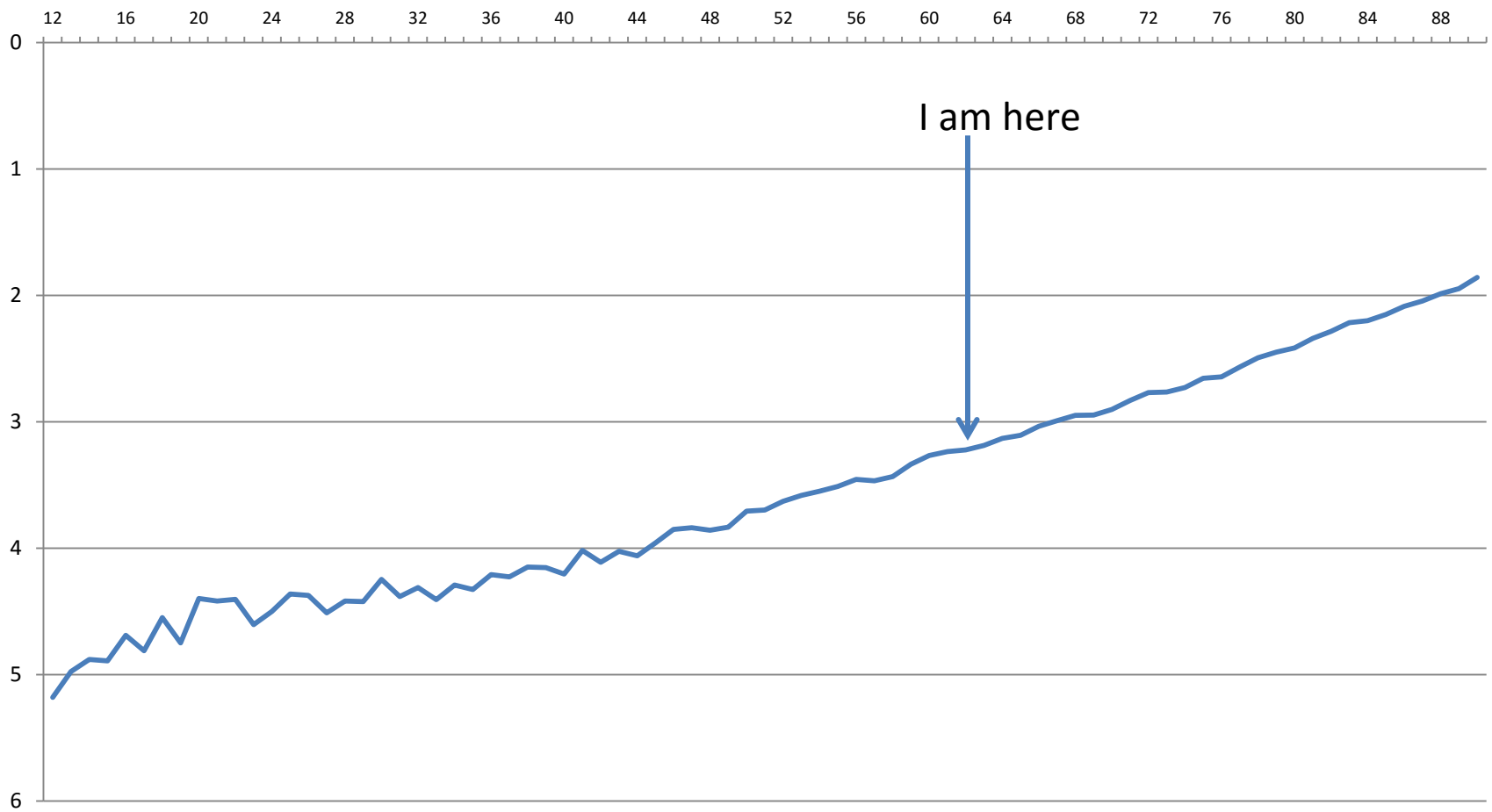

The monthly background risk of dying: $1/10^{y}$

Dangerous travel:
There are 210,000 humanitarian workers in the world, and 100-200 humanitarian workers are killed per year. The monthly risk of dying from being a humanitarian worker equals the background risk of being 35-40 years old, i.e., 1/12,000-25,000.

Foto: MSF

What is the risk of contracting a vaccine-preventable disease here?

If you are not worried about your monthly background mortality of

1:30,000 (24 years)

1:10,000 (45 years)

1:1,000 (67 years)

you should not worry much about dying from

- Rabies (one in several millions)
- Hepatitis B (less than one in a million)
- Japanese encephalitis (less than one in a million)

Our findings indicate that a substantial part of travellers would buy any vaccine, no matter how low the risk of dying from a disease is.

Should we then offer them as many vaccines as possible?

I mean NO.

Is cost per life safed a useful tool in travel medicine?

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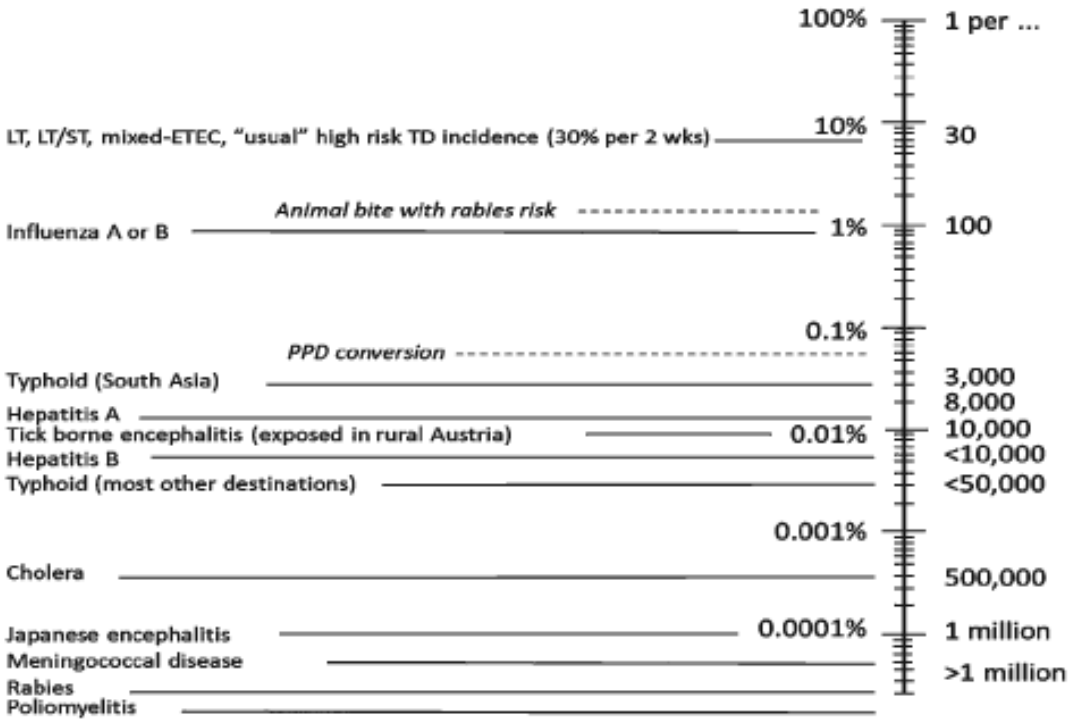
These calculations are made from risk assessments of general travellers.
In certain cases the risks may be much higher:

During the Vietnam war the American soldiers had a risk of 1:10,000/week for contracting Japanese encephalitis.

Bat-researchers may be bitten by bats several times per year.

Meningococcal disease may occur in spectacular outbreaks.

VFRs to rural Pakistan may have a risk of typhoid fever > 1 %



Steffen et al. 2015

Vaccines that are normally NOT indicated for ordinary low risk travel:

- Hepatitis B
- Japanese encephalitis
- Meningococcus ACWY
- Rabies
- Typhoid fever

These vaccines may be considered when there are special risk factors

Japanese encephalitis vaccine is potetially easy to sell

- 30% mortality
- Half of the survivors end up with brain damage (you may end up as a «living vegetable»)
- Most of the travellers who get Japanese encephalitis are ordinary, «low risk» travellers

http://hubpages.com/

As responsible health care providers travel, we should give evidence based advice and provide reasonable measures

Handle the patients' perceptions of risk

We should NOT be guided by the patients' willingness to pay.