

# Do Public Campaigns Decrease Antibiotic Prescription in the Community? Evidence from a 14-Years Reimbursement Data Survey in Belgium

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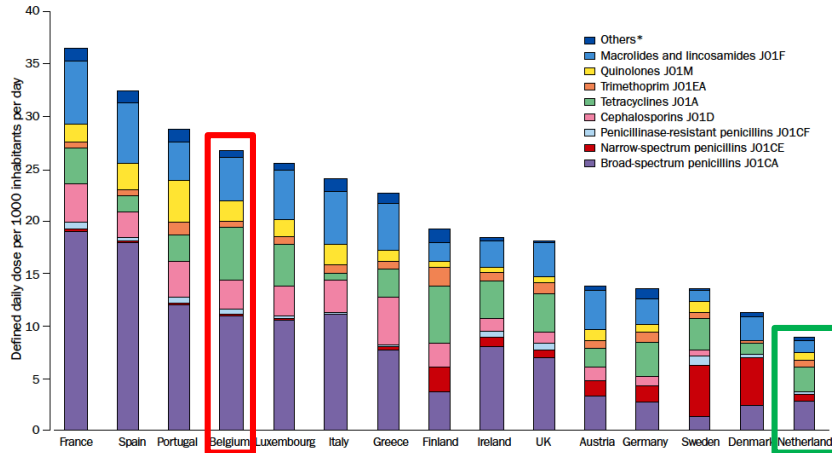


# Disclosures

- The work presented here was made without support from any source and uses information and data that are publicly available and at no cost.
- I have been (and still am) member of the subcommittee of the Belgian Antibiotic Policy Committee (*BAPCOC*) responsible for the organization of the public campaigns in Belgium since 2000, but have received no financial support in this context
- My laboratory work, unrelated with the topic of this presentation (and dealing mainly with *in vitro* pharmacodynamics and toxicodynamics of existing and novel antibiotics) has been supported by various non-profit and profit-making organizations (see poster SATURDAY-581 Session 188 for a complete listing)

# Why public campaigns for less use of antibiotics in the community in Belgium ?

1997



Outpatient antibiotic sales in 1997 in the European Union

\*Includes sulphonamides, penicillinase-resistant penicillins, amphenicols, aminoglycosides, and glycopeptides.

Cars *et al.* Lancet. 2001;357:1851-3 - PMID: [11410197](https://pubmed.ncbi.nlm.nih.gov/11410197/)

1997 - 1999

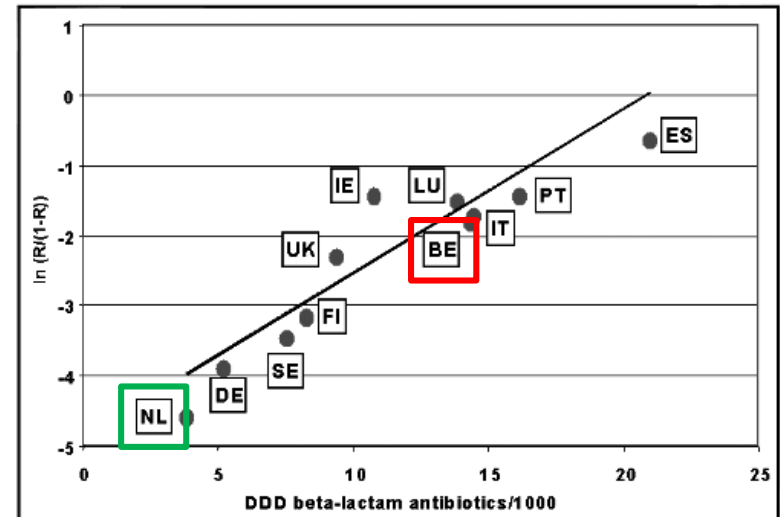


Figure 2. The log odds of resistance to penicillin among invasive isolates of *Streptococcus pneumoniae* (PNSP;  $\ln(R/(1-R))$ ) is regressed against outpatient sales of beta-lactam antibiotics in 11 European countries; antimicrobial resistance data are from 1998 to 1999 and antibiotic sales data are from 1997. DDD = defined daily dose; BE = Belgium; DE = Germany; FI = Finland; IE = Ireland; IT = Italy; LU = Luxembourg; NL = the Netherlands; PT = Portugal; ES = Spain; SE = Sweden; UK = United Kingdom.

The message was clear and understood:

- Belgium consumes too much antibiotics in the community, which creates resistance...
- If you reduce antibiotic pressure (DDDs) in the community, you will reduce resistance !



Bronzwaer *et al.* Emerg Infect Dis. 2002;8:278-82. PubMed PMID: [11927025](https://pubmed.ncbi.nlm.nih.gov/11927025/)

# So, we started public campaigns targeted to the community...

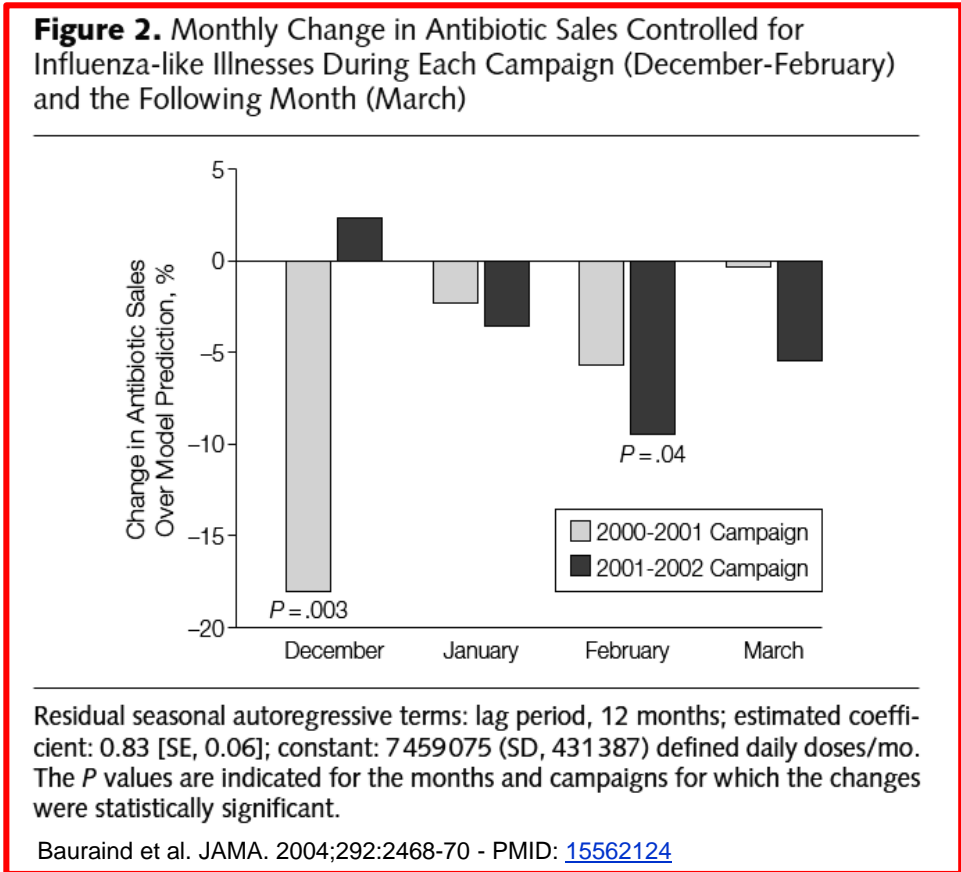
2000-2003



use less often and better

<http://www.red-antibiotica.org/> (Dutch)  
<http://www.antibiotiques.org/> (French)

And these first campaigns were modestly but significantly successful in reducing the number of DDD's per month in the winter periods of 2000-2001 and 2001-2002



# So, public campaigns targeted to the community were repeated each year with various themes...



[http://www.belgium.be/fr/actualites/2013/news\\_campagne\\_antibiotiques\\_2013](http://www.belgium.be/fr/actualites/2013/news_campagne_antibiotiques_2013)

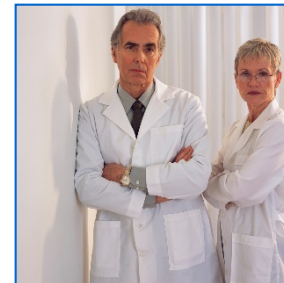


<http://www.gebruikantibioticacorrect.be/nl/lees-tante-biotica-online>

**LES ANTIBIOTIQUES**  
**PRENEZ-LES COMME IL FAUT ET UNIQUEMENT QUAND IL LE FAUT !**

Une mauvaise utilisation des antibiotiques rend les bactéries plus résistantes. Par conséquent, les maladies graves ne peuvent plus être traitées correctement. Veillez donc à ce que les antibiotiques agissent encore lorsque vous en aurez réellement besoin

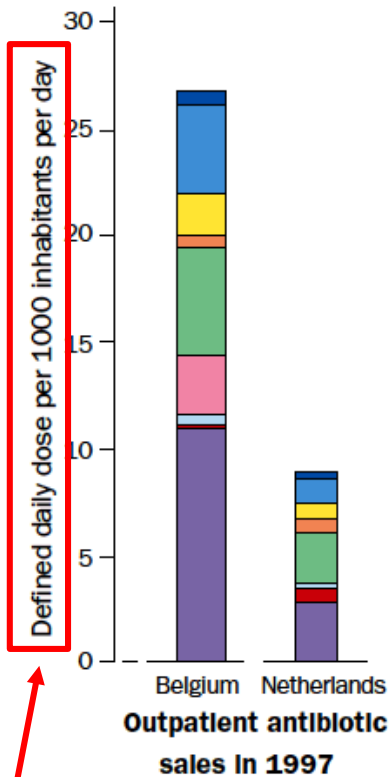
<http://www.usagecorrectantibiotiques.be/fr>



but what are the results ?

# What and how did we analyze the antibiotic pressure in the community ?

## What is a Defined Daily Dose and why did we use it ?



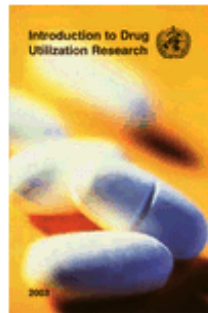
this is what triggered the campaigns

WHO Collaborating Centre for Drug Statistics Methodology

News	<h3 style="margin: 0;">Definition and general considerations</h3> <p><b>Definition and introduction</b> The basic <b>definition</b> of the defined daily dose (DDD) is:</p> <div style="border: 2px solid red; padding: 5px; margin-top: 10px;"> <p><i>The DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults.</i></p> </div>
ATC/DDD Index	
ATC/DDD methodology	
ATC	
DDD	

[http://www.whocc.no/ddd/definition\\_and\\_general\\_considera/](http://www.whocc.no/ddd/definition_and_general_considera/)

"Introduction to Drug Utilization Research"



The use of DDD / 1,000 inhabitants / day allows for direct comparisons between countries, regions and health facilities without confounding factors such as

- differences in size of packages (prescription drugs are mostly sold as packages, NOT as units in Europe)
- differences in prices (markedly influenced by the introduction of generics, taking place to an increased extent since 2005 in Europe)

[http://www.whocc.no/filearchive/publications/drug\\_utilization\\_research.pdf](http://www.whocc.no/filearchive/publications/drug_utilization_research.pdf)

# Public data from the National Institute for Health and Disability Insurance (NIHDI [INAMI / RIZIV]\* )

Tableaux de bord pharmaceutiques - INAMI - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Tableaux de bord pharmaceu... x

Tableaux de bord pharmaceutiques - INAMI

www.inami.fgov.be/fr/statisti

Autres informations et services officiels: [www.belgium.be](http://www.belgium.be)

nl fr

Institut national d'assurance  
**INAMI** maladie-invalidité

## Tableaux de bord pharmaceutiques

Chaque année, nous illustrons le **profil de prescription des généralistes, spécialistes et des dentistes** dans les « tableaux de bord pharmaceutiques » suivants :

- volume (mesuré en DDD ou defined daily dose - dose définie journalière)**
- nombre de patients des principaux groupes de médicaments.

Nous utilisons pour cela notre [banque de données sur les médicaments vendus en pharmacies publiques \(Pharmanet\)](#).

Nous établissons les tableaux de bord autant que possible dans un contexte temporel. Nous pouvons ainsi observer et suivre certaines tendances dans le temps..

Pour chaque rapport (tableau de bord), il y a aussi un [guide de lecture](#).

prescription profiles of general practitioners, dentists, and specialists (in the community)

volume (measured as DDD's (defined daily doses))

**Data are available from 1997 through 2014**

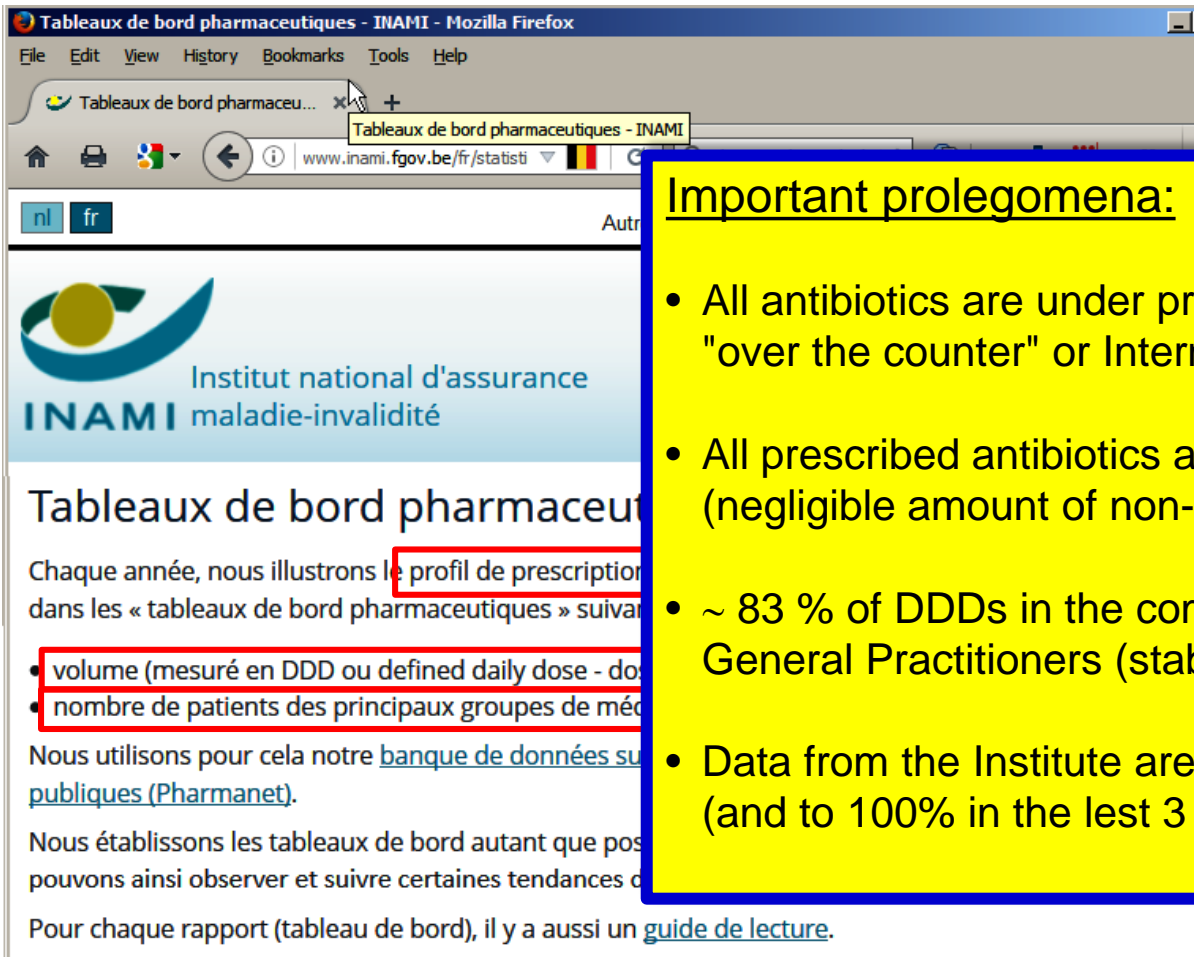
Tiny URL: <http://tinyurl.com/hwu74sf>:

Full URL: <http://www.inami.fgov.be/fr/statistiques/medicament/Pages/statistiques-medicaments-pharmanet-01.aspx#.V1wBn6JYyE0> (French)

Full URL: <http://www.inami.fgov.be/nl/statistieken/geneesmiddel/Paginas/statistieken-geneesmiddelen-farmanet-01.aspx#.V1wDhKJYyE0> (Dutch)

\* *Institut national d'assurance maladie-invalidité / Rijksinstituut voor ziekte- en invaliditeit verzekering*

# Public data from the National Institute for Sickness and Invalidity Insurance (INAMI / RIZIV\*)



The screenshot shows a Mozilla Firefox browser window displaying the INAMI website. The page title is "Tableaux de bord pharmaceutiques - INAMI". The browser address bar shows "www.inami.fgov.be/fr/statisti". The website header includes the INAMI logo and the text "Institut national d'assurance maladie-invalidité". The main content area is titled "Tableaux de bord pharmaceutiques" and contains the following text:

Chaque année, nous illustrons le profil de prescription dans les « tableaux de bord pharmaceutiques » suivants :

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Nous utilisons pour cela notre [banque de données statistiques publiques \(Pharmanet\)](#).

Nous établissons les tableaux de bord autant que possible afin que nous pouvons ainsi observer et suivre certaines tendances de prescription.

Pour chaque rapport (tableau de bord), il y a aussi un [guide de lecture](#).

## Important prolegomena:

- All antibiotics are under prescription in Belgium (negligible "over the counter" or Internet sales)
- All prescribed antibiotics are reimbursed in Belgium (negligible amount of non-reimbursed forms)
- ~ 83 % of DDDs in the community are prescribed by General Practitioners (stable over years)
- Data from the Institute are considered correct to > 96.9% (and to 100% in the last 3 years).

Tiny URL: <http://tinyurl.com/hwu74sf>:

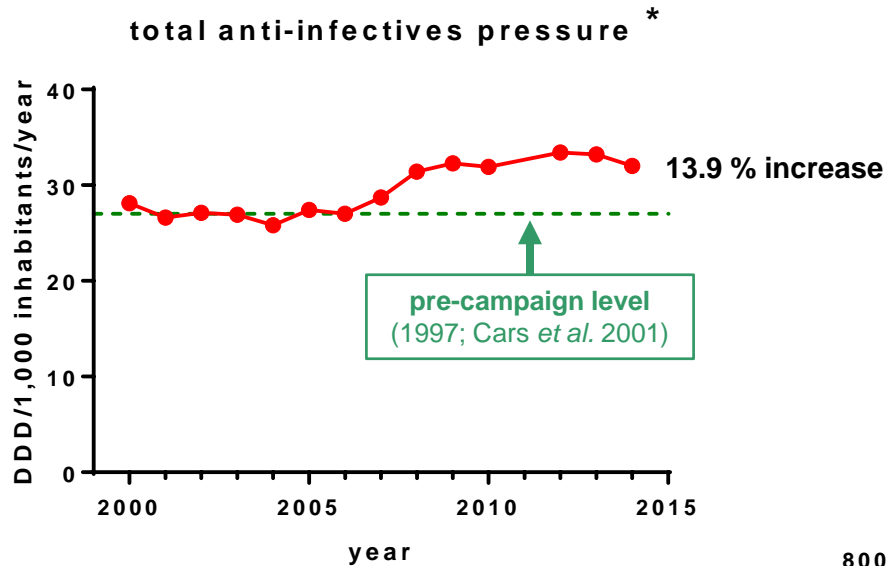
Full URL: <http://www.inami.fgov.be/fr/statistiques/medicament/Pages/statistiques-medicaments-pharmanet-01.aspx#.V1wBn6JYyE0> (French)

Full URL: <http://www.inami.fgov.be/nl/statistieken/geneesmiddel/Paginas/statistieken-geneesmiddelen-farmanet-01.aspx#.V1wDhKJYyE0> (Dutch)

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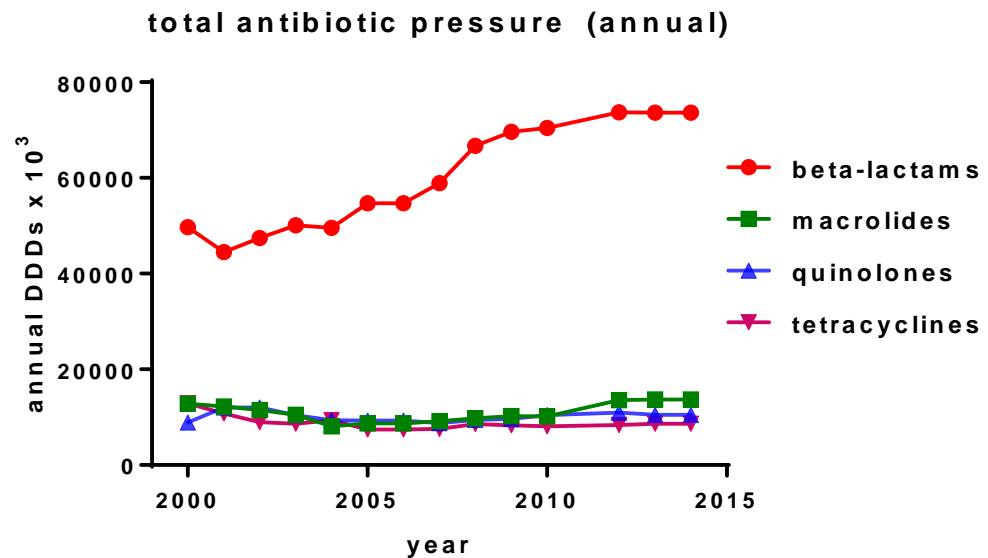


# What did we find ?

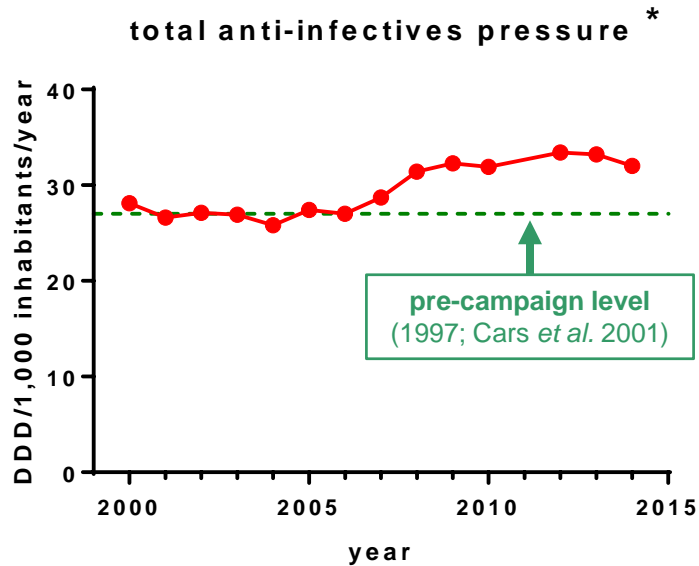


\* defined as DDD's of ATC class J drugs (anti-infectives for systemic use) reimbursed in the community (~ 85% antibiotics)

## But which antibiotics ?

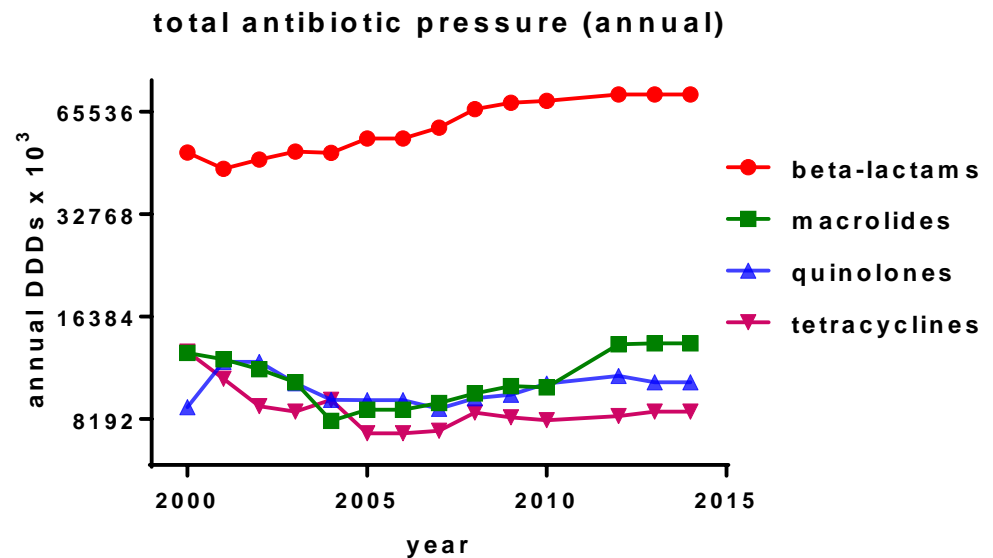


# What did we find ?



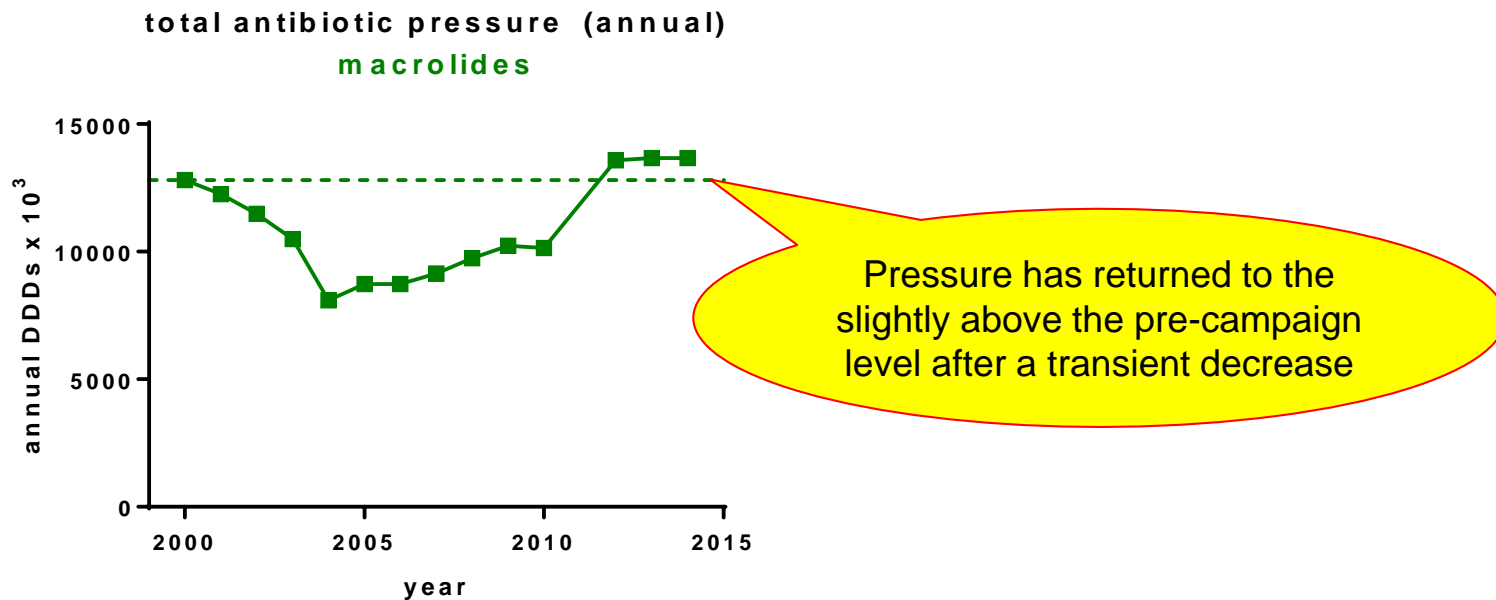
\* defined as DDD's of ATC class J drugs (anti-infectives for systemic use) reimbursed in the community (~ 85% antibiotics)

## But which antibiotics (in log<sub>2</sub> scale) ?



# Were targeted efforts rewarded ?

1. *S. pneumoniae* full resistance to macrolides in clinically confirmed CAP and clinically-confirmed confirmed COPD is ~ 25 % in Belgium \* and is, therefore, no longer recommended as first line ...

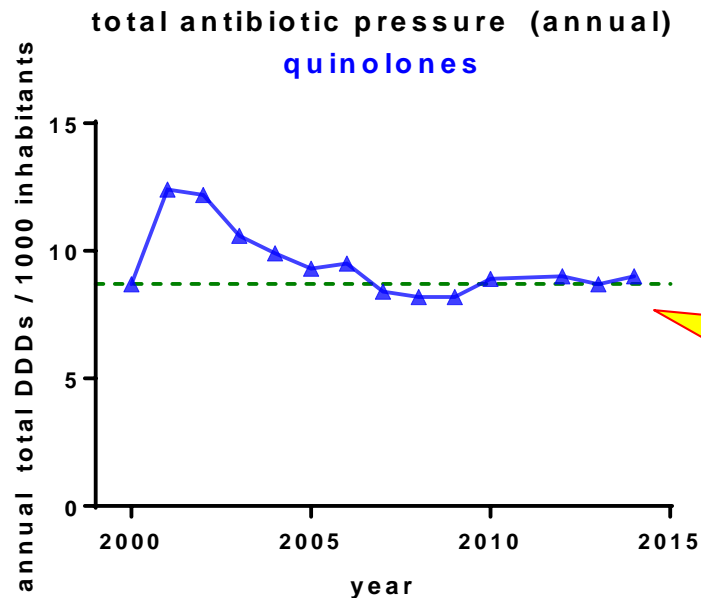


\* Lismond *et al.* Intern J Antimicrob Agents (2012) 39:208–216 - PMID: [22245497](#)

Vandeveldel *et al.* Intern J Antimicrob Agents (2014) 44:209–217 - PMID: [25123808](#)

# Were targeted efforts rewarded ?

2. Many actions were taken to reduce what was considered as an exaggerated prescription of quinolones in Belgium \* (31% of total DDDs in 2000)



after a short burst (due to the introduction of the so-called "respiratory quinolones", pressure has returned to baseline

\* see, for example,

- the limited recommendations of fluoroquinolones in the antibiotic guidelines for GPs (available at <http://www.health.belgium.be/fr/antibiotiques-guide-belge-des-traitements-anti-infectieux-en-pratique-ambulatoire> <http://www.health.belgium.be/nl/antibioticabelgische-gids-voor-anti-infectieuze-behandeling> )
- information letters and GP's profiling made by the National Institute for Health and Disability Insurance (NIHDI [INAMI / RIZIV]) available at <http://www.inami.fgov.be/fr/recherche/pages/default.aspx?k=antibiotiques#.V10T4KJYyE1> <http://www.inami.fgov.be/nl/zoeken/paginas/default.aspx?k=antibiotica#.V10Ux6JYyE0>

# A problem of metrics ?

- DDDs are not perfect and may not represent actual prescribed doses ...  
→ but they are the metric used to trigger actions about resistance...

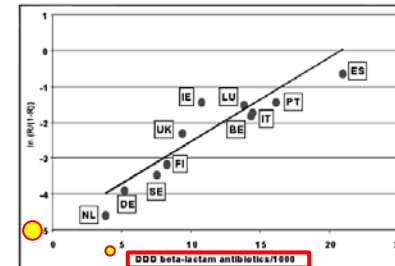


Figure 2. The logodds of resistance to penicillin among invasive isolates of *Streptococcus pneumoniae* (PNSP:  $\ln(R/(1-R))$ ) is regressed against outpatient sales of beta-lactam antibiotics in 11 European countries; antimicrobial resistance data are from 1998 to 1999 and antibiotic sales data are from 1997. DDD = defined daily dose; BE = Belgium; DE = Germany; FI = Finland; IE = Ireland; IT = Italy; LU = Luxembourg; NL = the Netherlands; PT = Portugal; ES = Spain; SE = Sweden; UK = United Kingdom.

## Other metrics are available... but may have other problems

- **packages** (in Europe): assumed to better represent prescriptions ... and showing a decrease of 17% between 2002 and 2009 vs. an increase in DDDs of 12 %  
(see Coenen *et al.* J Antimicrob Chemother. 2014;69:529-34 - PMID: [24084641](https://pubmed.ncbi.nlm.nih.gov/24084641/))

but package sizes change over time ... as mainly decided by Industry ...

(e.g., major changes for amoxicillin and amoxi-clav in Belgium, largely but not only for commercial positioning...) and may not express the overall antibiotic pressure and risk of resistance...

- **prices**: useful for business and some politicians ... but highly variable between countries ... and markedly influenced by the introduction of generics...  
(e.g., the price of levofloxacin was halved (incl. for the original) upon introduction of generics in Belgium)

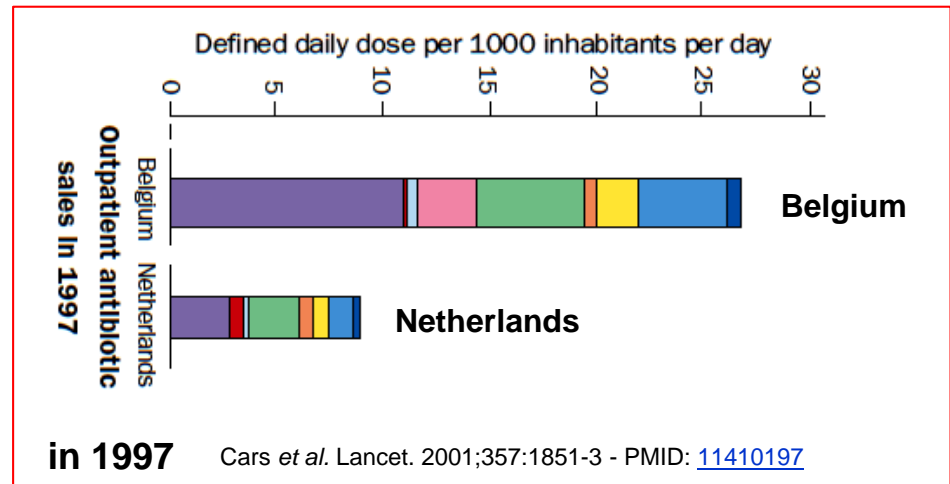
# At the end, the real questions...

- Why do we do public campaigns ?

→ To reduce unnecessary usage of antibiotics ?

If such, would a decreased number of packages explain the large differences in DDDs between Belgium and the Netherlands ?

Or, is the antibiotic pressure really different ?



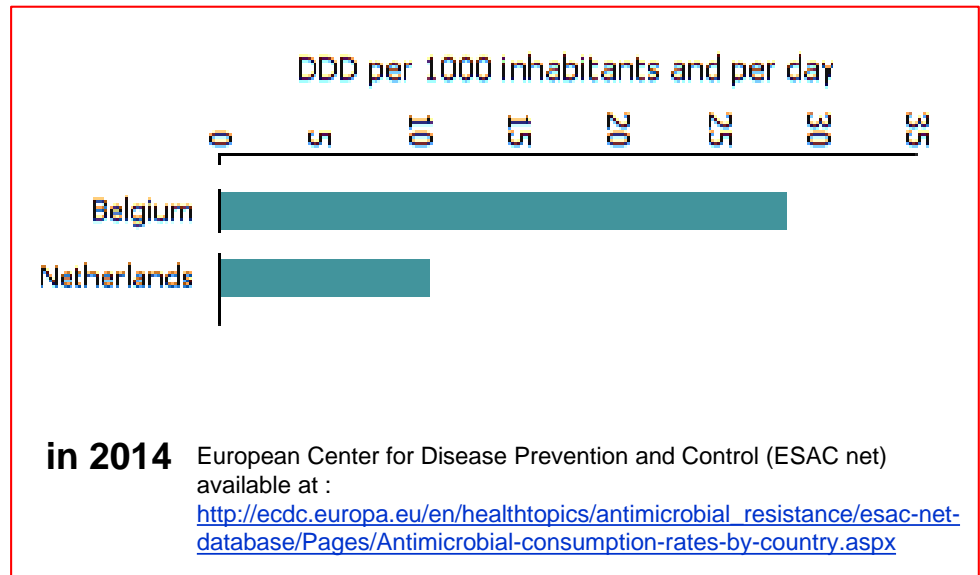
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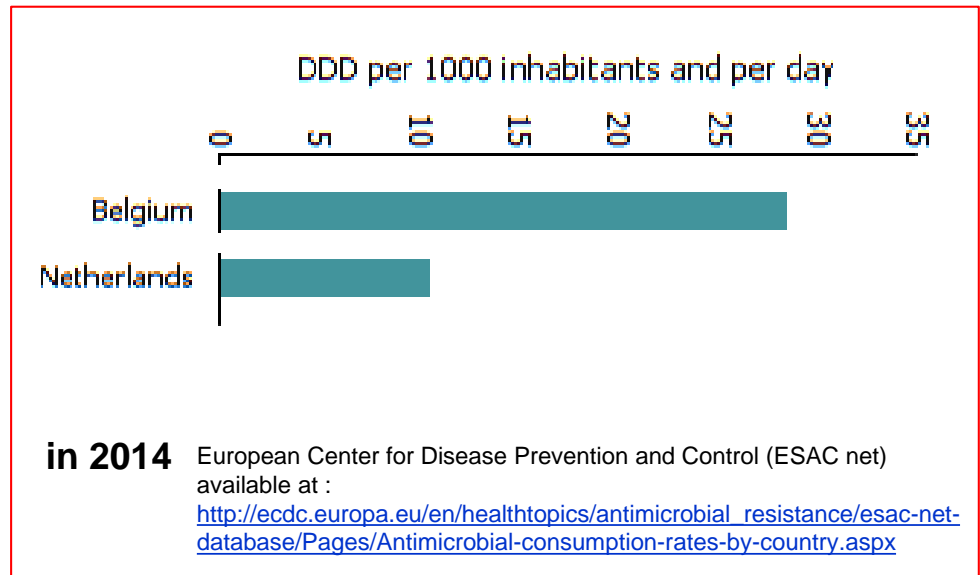
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Or, is the antibiotic pressure really different ?



→ To reduce the rate of emergence of resistance ?

→ To save money ?



# And why could campaigns be ineffective ? \*

- Did we address the REAL questions for the doctor ?

→ What is the diagnostic ?

→ What are the risks of not giving an antibiotic ?

→ Will the patient go and see another doctor ?

- and for the patient...

→ am I going to take a risk for my-self ?

→ what for my child, my elder parent, ... ?

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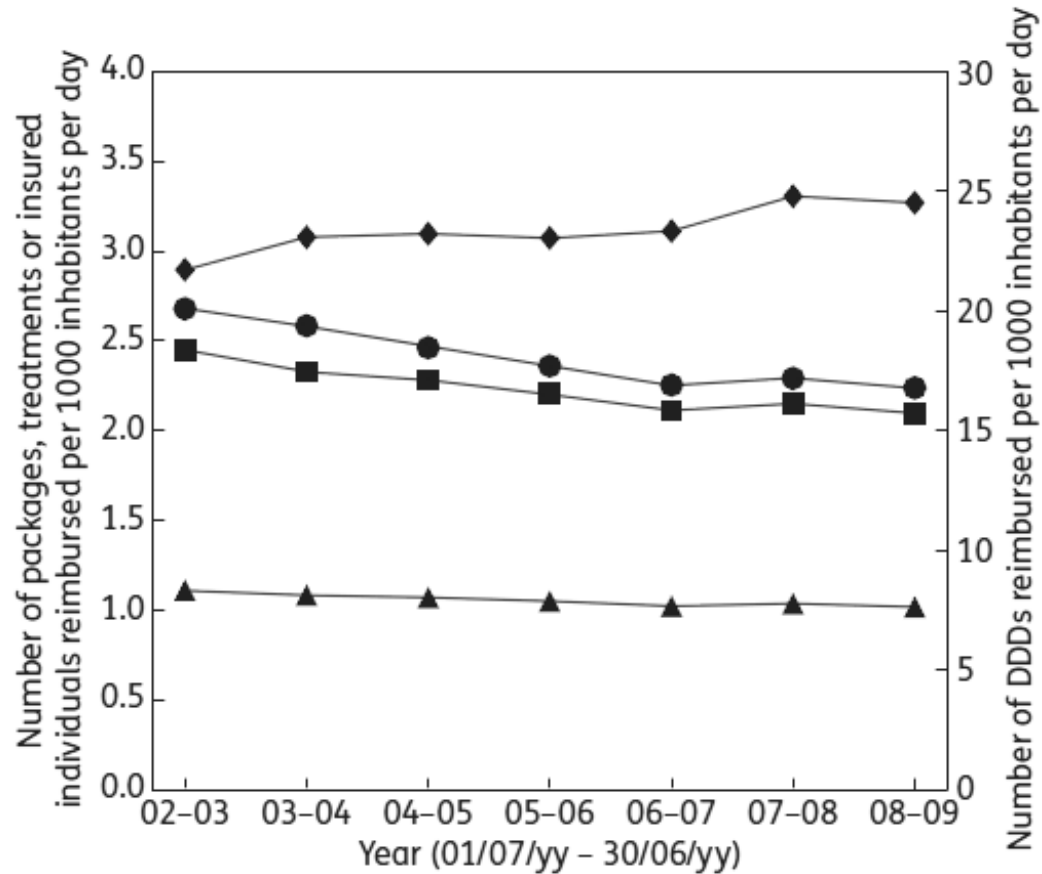
\* Based on surveys with Belgian GP's (Feron *et al.* Pathologie Biologie (Paris), 2009: 57:61-64 – PMID: [18848403](#) and papers in preparation)

# To sum up...

- Public campaigns targeting the public are potentially interesting actions for trying to curb exaggerated use of antibiotics and, thereby, for reducing antibiotic resistance in the community...
- However, there is so far little demonstration of real, important, and long-lasting effects of public antibiotic campaigns on actual antibiotic pressure, and, more critically, on resistance levels...
- The main reasons for failure may be that public campaigns
  - (i) miss the real targets, i.e. the sick patient and the attending physician...
  - (ii) do not address the real questions of importance for these two key actors, such as uncertainty of diagnostic and risk of missing what could be a real threat...

# Back-up

# Comparison of DDDs and PIDs in Belgium (2002-2009)



**Figure 1.** Outpatient antibiotic use in Belgium per July–June year expressed as the number of DDDs (diamonds), packages (circles), treatments (squares) and insured individuals (triangles) reimbursed per 1000 inhabitants per day.

Coenen *et al.* J Antimicrob Chemother 2014; 69: 529–534 – PMID: [24084641](https://pubmed.ncbi.nlm.nih.gov/24084641/)