Introduction

- For the WHO, high-quality research is essential to achieve its constitutional objective: "the attainment by all peoples of the highest possible level of health"

- According to the European Commission's Scientific Panel for Health (SPH), biomedical research:

  - Aims at improving health and wellbeing of people

  - In addition, biomedical research contributes to economic prosperity

Introduction

- Public policies in science are partly shifting their focus towards supporting research that helps to address societal problems

- Challenge: assessment of the alignment between *science supply* and *societal needs*

  - Science supply: estimates of <u>research portfolio contents</u> on the basis of resources (people, funding) invested in research areas or in terms of <u>research outputs</u>

  - Societal demand: difficult and controversial, dependent on problem framing

(Some) problems in health research

- <u>Most clinical research is not useful</u> (Ioannidis, 2016)

  - ➢ Useful clinical research

    - ▪ Problem base
    - ▪ Context placement
    - ▪ Information gain
    - ▪ Pragmatism

    - ▪ Patient Centeredness
    - ▪ Value for money
    - ▪ Feasibility
    - ▪ Transparency

(Some) problems in health research

- <u>Misalignment research priorities – health needs</u> (I)

  ➢ Gross et al. (1999) Relation of NIH funding and burden of disease

    - Significant relation between NIH research funding and measures of the burden of disease

    - DALYs was the most strongly associated with funding

    - Some diseases received more funding per DALY than others

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(Some) problems in health research

- <u>Misalignment research priorities – health needs</u> (II)

  ➢ Evans et al. (2014) Relation between medical research and burden of disease

    ▪ No relationship between the global disease burden and research attention

    ▪ local health needs within a country draw the attention of researchers and research resources of the country more than global health needs

    ▪ Poor populations face the greatest disease burden and also the least medical research attention

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Objective

Explore the comparison between disease burden and publication patterns and reflect on its use in health research priority setting

➢ Update of previous comparisons (e.g. Agarwal and Searls, 2009; Evans et al., 2014)

➢ Provide a more fine-grained analysis of different regional and disease patterns
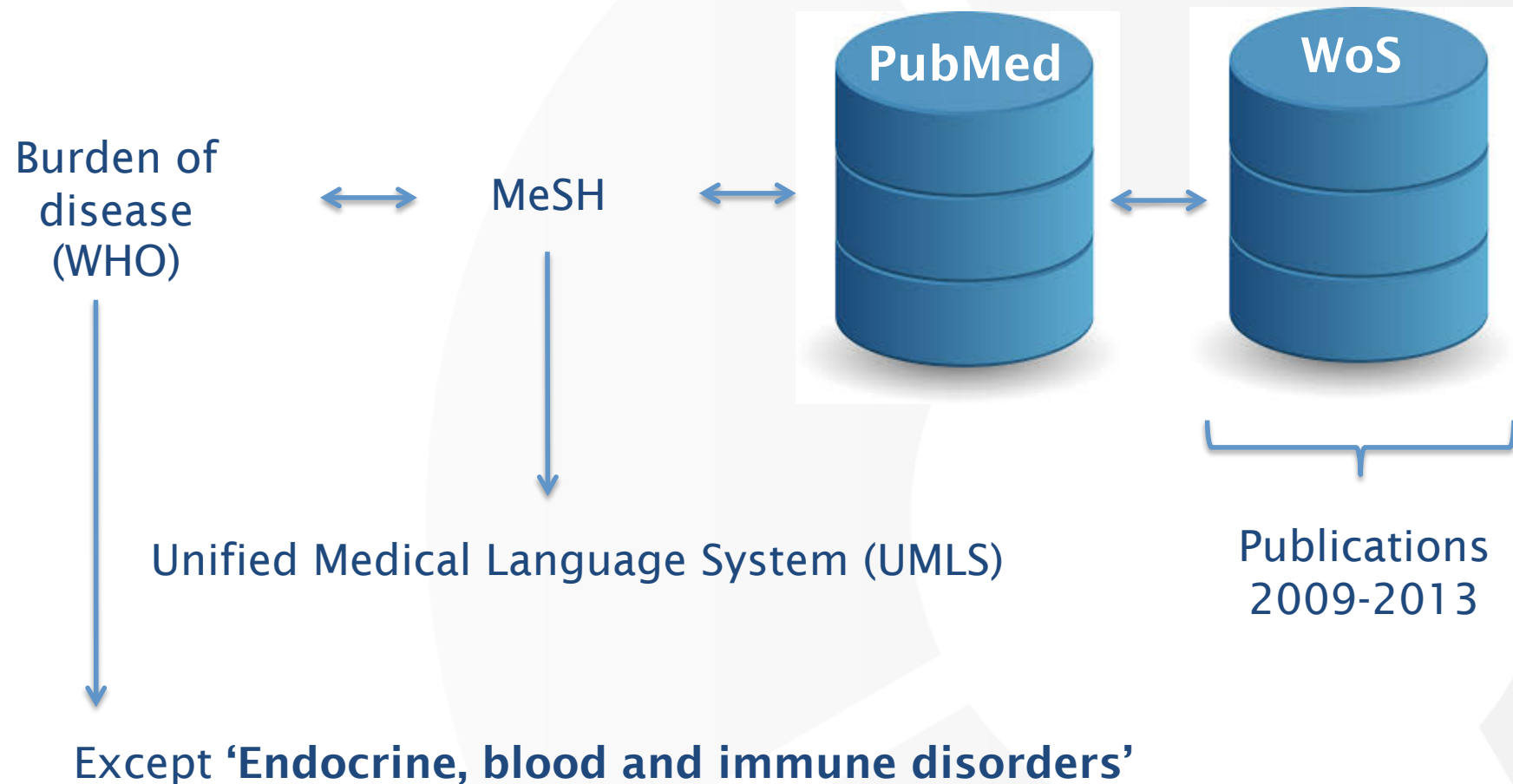
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DALYs and scientific publications

- One DALY ≈ one lost year of "healthy" life

- Burden of disease (i.e. sum of these DALYs across the population) ≈ gap between current health status and an ideal health situation

DALY = YLL + YLD

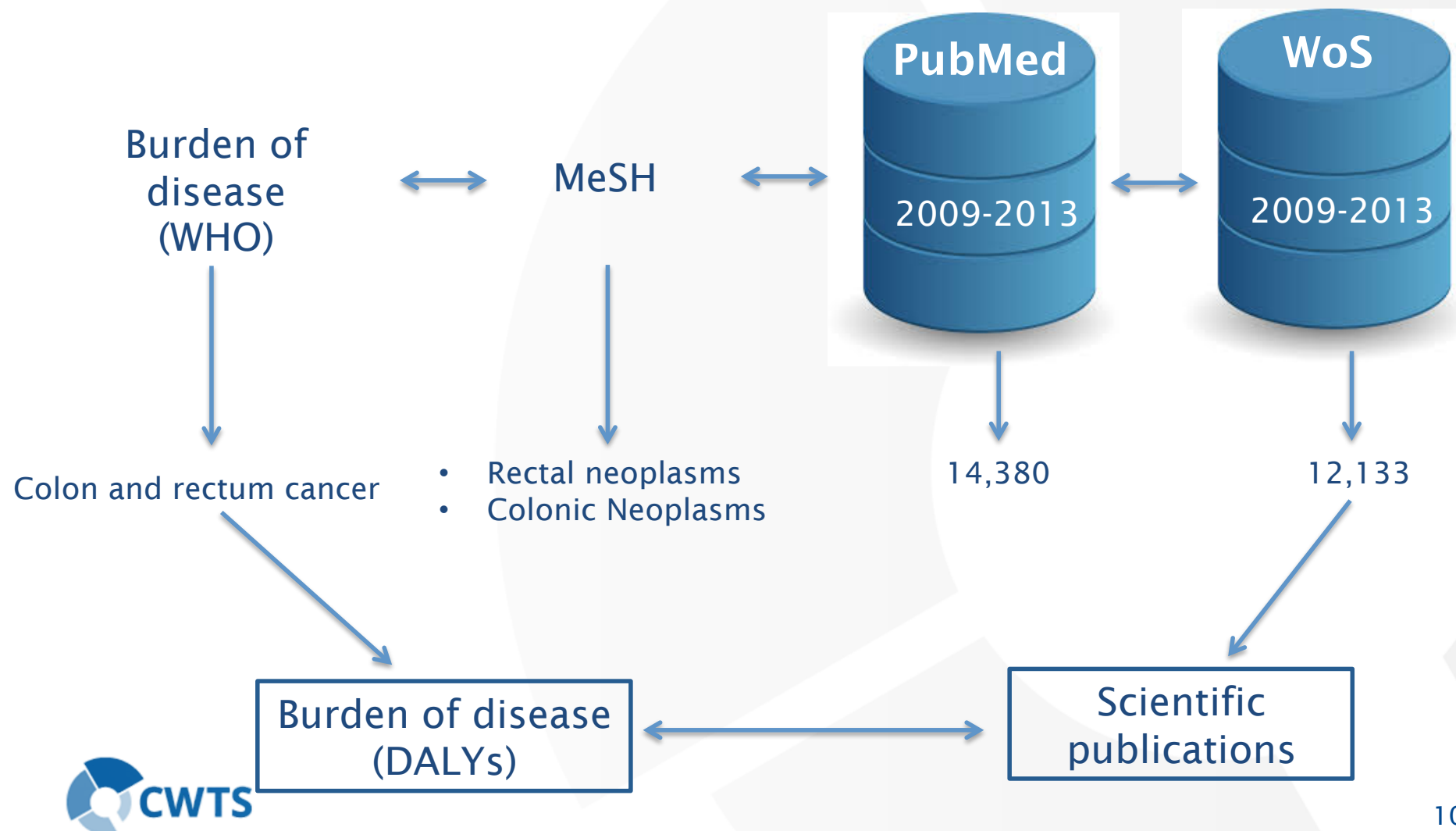| Years of Life Lost	Years lost due to Disability

DALYs and scientific publications

- Global burden of disease (DALYs): Estimated DALYs by cause, sex and WHO Member State, 2012. (Published by WHO in May 2014)

- Scientific publications: papers published in the period 2009-2013 (5 years) covered by the Web of Science.

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DALYs and scientific publications

Burden of disease (WHO) ←→ MeSH ←→ **PubMed** ←→ **WoS**

Unified Medical Language System (UMLS)

Publications 2009-2013

Except **'Endocrine, blood and immune disorders'**

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DALYs and scientific publications

Burden of disease (WHO) ⟷ MeSH ⟷ **PubMed** 2009-2013 ⟷ **WoS** 2009-2013

Colon and rectum cancer

- Rectal neoplasms
- Colonic Neoplasms

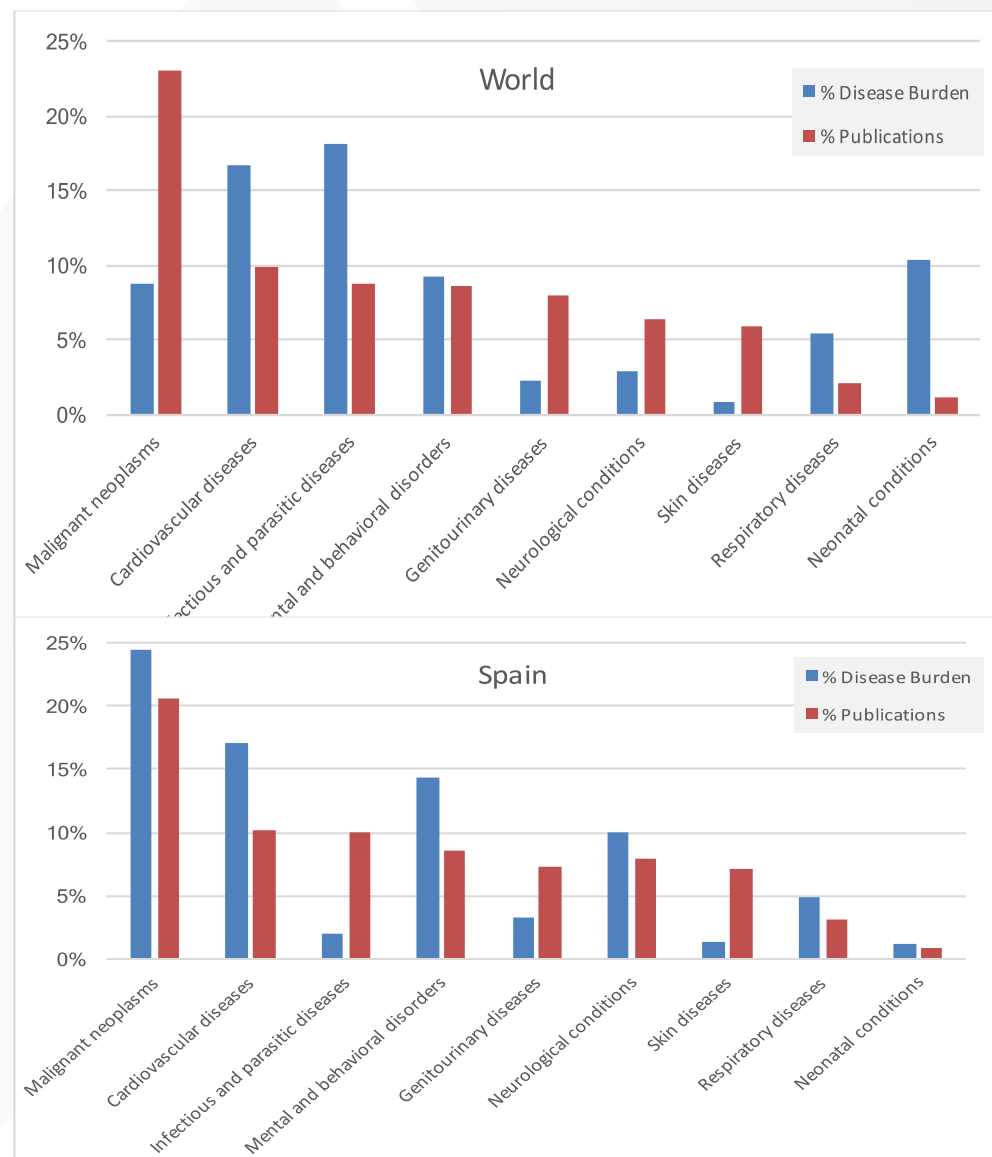14,380   12,133

Burden of disease (DALYs) ⟷ Scientific publications

Burden of disease vs publications

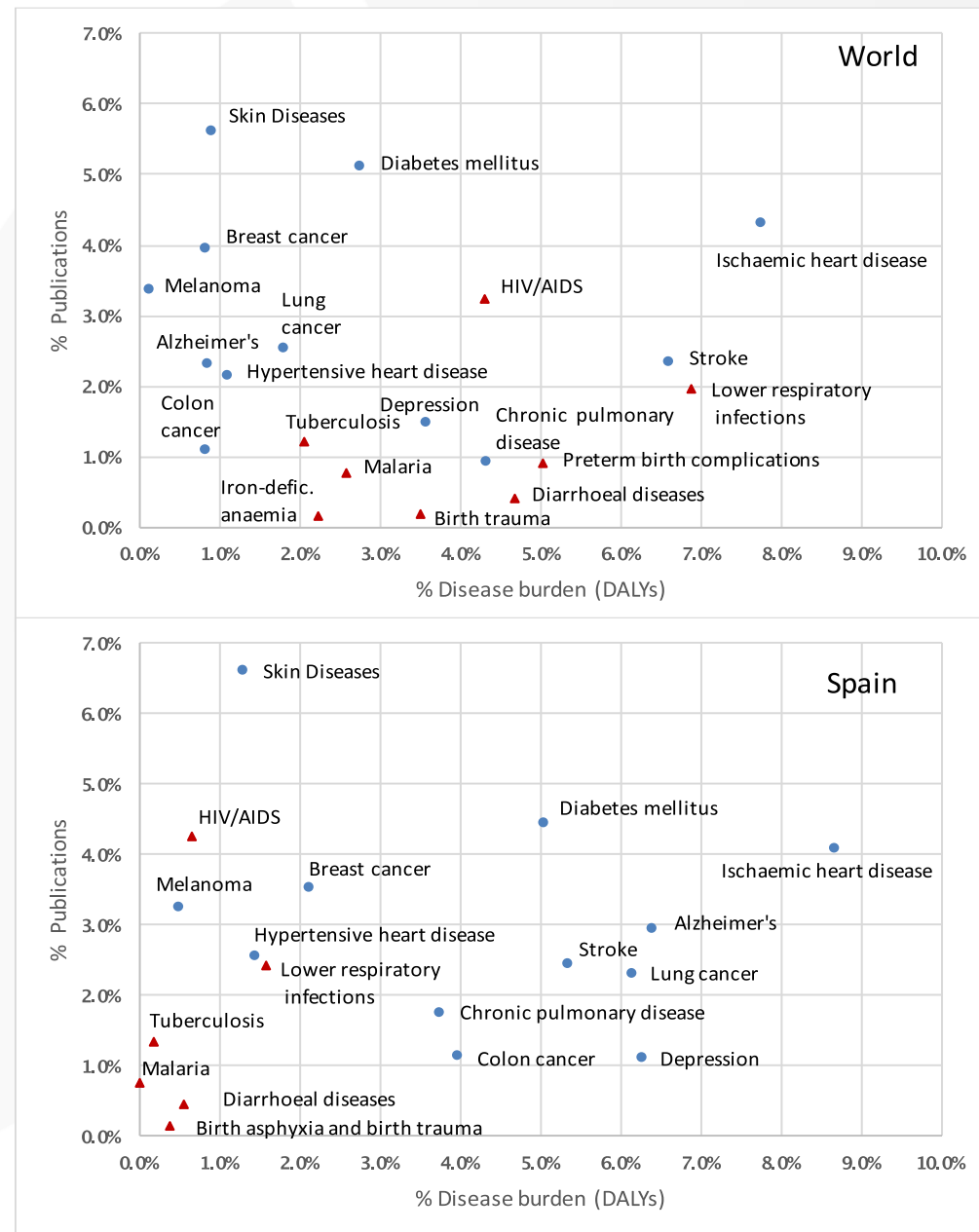% disease burden (DALYs) vs. % Publications

Group of diseases

Burden of disease vs publications

% disease burden
(DALYs) vs.
% Publications

Specific conditions

Burden of disease vs publications

Spain

	Research effort **Disease burden**	**Research effort** Disease burden
Research effort Disease burden (World)	Under-investment in both the world and Spain — Ischaemic heart disease, depression, stroke, chronic obstructive pulmonary disease	Global health priority — HIV/AIDS, tuberculosis, malaria, lower respiratory infections (mainly type II and III diseases)
Research effort Disease burden (World)	Health priority in Spain — Diabetes mellitus, lung cancer, colon cancer, Alzheimer's	Over-investment in both the world and Spain — Skin diseases, melanoma, breast cancer, hypertensive heart disease

World

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Limitations

- Scientific publications are an inaccurate a proxy of research effort / investments

- Not all fields publish with the same frequency due to different disciplinary traditions and incentives and some research topic become temporarily fashionable or unfashionable for reasons that are not related to either science or health

- time lag (perhaps 2 to 5 years) between knowledge production and publications, and a much longer lag (5 to 20 years) between research findings and their use or application in societal contexts
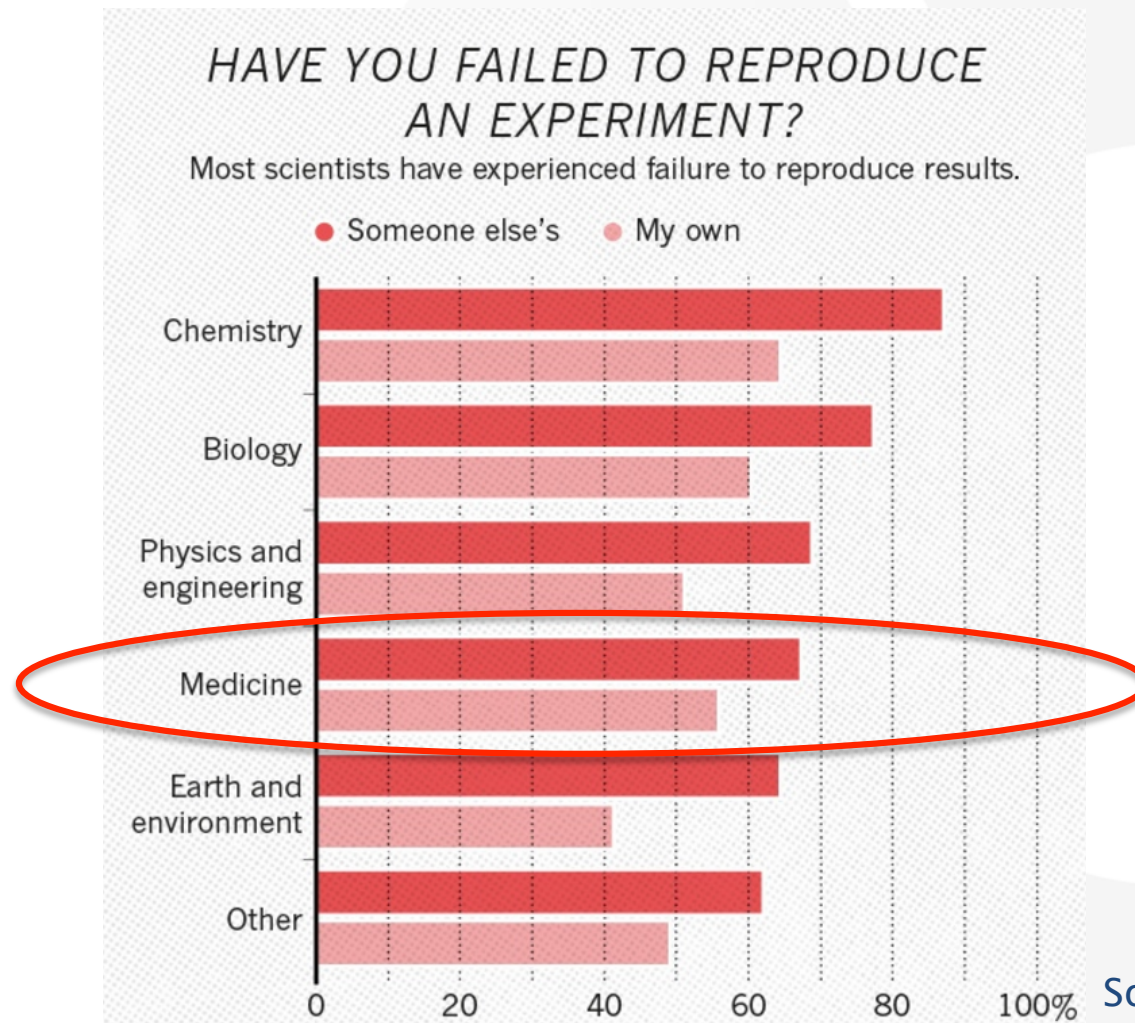
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Conclusions

- Health benefits from research could be significantly improved through a more systemic planning of research priorities

- Research evaluations should focus not only on scientific visibility but also on societal contribution/ alignment with the priority settings

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Problems in health research

- Reproducibility crisis

  ➢ *Nature's* survey (2016): out of 1,576 researchers

    - 70% failed to reproduce another scientist's experiments

    - More than 50% failed to reproduce their own experiments

Problems in health research

- Reproducibility crisis

HAVE YOU FAILED TO REPRODUCE AN EXPERIMENT?

Most scientists have experienced failure to reproduce results.

Source: *Nature*

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Conclusions

- Health benefits from research could be significantly improved through a more systemic planning of research priorities

- Research evaluations should focus not only on scientific visibility but also on societal contribution/ alignment with the priority settings

- Priority setting should be enriched not only with information about health needs, but also with dialogue with patients and other stakeholders of health R&D

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Conclusions

- NIH priority setting:

  1. Public health needs

  2. Scientific quality of research

  3. Potential for scientific progress

  4. Portfolio diversification

  5. Adequate support of infrastructure