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 *research portfolio contents* on the basis of resources (people, funding) invested in research areas or in terms of *research outputs*

  ➢ Societal demand: difficult and controversial, dependent on problem framing
(Some) problems in health research

- Most clinical research is not useful (Ioannidis, 2016)

  Useful clinical research

  - Problem base
  - Context placement
  - Information gain
  - Pragmatism

  - Patient Centeredness
  - Value for money
  - Feasibility
  - Transparency
(Some) problems in health research

• Misalignment research priorities – health needs (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
(Some) problems in health research

- **Misalignment research priorities – health needs (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
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
DALYs and scientific publications

- One DALY $\approx$ one lost year of "healthy" life
- Burden of disease (i.e. sum of these DALYs across the population) $\approx$ gap between current health status and an ideal health situation

\[ \text{DALY} = \text{YLL} + \text{YLD} \]
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.
DALYs and scientific publications


Except ‘Endocrine, blood and immune disorders’

Publications 2009-2013
DALYs and scientific publications

Burden of disease (WHO)

Colon and rectum cancer
  • Rectal neoplasms
  • Colonic Neoplasms

MeSH

PubMed
  2009-2013
  14,380

WoS
  2009-2013
  12,133

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

<table>
<thead>
<tr>
<th>World</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research effort</strong></td>
<td><strong>Research effort</strong></td>
</tr>
<tr>
<td><strong>Disease burden</strong></td>
<td><strong>Disease burden</strong></td>
</tr>
<tr>
<td>Under-investment in both the world and</td>
<td>Global health priority</td>
</tr>
<tr>
<td>Spain</td>
<td>HIV/AIDS, tuberculosis, malaria,</td>
</tr>
<tr>
<td>Ischaemic heart disease, depression, stroke,</td>
<td>lower respiratory infections (mainly type II and III diseases)</td>
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<tr>
<td>chronic obstructive pulmonary disease</td>
<td></td>
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<td></td>
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<tr>
<td>Health priority in Spain</td>
<td>Over-investment in both the world</td>
</tr>
<tr>
<td>Diabetes mellitus, lung cancer, colon</td>
<td>and Spain</td>
</tr>
<tr>
<td>cancer, Alzheimer’s</td>
<td>Skin diseases, melanoma, breast</td>
</tr>
<tr>
<td></td>
<td>cancer, hypertensive heart disease</td>
</tr>
</tbody>
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**CWTS**
Limitations

• Scientific publications are an inaccurate proxy of research effort / investments.

• Not all fields publish with the same frequency due to different disciplinary traditions and incentives, and some research topics 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.
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
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

Source: Nature
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
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
Thanks!