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# Colombian Health Innovation Landscape: Building Bridges

OSUN Research Collaboration on Technology,  
Equity and Right to Health - Medicines



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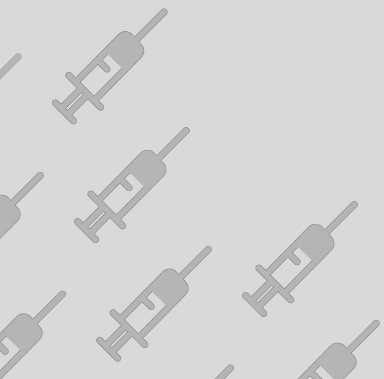


# Chapters

1. Introduction
2. Methodology
3. Findings
4. Discussion

# Chapter 1: Introduction

There is no clear diagnostic of how innovations develop in LMIC, including Colombia.



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The COVID-19 pandemic explicitly highlighted access problems in supplies and medical technologies, as well as a lack of preparedness for emergency situations

In the case for Colombia these challenges interact with a loose competitiveness public policy that privileges the coordination role of the state, facilitating connections amongst private actors in the value chain, over explicit industrial promotion policies.

Colombia faced shortages of mechanical ventilators, personal protective elements (EPPs), vaccines and some medicines. *Source: Unisabana, 2020*

# Chapter 2: Methodology

The team reviewed relevant literature and policies, conducted interviews with innovation accelerators working on biomedical research, and researched R&D funding and clinical trial databases

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## Literature en policy review

### Search by keywords

Keywords include “pharmaceutical”, “drug”, “medicine”, “vaccine”, “health”, “innovation”, “research and development”, “product development”, “biomedical innovation”, “Colombia”

### Literature in Spanish and English

Although subject to limitations, it allowed to construct a general map of this ecosystem

## Interviews

### Innovation accelerators

Chosen by area of expertise

### Public and private organizations

Knowledge transfer in pharmaceutical policy, access to medical devices and industry-researcher networking

### Main actors

Identified what are the incentives to innovate and the main challenges researchers, entrepreneurs and investors face.

## R&D Databases

### R&D funding

Ministry of science databases of funded biomedical R&D process from 2010 to 2019

### Clinical trials

Data extracted from ICTRP that added a classification of sponsors and funders categorized as commercial and non-commercial

# Chapter 3: Results

03



# Literature and policy review

1960s

Colombia began to build a science, technology and innovation policy. **Colciencias was created along with the National Financing Fund for Science, Technology and Innovation.**

1990s

At the beginning of the decade, after a constitutional reform there was a **major shift in the country's economic model veering towards an export-led development approach** (Moncayo, 2018).

2009

The National Council for Science, Technology and Innovation (CSTIS) was founded (Law 1286 of 2009).

The CONPES (Economic and Social Politics Council) issued a major STI policy program **broadening the scope of Colciencias and increasing its autonomy.**

2019

Colciencias changes its name to Minciencias and is responsible for the development of science and technology in Colombia and is the **largest source of public funding for R&D in the country** (OCyT report of 2020, 2021)



# Literature and policy review

## In Colombia, there is a under-utilization of productive capacities

- Lead by an absence of a clear, regulated definition with continuity over time
- Lack of actions for the development of coordinated processes between the productive sector and research production centers such as universities (Escobar and Herrera-Vargas, 2015)
- Difficulty connecting the STI guidelines with productivity and competitiveness policies and with the instruments for the development of the STI policy
- Lack of a clear definition of the STI policy

# Literature and policy review

## The major constraint to innovation generation is access to financial resources

It seems to be more important to be able to continuously invest in R&D with both external and internal funding than the amount that is actually invested.

There has been a recent phenomenon in which **companies are committed to innovation as a central component of their competitive strategy** and, in addition, operate in sectors that are intensive in health technology (Sierra-González et al, 2021).

The literature shows that the pharmaceutical industry in Colombia has concentrated its R&D efforts on drug development, followed by vaccines and a few studies on diagnostics

# Interviews



## Ruta N

A state owned organization, in order to promote the development of technology-based businesses to **increase competitiveness in the city of Medellín.**



## Tech Innovation Group (TIG)

Organization focused on the development of companies dedicated to technologies that contribute to **human, animal and environmental health.**



## PECET

**Universidad de Antioquia's multidisciplinary research group in tropical diseases.** Has received significant funding from MinCiencias and has partnered with domestic and multinational industries and pharmaceutical companies.

# Interviews

## Findings

- **Innovation accelerators, both public and private, have helped bridge the funding gap** that exists between basic research and the prototype development, clinical trials and production phases.
- Innovation accelerators **select projects and allocate funding to them depending on their promise, the stage of development** at which they are and the funding pre-invested by the technology's owners.
- **Their main objective is to boost the biomedical innovation market**, in order to guarantee research independence.
- **Articulating research groups and fostering collaborations** and partnerships could deeply benefit the innovation ecosystem.
- **The lack of a formal industrial policy** is one of the major challenges for biomedical R&D in Colombia.
- **The government has not been the main facilitator of product development processes.**

# R&D Databases

## MinCiencias Database

There is tension between researchers and policy-makers alike.

Researchers that are involved in basic or “pure” science are critical towards the current allocation. Nevertheless, some policy-makers celebrate the current way funds are allocated given how this has changed over time.

In Colombia’s policy framework, long-term promotion of R&D projects is on paper inexistent.

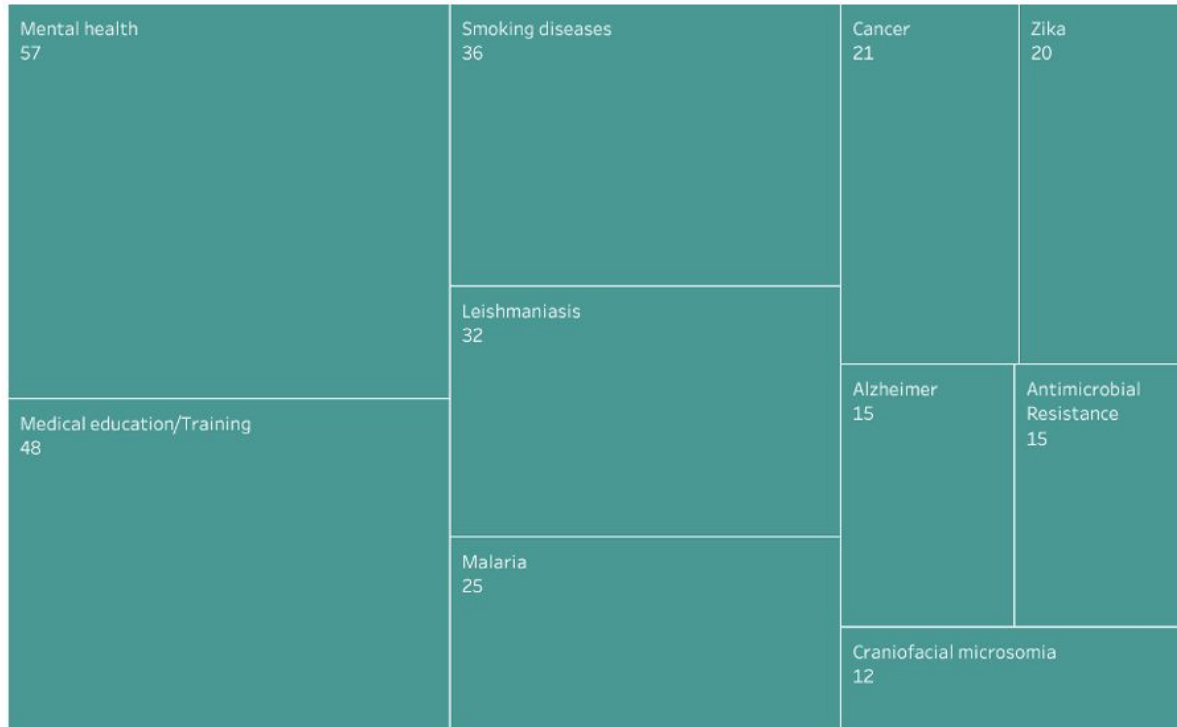
Weak state of biomedical research and development in Colombia

More than two thirds of projects have not progressed from the preclinical stages of R&D.

Public funding has been insufficient to guarantee the advancement of biomedical research into later stages of development. The low institutional capacity is directly reflected in the difficulty of the researchers to obtain funding until the end of their projects.

# R&D Databases

Top 10 most funded research areas (# of projects)

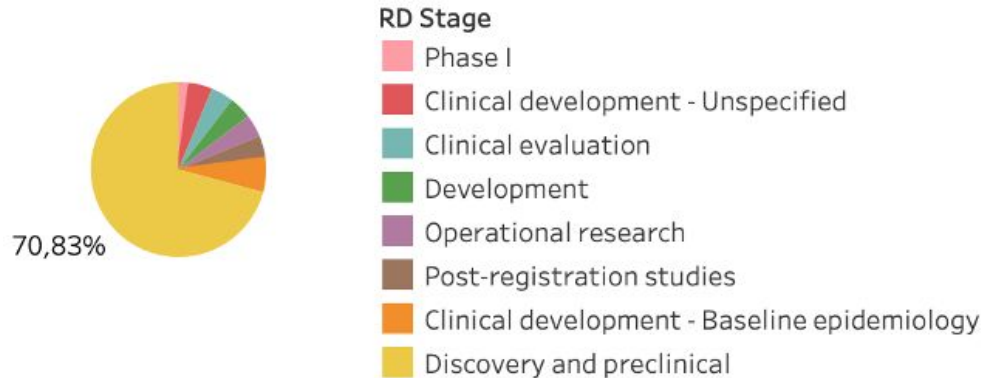


External R&D promotion by health area, 2016-2020.

There is still a relevant participation of non-communicable diseases such as smoking diseases, cancer, and congenital diseases like craniofacial microsomia

# R&D Databases

## Distribution by R&D Stage



Source: G-FINDER survey, Policy Cures

Locally-funded distribution of projects by R&D stage, 2008-2020.

More than two thirds of projects have not progressed from the preclinical stages of R&D.

# R&D Databases

## Local and external funding at the national level

Local funding is focused mainly in the basic research of diseases as Dengue, Kinetoplastid diseases, Malaria and Tuberculosis.

The projects funded are mainly concentrated in Bogota, Antioquia, Santander, and Valle del Cauca which are hosts to some of the country's principal cities such as Medellín, Bucaramanga, and Cali.

The main international funder between 2016 and 2020, was the US National Institute of Health (NIH), followed by the Canadian Institute of Health Research and the Global Alliance of Chronic Diseases.

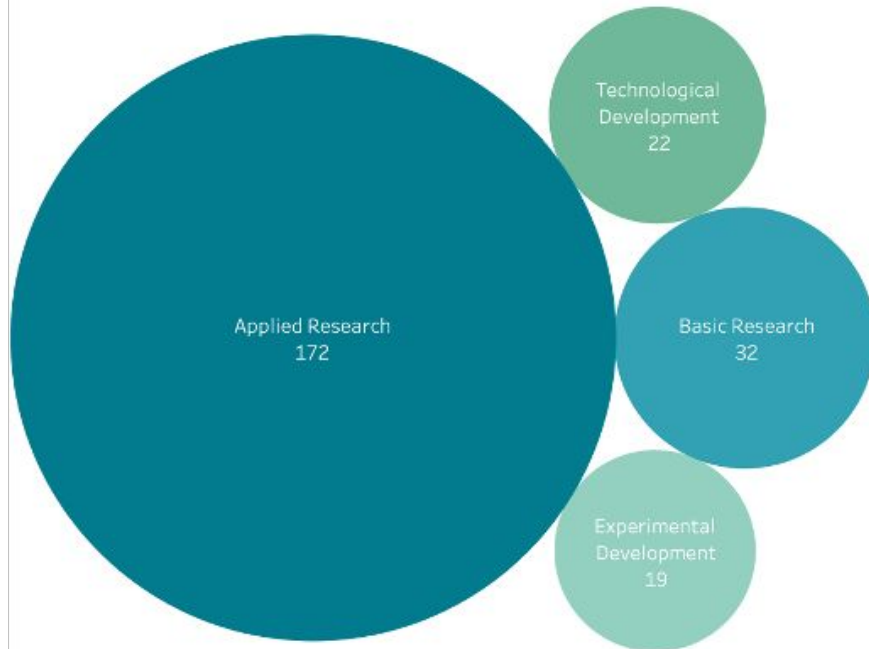
External funding is focused on communicable diseases, mainly Leishmaniasis, Malaria, and Zika, but there is a relevant participation of non-communicable diseases.

The leading recipient organization is the Universidad de Antioquia, located in the city of Medellin, followed by the CIDEIM located in the city of Cali, and the Universidad de los Andes located in Bogota.



# R&D Databases

Number of projects by R&D type



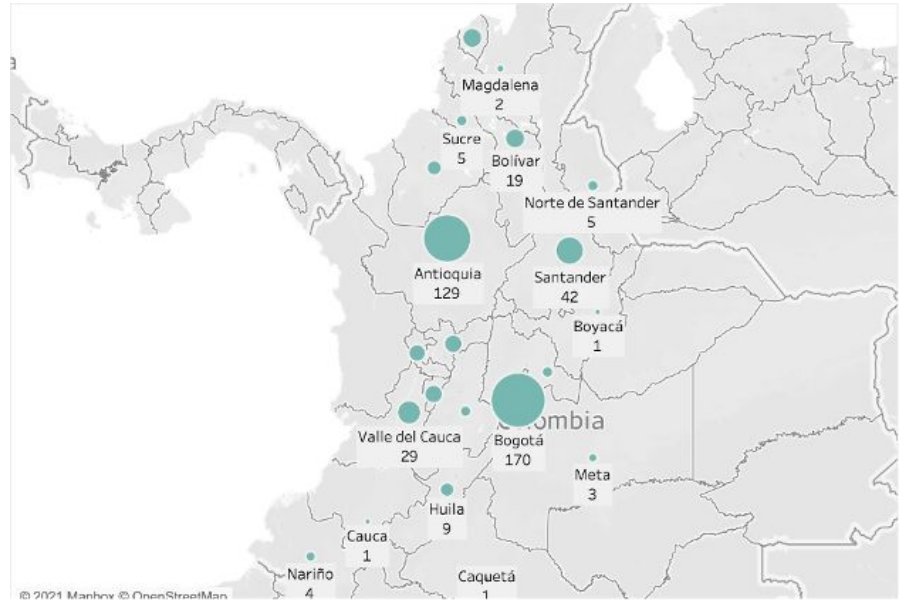
Public funding from the Health Research Fund recently has been directed mostly towards applied research. This data suggests that R&D promotion is risk-averse, as only 10% of total funding is directed towards basic research. In terms of project amounts, only 32 projects in basic research were promoted.

# R&D Databases

Geographical distribution of externally-funded projects, 2010-2016



Geographical distribution of locally-funded projects, 2016-2020



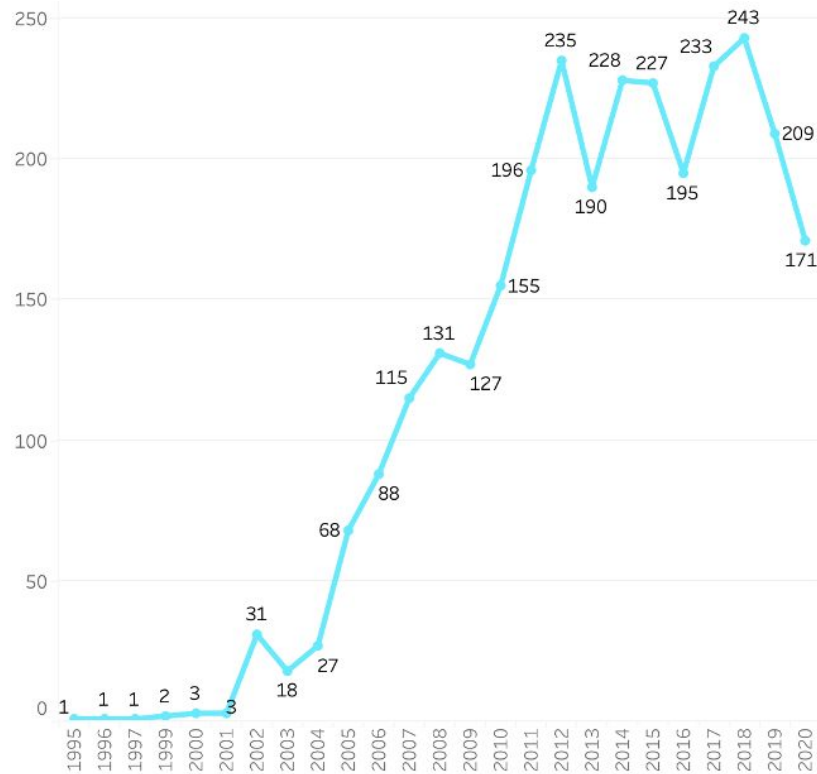
# Clinical trials

## ICTRP (WHO) Database

- **Malignant neoplasms, cardiovascular diseases and musculoskeletal diseases** are the health categories with most participations in the country.
- Phase 3 is the most common phase for international and national primary sponsors.
- **In total 2898 clinical trials were registered**, 301 from national sponsors and 2597 from international sponsors.
- Colombia is among the 5 countries that conduct the largest number of clinical trials in Latin America.

# Clinical trials

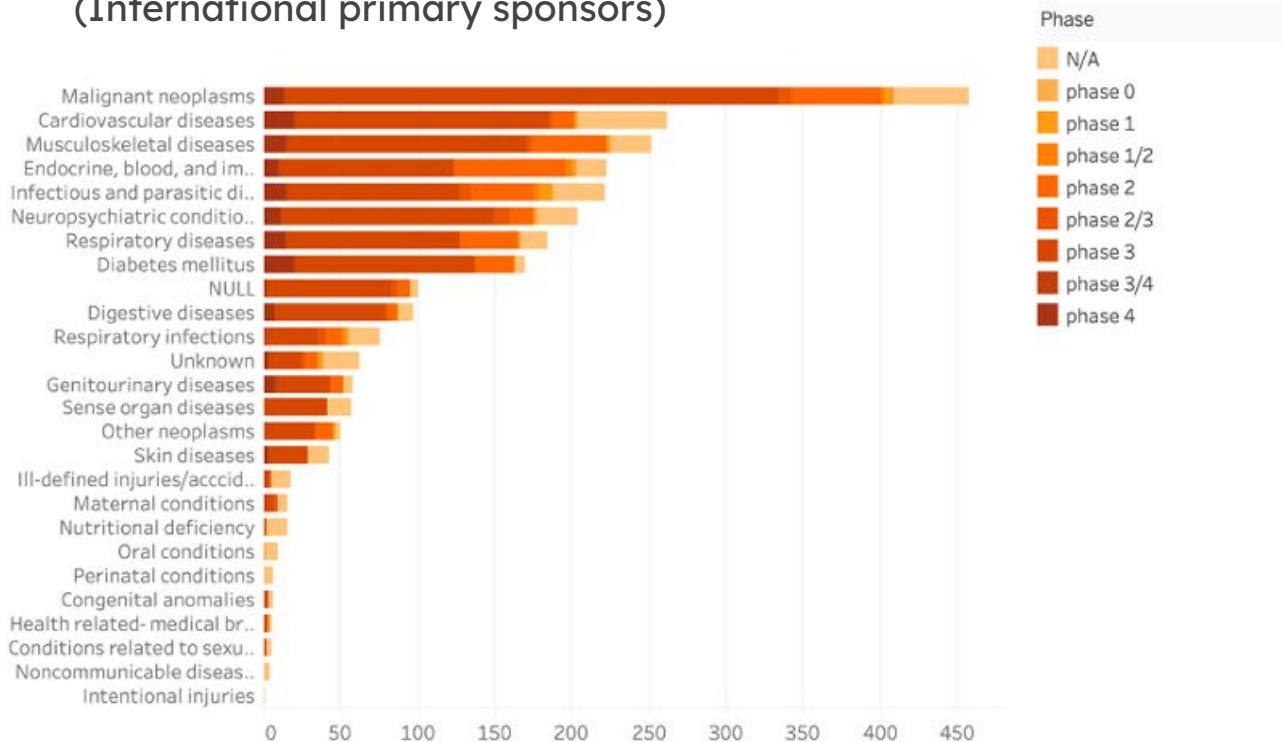
Clinical trials by year in Colombia (1995-2020)



It is until 2001 when the number of clinical trials conducted in the country starts to grow, followed by an upward trend until 2012, then there are some fluctuations until 2018, where a significant decrease in the development of clinical trials in the country is presented. **In total 2898 clinical trials were registered in this database.**

# Clinical trials

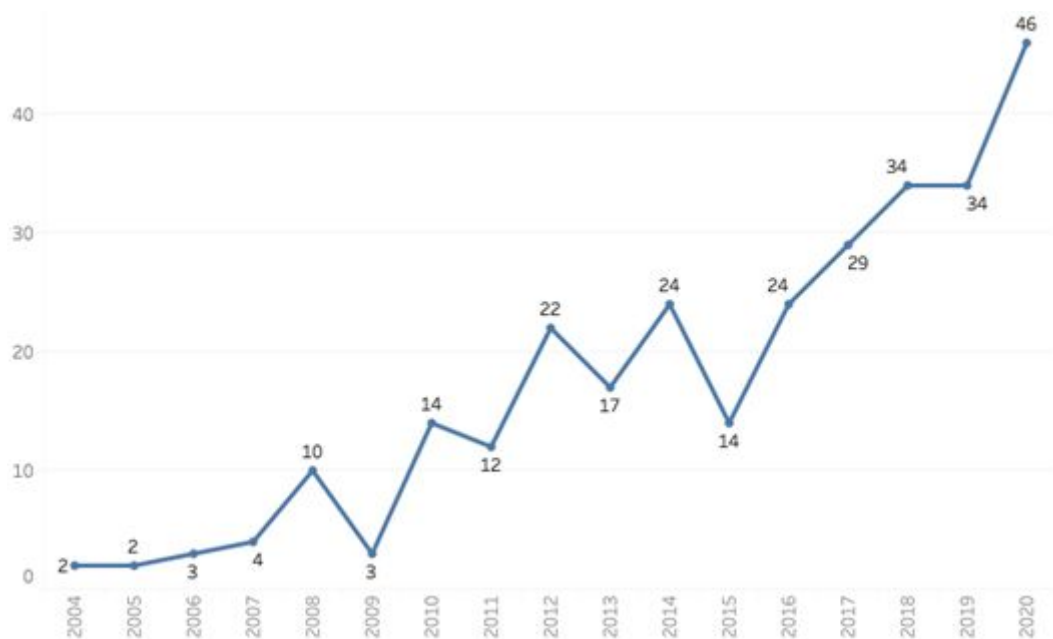
Distribution of health categories by phase  
(International primary sponsors)



The main diseases for clinical trials sponsored by international organizations are malignant neoplasms (457 records), cardiovascular diseases (262 records) and musculoskeletal diseases (251 records).

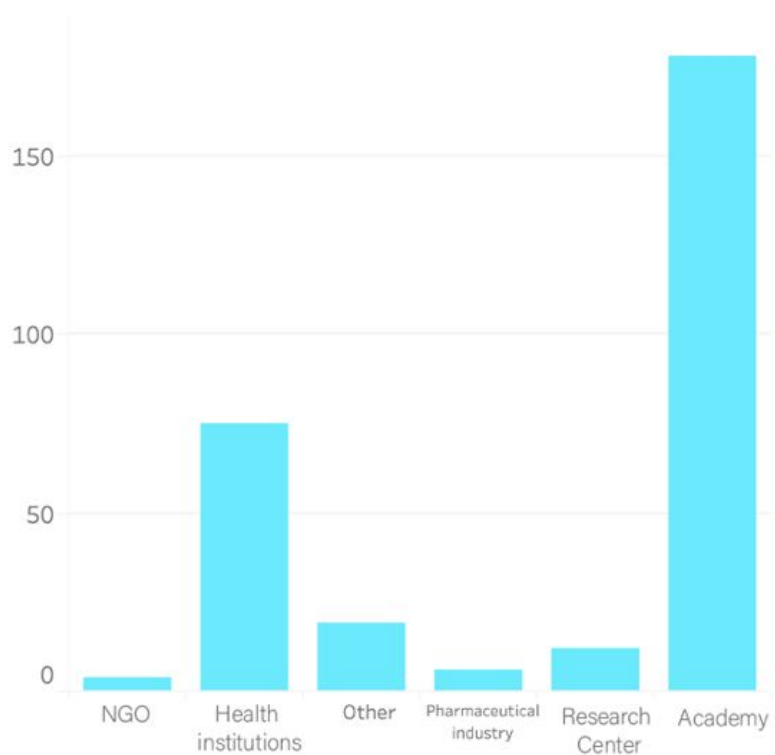
# Clinical trials

Clinical trials per year in Colombia with national primary sponsors (2004-2020)



The number of clinical trials by year in which the primary sponsor was national, in total 294 clinical trials were conducted in which the primary sponsor was national in the country between 2004 to 2020 (period with available records).

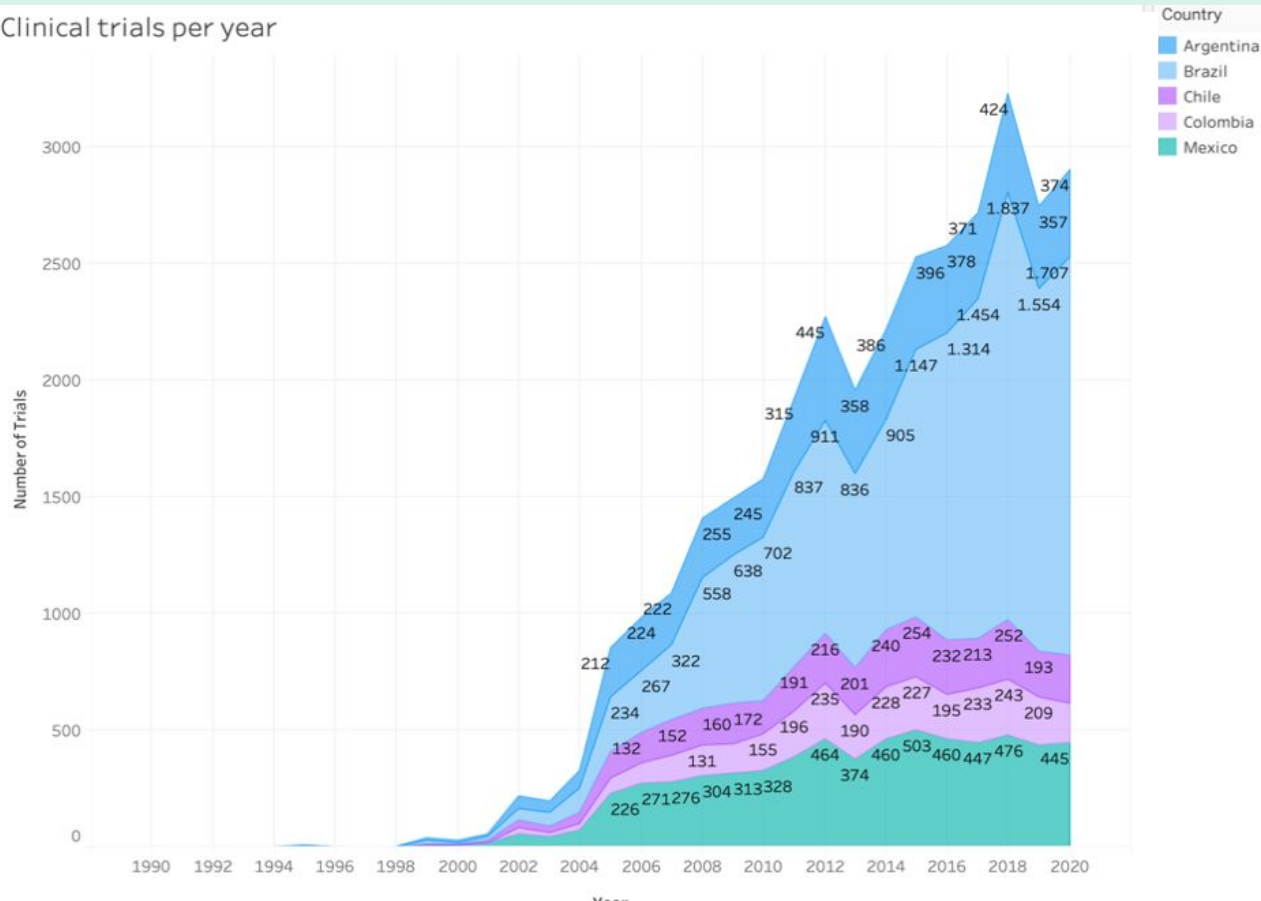
# Clinical trials



The main group of primary national sponsors belong to academia including public and private universities (179 records), followed by health institutions (76 records), and research centers (16 records).

# Clinical trials

Clinical trials per year



As a rough estimate we weighted the two decade total number of clinical trials in each country over their population in 2022. With that estimate the ranking changes considerably: Chile is the country with the highest rate of clinical trials per million inhabitants (163,2), followed by Argentina (119,3), Brazil (71,9), Colombia (55,9), and Mexico (49,9).



# Chapter 4: Discussion

It is necessary to exalt the role of actors that serve as bridges between funders researchers. Government efforts must be directed towards the articulation of actors in innovation.



