NIH Funding of COVID Research in 2020: A Preliminary Report

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Executive Summary

- Of the $42 Billion 2020 NIH annual budget, 5.7% was spent on COVID-19 research
- Public health research was underfunded at 0.4% of the 2020 NIH budget
- Only 1.8% of the 2020 NIH budget was spent on COVID-19 clinical research
- Average COVID-19 NIH funding cycle was 5 months
- Aging was funded 2.2 times more than COVID-19 research
- By May 1, 2020, 3 months into the pandemic, the NIH spent 0.05% annual budget on COVID-19 research
- Of the 1419 grants funded by the NIH:
  - NO grants on kids and masks specifically
  - 58 studies on social determinants of health
  - 57 grants on substance abuse
  - 107 grants on developing COVID-19 medications
  - 43 of the 107 medication grants repurposed existing drugs

Introduction

The National Institutes of Health (NIH), is the world's largest funder of biomedical research, employing over 20,000 people with a $41.7 billion annual budget appropriated by congress.[1,2] Research funded by the NIH tackles the toughest problems in healthcare from cancer to diabetes and financially supports scientists at every stage. Despite such resources, the NIH has been criticized in the past for patterns of delays, research gaps, and inconsistencies.[3-6] The COVID-19 pandemic has only exacerbated the NIH institutional challenges and inability to reallocate funds quickly to critical research.

The NIH plays a key role in the United States response to mitigate the impact of the COVID-19 pandemic. Analysis of congressional appropriation has previously shown that the NIH has been underfunded for COVID-19 research, with only an 8.4% increase in research budget received in late April 2020.[6] The NIH internally developed 5 priorities for COVID-19 research: [7]

1. Improve fundamental knowledge of SARS-CoV-2
2. Advance research to improve detection
3. Support research for treatment
4. Accelerate research to improve prevention
5. Address poor COVID-19 outcomes in health disparity and vulnerable populations.

Outside of these priorities, to date, no research has investigated NIH COVID-19 funding patterns to the best of our knowledge.

The purpose of this report is to better understand the NIH initial response to the pandemic. Our research team analyzed NIH COVID-19 research funding allocation in 2020.

Methods

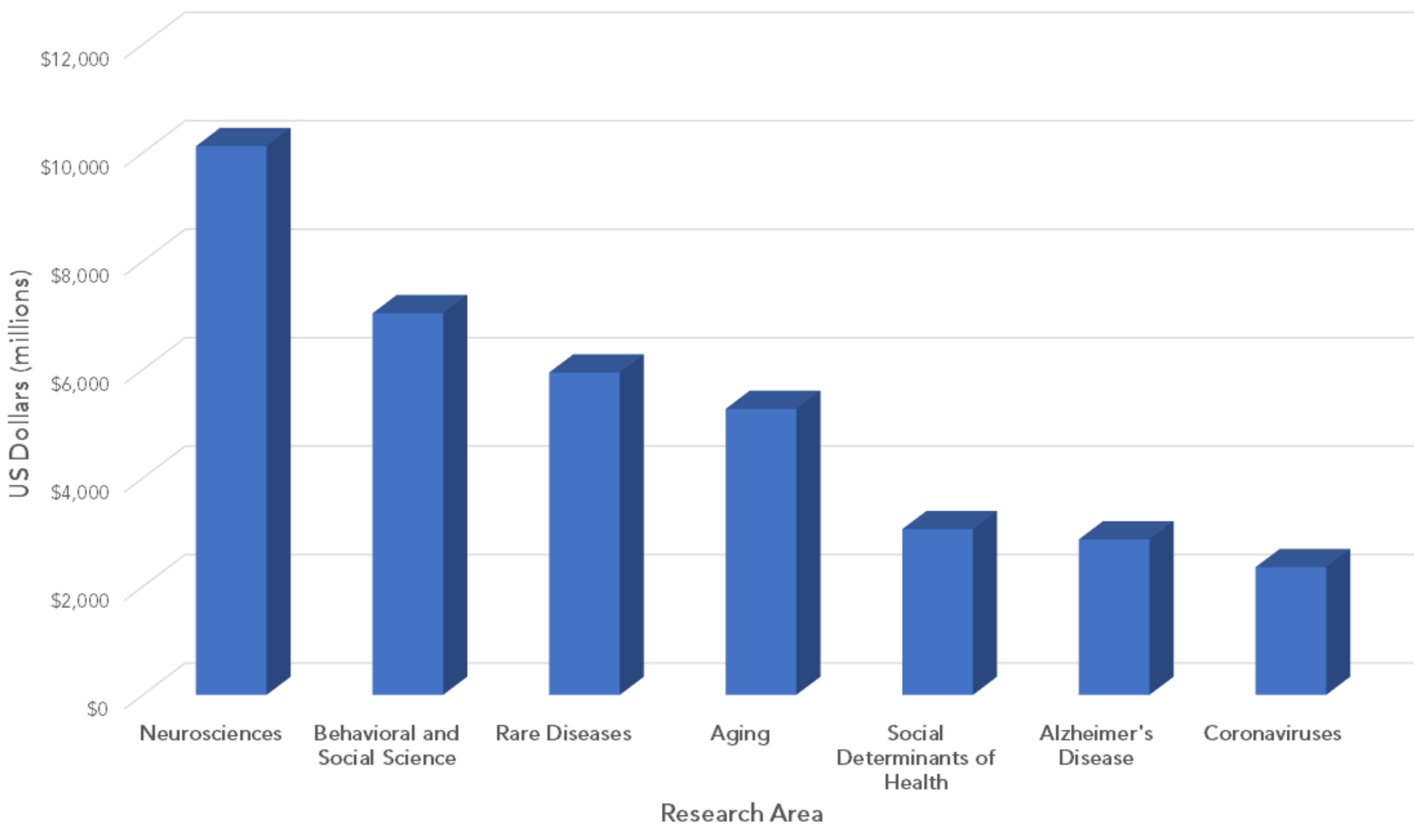
We used the RePORTER dataset of all COVID-19 grants found on the NIH COVID-19 website, accessed on June 9th, 2021 and the NIH 2020 budget breakdown to identify and describe NIH COVID-19 research.[8] We identified all grants funded for COVID-19 research between January 1, 2020 and December 31, 2020. NIH funding dataset variables included spending categorization, award type, location, organization, methodology, discipline, request for application date, award date notice, and amount awarded as defined by NIH. The date of request for application (RFA) and the award notice date was obtained from a table on NIH COVID-19 grant opportunities and NIH RePORTER dataset respectively.[9] The RFAs and Funding Opportunity Announcement (FOAs) were matched per grant proposal, and the difference in dates were calculated to obtain the funding cycle.

Our scientific researchers worked to define research areas and subcategories of primary research subjects using National Library of Medicine's MeSH (Medical Subject Headings) thesaurus, Computer Retrieval of Information on Scientific Projects (CRISP thesaurus), Center for Disease Control (CDC), American Medical Association (AMA), American Association of Medical Colleges (AAMC), and expert consensus. Each NIH funded grant was first categorized into one of these 5 research areas: basic science, clinical, public health, infrastructure & education, or translational research (Appendix 1). Next, each NIH funded grant was subcategorized by primary research subject (Appendix 2). Following categorization, all funded research grants in the dataset were tested against the category definitions and reviewed by a second independent researcher. Final validation was completed by an expert panel to refine the category's terms and thresholds to develop valid categorization.

Results

In 2020, COVID-19 research accounted for 5.7% of the annual NIH budget with just over $2.2 billion of the $41.7 billion appropriated to the NIH (Figure 1). We found that several disease and condition specific research areas were funded over Coronaviruses research, such as Rare Diseases and Aging which received 2.5 and 2.2 times the funding of Coronavirus respectively.

Figure 1: NIH Funding by Research Area in 2020



We identified 1,419 NIH COVID-19 grants from the year 2020 in the NIH RePORTER dataset and linked grants by their FOAs to RFAs. The average COVID-19 research study was issued funding 150.4 days (SD: 58.2) after the RFA while the median was 137 days (IQR: 109-196), with a range from 42-295 days.

We identified 1,167 COVID-19 grants which met the definition of COVID-19 research funded by the NIH in 2020. 252 studies were excluded as duplicates or without COVID-19 research relevance. Of the research categories, basic science research comprised the greatest number of grants funded by the NIH with a total of 313 grants.

However, the infrastructure and education research category was allocated the highest dollar amount at 2.3% of the annual NIH budget (Table 1). 295 grants (1.8% of the NIH annual budget) were categorized as clinical research and 231 (0.4% of the NIH annual budget) grants were public health research.

Subcategorization by research primary subject showed that the NIH funded 4 grants studying airborne transmission of COVID-19, 2 grants on mask efficacy, and no grants on kids and masks. Additionally, the NIH funded 107 grants on developing medications of which 43 grants explored repurposing existing therapeutics. 58 grants examined the social determinants of health, and 57 grants studied substance abuse. Infrastructure for COVID-19 testing capacity, Vaccine and Treatment Evaluation Units (VTEU), and Clinical Trial Units (CTU) together comprised 132 grants and 65.7% of Infrastructure and Education funding.

Table 1: Number of NIH Grants Awarded by Large Categories in 2020

	Number of Grants	Total Amount Funded	Percentage of COVID-19 Funding	Percentage of Annual Funding
Basic Science	313 (26.8%)	$167,146,396	7.53%	0.40%
Translational	115 (9.9%)	$86,854,989	3.91%	0.21%
Clinical	295 (25.3%)	$729,746,593	32.89%	1.75%
Infrastructure and Education	185 (15.9%)	$962,720,736	43.39%	2.31%
Public Health	231 (19.8%)	$148,213,662	6.68%	0.36%
Other	28 (2.4%)	$124,134,117	5.59%	0.30%
Total	1,167	$2,218,816,493	100.00%	5.32%

Discussion

Despite COVID-19 being a worldwide healthcare crisis, COVID-19 research through the year 2020 only encompassed 5.7% of the total NIH 2020 budget. Our research study is consistent with the long history of NIH funding barriers where disease burden is not aligned with funding priorities. In the 1990s, NIH funding patterns were under major scrutiny from Congress and the scientific community due to concerns that funding allocations by the NIH failed to adequately reflect the burden of disease on society. [5] In 1998, the Institute of Medicine (IOM) released a groundbreaking report guiding the NIH to improve and develop disease-specific funding processes.[3] A landmark study published in the New England Journal of Medicine[4] and a follow-up study by Gillum et. al in 2011[5] also revealed that the NIH disease specific funding levels were not correlated with disease burden. Our research shows that this trend continues.

Our study shows only 0.05% of the annual NIH budget was allocated to COVID-19 research in the first three months of the pandemic, and COVID-19 grants had an average grant funding cycle of 5 months. In time of crisis, a prolonged funding cycle can delay critical research and implementation of evidenced-based public safety measures. In the March 2021 issue of Health Affairs, Sampat and Shadlen also highlighted the NIH's slow start in responding to COVID-19.[6] Our COVID-19 funding research aligns with previous analysis of NIH funding indicating persistent issues in the funding approval processes and stagnation in crises.

Study Limitations

Our analysis is not without limitations as 253 grants were unable to be categorized due to lack of relevance to COVID-19 or duplication. Nevertheless, given the detailed information available across the NIH RePORTER dataset, the findings of this report give insight into the 2020 NIH COVID-19 funding patterns and adaptability.

Conclusion

- While the NIH has made progress in funding allocation transparency, funding priorities should reflect disease burden of society especially at times of crisis.
- Grantmakers, like the NIH, should develop guidelines for reviewing grant proposals and pivoting funding rapidly to accelerate crisis-related research.
- In a public health emergency, the NIH should promptly fund studies to specifically inform policy and address the needs of society, such as the efficacy of masks, airborne transmission, and COVID-19 transmission in schools.
- As the largest funders of research in the US, the NIH should diversify the topics of grants to expand public health funding.

Appendix 1

Basic Science Research: Fundamental laboratory or bench research and provides the foundation of knowledge for applied science and encompasses; biochemistry, microbiology, physiology, and pharmacology, and their interplay, and involves laboratory studies with cell cultures, animal studies or physiological experiments. [10]

Clinical Research: Research in which people, or data or samples of tissue from people, are studied to understand health and disease. [11]

Translational Research: Research that has both basic science and clinical components. Translational research includes two areas of translation. One is the process of applying discoveries generated during research in the laboratory, and in preclinical studies, to the development of trials and studies in humans. The second area of translation concerns research aimed at enhancing the adoption of best practices in the community. Cost-effectiveness of prevention and treatment strategies is also an important part of translational science. [12]

Infrastructure Research: Research infrastructure refers to the facilities, resources and services that are used by the research and innovation community to conduct research and foster innovation in their fields, such as increasing testing capacity or Vaccine and Treatment Evaluation Units. [13]

Education Research: Educational research is a type of systematic investigation that applies empirical methods to solving challenges in education. It adopts rigorous and well-defined scientific processes to gather and analyze data for problem-solving and knowledge advancement. This involves research related to teaching, training the public or sub-populations to improve knowledge of COVID-19 and COVID-19 preventative methods. [14]

Public Health Research: Public health research tries to improve the health and well-being of people from a population-level perspective including research that addresses mental health and social determinants of health. [15]

Appendix 2

Airborne Transmission: Research that identifies airborne transmission COVID-19 and describes how COVID-19 spreads in the air. Does not include droplet research.

Masks: Research on the efficacy and safety of facial masks to answer basic questions like "Do masks reduce transmission of COVID-19?"

New Therapeutic Development: Therapeutic Intervention research such as creating new drugs for the treatment and prevention of COVID-19 or COVID-19 symptoms.

Existing Therapeutic Analysis: Therapeutic Intervention research of existing drugs (FDA Approved) for the treatment and prevention of COVID-19 or COVID-19 symptoms, including convalescent plasma and pre-existing antivirals.

Social Determinants of Health: Social determinants of health (SDOH) are the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks. Research in this area identifies the effect of social determinants on people's health in the context of covid-19 infection and preventive methods. [16]

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