The Chan-Zuckerberg Biohub: Modern Philanthrocapitalism Through a Critical Lens

Nishila Mehta[1], Elnaz Assadpour[1]
[1]*Faculty of Health, York University, Toronto, Canada*

ABSTRACT

Philanthrocapitalism—the application of capitalist concepts and objectives to philanthropy—is increasingly directing the course of many efforts in global health research and development. Instead of donating money to charities, philanthrocapitalists prefer a more hands-on approach that imitates for-profit business practices. The practice recognizes that capitalism can be utilized for the benefit of mankind by propelling profit-driven innovation. One such enterprise is the Chan-Zuckerberg Initiative, (CZI) recently formed by Mark Zuckerberg and his wife Priscilla Chan. The first leg of this initiative is the Chan-Zuckerberg Biohub, a research center that aims to pursue the initiative's goal of "curing, preventing or managing all diseases by the end of this century" (Chan-Zuckerberg Initiative, 2017). This paper critically examines the popular discourse surrounding the benefits of philanthrocapitalism in relation s to the potential efficacy of the Biohub. Drawing from examples of past initiatives with similar goals, this paper raises questions of accountability, political repercussions, tax benefits and private interests. A critical analysis of the Biohub provides some insights into how this initiative may be laying the foundation for future patentable drugs and technologies, but also may be protecting large sums of money from state taxation, steering research priorities with little public oversight and undermining government support for research. It also raises questions around the capacity of this initiative to substantially alleviate the global burden of disease. This discussion ventures to raise awareness about the methods and practices of philanthrocapitalist initiatives using the Biohub as an example and provide recommendations for change.

INTRODUCTION

Advancing human potential and promoting equality are the words boldly displayed on the homepage of the CZI website (2017). This initiative is the brainchild of Facebook co-founder Mark Zuckerberg, and his wife Priscilla Chan, a pediatrician and vocal advocate for science, education and health care initiatives(CNN, 2015). In 2015, they announced they would be donating 99 percent of their Facebook shares over the course of their lives—an estimated value of $45 billion (Eisinger, 2015). These funds are said to be directed towards a wide set of goals, including curing disease, connecting people and researchers, engaging communities and creating technological advances (Zuckerberg, 2015). This announcement was met with an immediate reaction by both media and academia, dominated by praise for the generosity and far-sightedness of this initiative (Anwar, 2016). One year later, the CZI unveiled its plans for the first leg of the initiative: the Chan-Zuckerberg Biohub. The Biohub is a research center situated in Silicon Valley, California, that brings together scientists and engineers from three of the world's leaders in biomedical and engineering innovation: University of California at Berkeley, University of California at San Francisco and Stanford University (Anwar, 2016). At the BioHub, scientists are given funds to pursue research projects which contribute to the CZI's goal of "curing, preventing or managing all diseases by the end of the century by accelerating basic science research" (Kaiser, 2016).

The Biohub's first two projects are set to begin later this year: The Infectious Diseases Initiative, which will develop diagnostic tests, new drugs, vaccines and rapid response systems for infectious diseases, and The Cell Atlas, a map of all the different types of cells that control the body's major organs (Anwar, 2016). University of California president Janet Napolitano issued a public statement regarding the initiative, stating, "This exciting new venture by the CZI brings together private philanthropy with some of the best minds in the world" (Anwar, 2016).

Private philanthropy of this nature has a name—it is called philanthrocapitalism, a term first coined by economist and author Matthew Bishop, and is defined as the philosophy of applying capitalist- objectives and crite-

ria to the direction of philanthropic enterprises. These include maximizing efficiency, clearly defining targets and prioritizing measurable outcomes and quick results (Bishop & Green, 2008). This new type of philanthropy mirrors business practices in the for-profit world, where donors adopt a more hands-on approach to ensure that their funds return maximal measurable impact (Bishop & Green, 2008). Philanthrocapitalism is becoming increasingly popular among billionaires, and is increasingly directing the course of many efforts in global health research and development (Cassidy, 2015). According to a 2009 report by the Hudson Institute, global philanthropy amounted to over $53 billion, and in 2010, Bill Gates and Warren Buffett co-founded the Giving Pledge to challenge billionaires around the globe to donate at least 50% of their wealth (Tran, 2011; Cassidy, 2015). Since then, over 170 wealthy individuals have signed the Giving Pledge (The Giving Pledge, 2017). Some individuals, such as Warren Buffett, who signed away a large portion of his wealth to the Gates Foundation, allow their donations to be directed by others. However, many are determined to steer their donations towards pursuing their preferred causes through setting up their own organizations (The Giving Pledge, 2017). This paper will critically examine the popular discourse surrounding the benefits of philanthrocapitalism as it applies to the potential efficacy of the Biohub, and will highlight potential shortcomings and unintended consequences.

JUSTIFICATION FOR THE BIOHUB

Philanthrocapitalist initiatives are generally born from the belief that the state, due to poor allocation of resources and inherent inefficiencies, falls short in its provision of quality care and basic needs for all members of a society. Thus, action must be taken to fill these gaps ("Conflicts of Interest", 2011). Corporate enterprises, theoretically apolitical and thus unbiased in nature, argue that they can use their expertise in business, markets and project management to adopt a problem-oriented approach to achieve social outcomes ("Conflicts of Interest", 2011). The justification behind the Biohub follows a similar line of thinking: Scientists in America are often limited in their abilities to conduct cutting-edge research due to tight budgets and strict requirements of government fundraising (Anwar, 2016). It is therefore imperative that scientists are given an alternative space where they are allowed to solve today's most pressing health problems, uninhibited by institutional pressures. The Biohub was created with the intention of facilitating the coming together of scientists in a free-flowing, collaborative space, thus speeding up the development of treatments for currently incurable diseases (Anwar, 2016). As Biohub is situated amongst multiple technology companies and startups in Silicon Valley, its scientists would also have the benefit of access to emerging and cutting-edge technologies (Anwar, 2016; Chan Zuckerberg Initiative, 2017). Through the Biohub, the CZI aims to be the driving force for discovery of novel drugs, technologies and medical interventions to allow people everywhere to live healthier and longer lives (Chan-Zuckerberg Initiative, 2017).

A CLOSER LOOK

Taken at face value, the stated objectives of the Biohub are a noble cause. If private philanthropy can truly accelerate the discovery and cure of all diseases globally, then this initiative is highly responsive to global health needs. However, upon taking a closer look, some issues with the Biohub project become evident, and call into question whether this project possesses the capacity to meet the CZI's stated goals.

What does it take to 'cure, prevent and manage all diseases'?

The entirety of the Biohub's project plans revolves around advancing basic science research. This means focusing on laboratory-based science, with aims of using technologies like cell sequencing and genome editing to discover the molecular basis of diseases. Using these methods, scientists hope to find novel drug therapies and vaccines to treat or prevent diseases. However, there is a stark difference between finding the right drug to cure a disease and significantly lowering the rate of that disease globally.

According to health experts, the good health seen in developed countries, in terms of higher life expectancy and lower disease burden, is attributable to a combination of biomedical advances, public health measures, improved hygiene and sociopolitical reforms which improved the living standards of working people (CDC, 2017). For example, a study of measles in nineteenth and twentieth century England and Wales revealed a sharp decline in measles-related mortality beginning in 1910, although the measles vaccine was only introduced

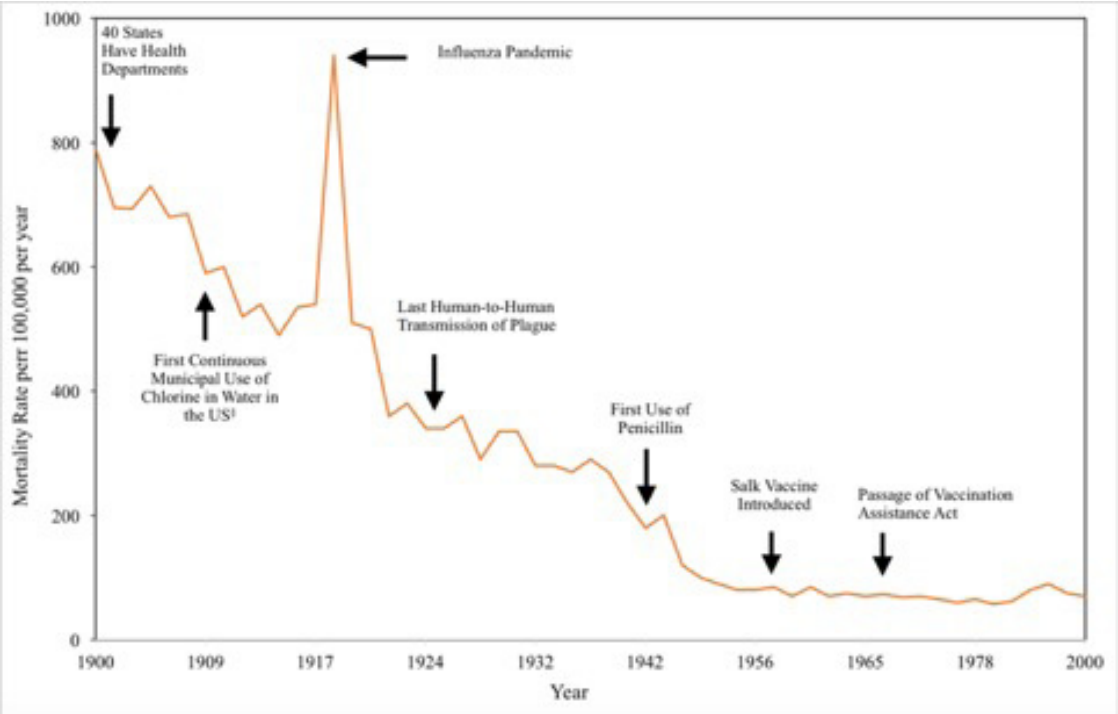

Figure 1. Death rate per 100,000 people per year for infectious diseases in the United States, 1900-1996*

**Adapted from the Center for Disease Control's adaptation of Armstrong GL, Conn LA, Pinner RW. Trends in infectious disease mortality in the United States during the 20th century. JAMA 1999:281;61-6. doi: 10.1001/jama.281.1.61*

§American Water Works Association. Water chlorination principles and practices: AWWA manual M20. Denver, Colorado: American Water Works Association, 1973.

disparities and the largely non-biomedical causes of the global burden of disease (Chan Zuckerberg Biohub, 2017). It has been the tendency of large health research organizations to neglect the social causes of disease when setting research priorities (Raphael, 2012). The underlying cause of this may be the low profitability of non-biomedical research, which raises the next point—the potential relationship between the Biohub and the for-profit industry.

What is the role of the for-profit industry?

While the Biohub project may not eradicate global disease, it will likely result in a number of novel and patentable drugs and technologies. For example, their project plans include the Infectious Diseases Initiative, which strives to create new diagnostic tests, new drugs and vaccines (Chan Zuckerberg Biohub, 2017). The potential for large amounts of profit raises the issue of Intellectual Property (IP) rights on these discoveries. Upon examining the recently released Biohub project proposal, the following statement was found:

The Hub shall own exclusively all right, title and interest, including all patent, copyright, trademark, trade secret and other proprietary rights and, accordingly, the Hub may choose whether or not to patent, otherwise protect, develop, license and otherwise commercialize any Hub IP in its sole and absolute discretion (Levine, 2016).

In essence, the Biohub will hold onto its control of all newly developed IP. If they choose to license these discoveries out to pharmaceutical companies, for example, there may be large profits flowing back to the Biohub. Without any information yet available on how these funds will be spent, there is no certainty that these funds will be reinvested in its projects. Not only will these IP rules limit how widely the impact of any discoveries made by the Biohub will be felt, but the goal of producing profitable technologies to financially bolster the Biohub may also influence which areas of research the hub chooses to engage with. Both the Cell Atlas project and the Infectious Diseases Initiative are already demonstrating this. The Cell Atlas project, which aims to create a map of the cells that control the body's major organs, is intended to become a resource that researchers around the world can use to further understand molecular mechanisms of diseases (Chan Zuckerberg Biohub, 2017). Nowhere on the website does it mention that this

will be an open access resource, so the Cell Atlas may also be a patented and profitable technology. Moreover, the Infectious Diseases Initiative centers around the creation of novel diagnostic tests, drugs, vaccines and rapid response systems, the first three of which may also have high costs due to either the production of the product itself or of its administration, making them potentially inaccessible to those who need it most, in low- and middle- income nations (Chan Zuckerberg Biohub, 2017). As such, these drugs and technologies are unlikely to alleviate the burden of disease experienced by the poor if not accompanied by measures that take into account financial inaccessibility of these discoveries. In South Africa, a region which has one of the highest incidences of multi-drug resistant tuberculosis (MDR-TB), obtaining sputum smear microscopy has proven to be an ineffective diagnostic tool, as many HIV co-infected individuals have smear negative results and may be asymptomatic at onset (Chauhan & Borisagar, 2014). The development of Xpert MTB/RIF has proven to be a faster, more user-friendly diagnostic tool that also tests for rifampin-resistance; however, only 5% of suspected cases are tested, as this technology continues to be financially inaccessible to many of the areas that need it most (Weyer et al., 2013 & Keshavjee & Farmer, 2012). Research and development have great potential only if accessible to those who need it most, particularly in the face of rising global threats, such as MDR-TB. However, no plans to ensure accessibility to biomedical innovations have been detailed by the CZI.

In addition to licensing deals with for-profit entities, the CZI may interact with industry through strategic investments. Researchers who have analyzed the spending habits of other large, philanthrocapitalist enterprises have found that there is generally a lack of oversight in how these enterprises make their investments ("Conflicts of interest", 2011). Take for, example, the Bill and Melinda Gates Foundation, an organization that seeks to enhance health, promote education and alleviate global poverty (Gates Foundation, 2017). This organization often partners with and promotes The Coca-Cola Company, despite the fact that the latter has been considered to be a major contributor to the global rise of obesity and diabetes rates ("Conflicts of interest", 2011). The Gates-Coca-Cola partnership, meant to assist 50,000 fruit farmers in Uganda and Kenya boost their income by participating in Coca-Cola's supply chain, has raised concerns that the Foundation's investments may be privately benefiting its owners, as the foundation it was revealed that possessed significant investment in Coca-Cola ("Conflicts of interest", 2011). With $45 billion to distribute, and very little transparency thus far on how these funds will be managed, there is concern that the CZI may also serve as an investment vehicle to produce gains for Chan and Zuckerberg. For example, in their public statement regarding this donation, one of the goals listed by the CZI was to "connect the world so you have access to every idea, person, and opportunity," with a strong emphasis on the advancement of the Internet and "personalized learning" (Zuckerberg, 2015). These goals are all tied to Facebook's interest in bettering connectivity of the world through the internet and personalization of the online experience. While increasing connectivity of the world is in no way harmful, its potential to advance the success of Facebook problematizes the conception of CZI as a solely charitable initiative. This raises the question of whether the Biohub and other philanthrocapitalist initiatives should be able to maintain complete control over their donations, or whether oversight is necessary from an impartial body such as state bodies, academic institutions and community organizations. Exploring the financial and legal structure of the CZI may provide insight into that question.

To whom is the Chan-Zuckerberg Initiative accountable?

Traditionally, philanthropists have set up private foundations to make charitable donations. Private foundations in the United States are required to spend a minimum of 5 percent of their value of endowment every year for charitable purposes and have requirements to increase transparency, such as necessary disclosures of public tax documents (Singer & Isaac, 2015). Instead, the CZI was formed as a Limited Liability Company (LLC). This is a relatively new type of business structure that combines characteristics of a corporation and a business partnership. The LLC model is bound by fewer rules than a private foundation and provides many benefits, with the primary advantage being more control for Chan and Zuckerberg (Singer & Isaac, 2015). Some activities in which an LLC can engage include investing in profit-making companies, contributing to political campaigns and writing checks to the owners of the LLC (Kwak, 2015). Chan and Zuckerberg justified their LLC model by claiming that "the mission will best be advanced by a combination of activities, including funding

nonprofit organizations, making private investments, and participating in policy debates." This model was also acknowledged as a creative and flexible use of capital by Jacob Harold, the chief executive of GuideStar, a national database about nonprofits (Kwak, 2015; Singer & Isaac, 2015). Less discussed, however, are the key questions that the LLC model raises about the transparency and accountability of this initiative. Ideally, philanthropic initiatives should be accountable to the people they seek to help. However, by opting for the LLC structure, Chan and Zuckerberg maintain complete control over their fortunes, and have, in essence, simply transferred money from one pocket to another.

Philanthropists who have previously donated large sums of money have been criticized for receiving sizable tax deductions in return (Collins & Flannery, 2016). CZI has garnered praise for steering away from the structure of a private foundation because it ostensibly claims that tax breaks were not the motivation behind this $45 billion donation. However, this opinion is misinformed, and upon performing an analysis of the tax implications of the LLC model, the potential tax benefits become clear. Dr. Victor Fleischer, a professor of law and tax specialist at the University of San Diego, comments on the various ways in which the LLC might go about its philanthropy (Eisinger, 2015). If this LLC donated sold Facebook stock, Fleischer argues that Zuckerberg would have to pay a large capitals gain tax, which is charged when stock is sold at a higher price than that for which it was purchased (Eisinger, 2015). Alternatively, the LLC could donate money to a charity, in which case Zuckerberg would get a tax deduction just like anyone else (Eisinger, 2015). However, as Fleischer comments, the LLC may also opt to donate appreciated Facebook stock to charity, as opposed to selling them. In this way, Zuckerberg would receive a tax deduction at the market value of the share, while also avoiding capital gains tax (Eisenberg, 2015). Using the LLC model paired with a plan to donate shares rather than cash, Zuckerberg might be able to effectively shelter billions of dollars of income from taxation.

What does all this mean for the Biohub? It means that any money poured into the development of the Biohub or any of its projects may indirectly serve to shield Zuckerberg's fortune from taxes. The LLC model also means that every decision in the Biohub, from research priorities to investments to the recruitment of scientists is entirely up to the discretion of Zuckerberg and Chan. With this much wealth at the disposal of two powerful individuals, it becomes necessary to examine the practices with which this wealth was accrued and the values these practices represent.

How were these funds accumulated?

Many wealthy philanthropists, both today and in the past, have been criticized for amassing their fortunes through business strategies which greatly exacerbated the same social and economic inequalities that they aimed to later remedy ("Conflicts of interest", 2011). For example, the Gates Foundation is funded primarily through revenues accrued from Microsoft, which has been criticized for accumulating its wealth through exploitative labor practices and monopolistic IP rights that stand contrary to the stated health equity aims of the Gates Foundation (Kalleberg, 2000). Facebook founder Mark Zuckerberg may not be exempt from this criticism. A quick glance at the history of Facebook brings into question whether its current stance on promoting equity aligns with the degree to which this organization has upheld the value of equity in the past. For instance, Facebook has been accused of gathering and selling untold amounts of data under the protection of inscrutable legal jargon. And, though the company boasts over 10,000 employees, only 32% of them are women, and less than 0.5%are African Americans (Maloney, 2015; Neate, 2015; Birn, 2014). Economic disengagement of vulnerable populations, which Facebook has perpetuated through hiring practices, has been strongly associated to the lower health status this group often experiences, and thus stands contrary to the health equity aims of the CZI (Adelman et al., 2008). While Facebook has committed to increasing the diversity of its workforce, specifically regarding the gender gap within its organization a 2017 article found that Facebook's hiring process continues to exhibit bias against minorities. This is largely due to the lack of diversity in hiring teams, as well as the use of traditional metrics such as the prestige of a candidate's college, or whether they had experience at another top tech firm, all which may serve to exclude those from underrepresented backgrounds (Huet, 2017). While these issues may not be exclusive to Facebook, the CZI's goals of "promoting equality and eradicating disease", contrast with the values displayed by Facebook during its rise to power and in its current business practices. Its unfair practices bring into question the capability of the CZI to

understand what is truly needed to bring about equitable health for all. The Biohub may be presenting a scope of influence larger than its true intentions and/or abilities, as promoting equity and health for all is a tremendous undertaking riddled with sociopolitical and practical challenges. As journalist and activist Teju Cole put it, its power "supports brutal policies in the morning, founds charities in the afternoon, and receives awards in the evening" (Cole, 2012). Until that cycle changes, the effectiveness of philanthropic initiatives can only go so far.

Are philanthrocapitalist initiatives really apolitical?

Philanthropic initiatives headed by the wealthy elite, including the Biohub project, often push the idea that they can, because of their problem-oriented and apolitical approaches to social issues, accomplish tasks in such manners hat inefficient governmental bodies cannot approach (Eisinger, 2015). This stance of political impartiality, however, has been criticized by some scholars as a guise for philanthrocapitalists to further neoliberal ideologies ("Conflicts of interest", 2011). Neoliberalism, associated with economic liberalization policies such as privatization and deregulation, advocates for a smaller role of the state in the economy and society in place of a greater role for the private sector. Warren Buffet, when he announced his $30 billion donation to the Bill and Melinda Gates Foundation in 2006, remarked that "the money would do more good than the money dropped into the US treasury." This sentiment echoes the neoliberal ideology of decreasing the role of the state in public affairs ("Conflicts of interest, 2011). Corie Bergmann, the Biohub's inaugural President of Science of, responded in a similar fashion when asked why the Biohub would be pursuing the formation of a rapid disease response team when the Centers for Disease Control already had one, asserting, "Look at the politics of Zika virus funding in this country. It's embarrassing. How can we possibly be acting that way in the face of this huge potential human tragedy worldwide? There's room for more people to step up" (Kaiser, 2016). Rhetoric like this delegitimizes government-run health initiatives, and when used by those in positions of power, may erode the support of taxpayers and policymakers for government spending on services such as health and research. Large, private donations in an area may also discourage government funding in the same area, effectively negating the benefit of the donation (BBC Ethics, 2014). If government funding in an area of research declines, this also has the potential to shift decision-making power on spending and determining priorities into the hands of private funders, rather than popularly elected officials. This puts at stake the idea of science for the common good, determined by the people, for the people. For example, it has been shown that private philanthropists are more likely to donate to organizations that support their own preferences, and support causes that relate to their own or their family's life experience (Breeze, 2013). Their individual preferences may not necessarily align with where the greatest needs lie, and this same bias may operate in setting priorities for the CZI and the Biohub. Creating spaces for dialogue that encourage participation from all stakeholders—lay citizens, health care professionals, researchers, funders and the state—allows for a greater likelihood that the decisions are made in the interest of the public, and is an important step in ensuring transparency and accountability of initiatives like the Biohub. While it would be incorrect to assume that the government-provisioned scientific funding in America is completely devoid of political motivation, the rise of private funding would result in science shaped even less by public priorities and more by the particular preferences of wealthy individuals

It is important to recognize that private funding has inarguably mobilized funds which have contributed to improved health. One example of this is the Gates Foundation, which has accelerated implementation in numerous countries of the directly observed treatment, short course (DOTS) strategy—the gold standard for tuberculosis control in low resource settings (Gates Foundation, 2017). Still, the fact that individual philanthropists may be prioritizing the treatment of one disease over another is problematic, as such decisions have the potential to be influenced by the biases of the donors.

The rise of philanthrocapitalism has been described as being the return of the aristocratic principle: if a population is to have basic rights, including the right to health, it will be at the whims of the rich. In the case of the Biohub, which aims to eradicate disease globally, the vast majority of those at the receiving end of the benefits, namely, those residing in lower-income nations, are not being consulted at all in the establishment of research priorities. However, this has historically been the case with most attempts by the Western world to eradicate poverty and disease, and is evident in both public and private research (Waitzkin, 2015). In what is often re-

ferred to as the "white savior complex" by activists, those who are being "helped" are rarely consulted over the matters that concern them, and assistance is delivered in a patronizing fashion (Cole, 2012). For example, the Gates Foundation funded research on malaria that has been vociferously criticized as advocating for the implementation of policies that are divorced from local needs (Kelly & Beisel, 2011). The Biohub has the potential to run into similar issues if it attempts to implement, for example, a novel policy around diagnostic testing through their Infectious Diseases Initiative in a region where it may not be feasible to do so.

LIMITATIONS

This paper has several limitations. Firstly, due to the novelty of the Biohub project, limited information has been made available by the CZI, and thus the majority of information used in the analysis was drawn from media sources. This introduces concern may introduces about the credibility of the sources. Next, a general lack of transparency around many different aspects of the CZI and the Biohub results in an inability to reach conclusive statements about the potential implications of these initiatives. Finally, because this is a prospective analysis, the policies of the Biohub could change at any time, resulting in the invalidation of one or several arguments presented in this paper. We believe these limitations highlight the urgent need to increase transparency of this initiative to allow for more informed dialogue around its impacts.

CONCLUSION

Upon examining the CZI's Biohub project through a critical lens, there is evidence to suggest that this initiative may lack the ability to realize its stated vision. With a purely biomedical approach, the CZI Biohub is unlikely to be successful at curing all diseases.' Although it may be effective at churning out patentable drugs and technology, the Biohub also paves the way for Facebook's future success, and places billions of dollars permanently out of the reach of American taxation. Apart from private gains, the project has the potential to inflict considerable social damage as well. The growing privatization of science may undermine state support for research, thus placing the power to steer research priorities in the hands of the wealthy elite. Figure 2 provides a summary of this paper's key concerns around the Biohub project and the projected consequences.

RECOMMENDATIONS FOR CHANGE

If Chan and Zuckerberg wish to create real social change and promote health equity, there are several important measures they must first take. To start, they should reexamine the research priorities of the Biohub, and recognize that there is a large body of literature which has proven that a reductionist approach to tackling disease is insufficient to improve health globally. Effective prevention, treatment and management of disease requires a combination of biomedical, behavioral and socio-environmental approaches, which only together can advance human potential and promote health equality. To ensure a truly responsive approach while setting research priorities, they must consult communities that carry the greatest burden of diseases, the global southGS, as well as experts from other fields such as global and public health. There is no evidence that the CZI is currently utilizing this approach. CZI could additionally support and cooperate with the idea of democratically directed redistribution of wealth, rather than implicitly attacking it through their LLC model, which allows for large-scale tax evasion. This can be accomplished either by reverting to the non-profit organization model, which is regulated by policies involving transparency and taxation, or creating their own robust internal policy detailing the donations made each year, as well as the exact tax implications that can be held accountable by the public. It would also be appropriate for Chan and Zuckerberg to issue a public statement of any conflicts of interest that may exist between the CZI's goals and those of Facebook. Additionally, they should ensure that all research produced by the Biohub remains open-access and revise their IP policies to reflect their vision of equality.

Furthermore, Chan and Zuckerberg could feed their funds directly into the existing programs operated by the national government that already seek to address some of the same issues with which their initiative intends to deal, such as the National Institutes of Health's Accelerating Medicines and Blueprint for Neuroscience Programs, or the numerous global health initiatives operated by the Centers for Disease Control and Prevention (NIH, 2017; CDC, 2017). Presently, the CDC has a budget of approximately $7 billion, and additional funds provided by Chan and Zuckerberg could enhance many of their ongoing efforts. At these established government

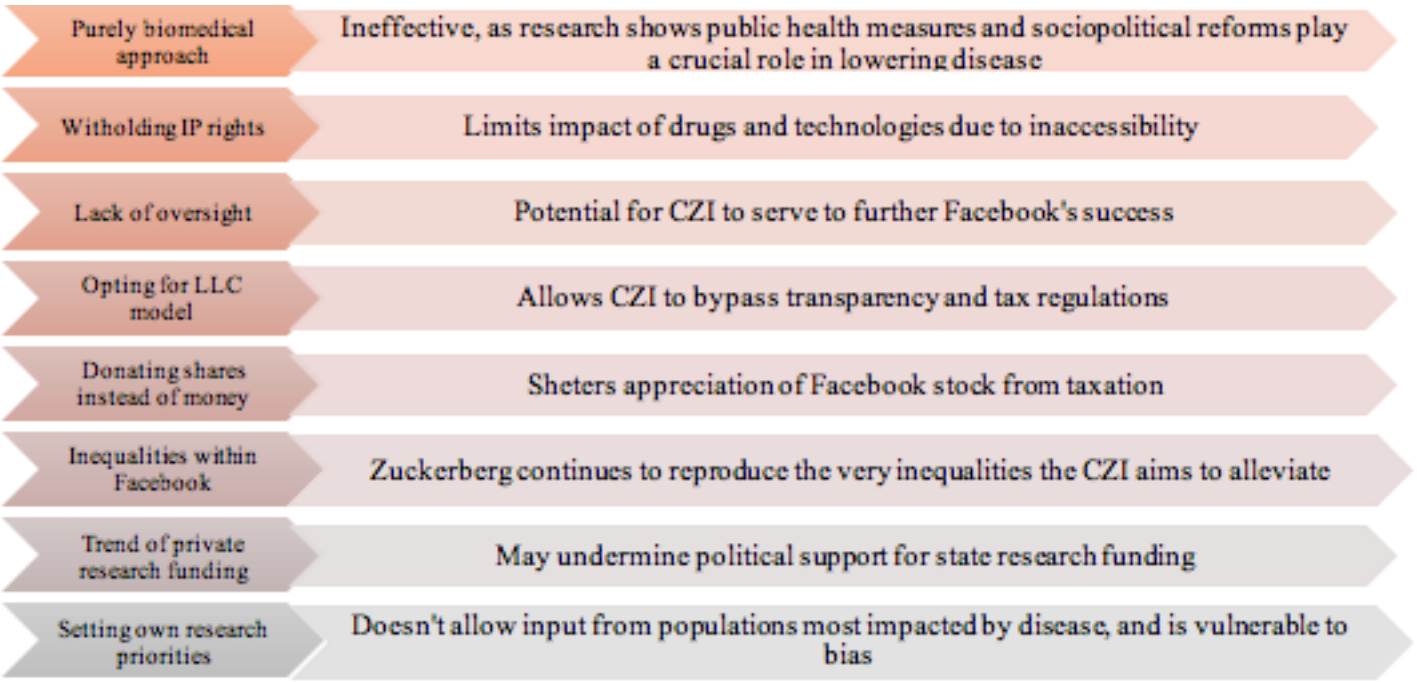

Figure 2. Summary of key concerns regarding the Chan-Zuckerberg Biohub and the projected consequences.

institutions, the decisions as to where funding will be best directed are more likely to be made democratically and by larger, more diverse groups of experts.

Chan and Zuckerberg could also direct their enormous influence towards tackling the underlying influences of global health problems, such as the disparities created by international trade and economic exploitation, or the worsening of environmental degradation by corporate America. They could achieve this, for example, by using their platform to publicly denounce labor exploitation or using funds to help vulnerable populations pay for litigation against corporations whose activities adversely impact their local environments or economies. In this way, they would not be acting as mere donors, but rather as advocates of a socially just system of development where advancements in science could truly benefit all. It is important to recognize that other groups that can also play a role. For example, US scientists must recognize that the increasing privatization of science will eventually threaten their scholarly freedom as well, and so they must remain strong proponents of government-funded, open-access research. Additionally, scientists should call to attention the Biohub project's lack of focus on the social determinants factors, and advocate for the Biohub's integration of a more multifaceted approach. Scientists, scholars and activists must all cooperate to ensure that the agenda of the global elite does not determine how, or whether, the world's largest problems are attacked, and should never cease to push for accountability and democratic decision-making in all aspects of global health research and policymaking.

AUTHOR INFORMATION

All correspondance should be sent to nishila.mehta@gmail.com.

CONFLICTS OF INTEREST

The authors have none to declare.

ACKNOWLEDGEMENTS

The authors would like to thank Dr. Claudia Chaufan for her support and guidance, and Sharlene Elsie for her revisions.

REFERENCES

Adelman, L., Smith, L., Herbes-Sommers, C., Strain, T. H., MacLowry, R., Stange, E., Garcia, R. P., ... Public Broadcasting Service (U.S.). (2008). Unnatural causes: Is inequality making us sick?. San Francisco, Calif.: California Newsreel

Anwar, Y. (2016, September 21). UC Berkley to partner in $600M Chan-Zuckerberg science 'Biohub'. Retrieved from http://news.berkeley.edu/2016/09/21/biohub/

Armstrong, G. L., Conn, L.A. & Pinner, R.W. (1999). Trends in infectious disease mortality in the United States during the 20th century. Journal of the American Medical Association (JAMA), 281(1), 61-66. doi:10.1001/jama.281.1.61

Barkan, J. (2013, Fall). Plutocrats at work: How big philanthropy undermines democracy. Dissent Magazine. Retrieved from https://www.dissentmagazine.org/article/plutocrats-at-work-how big-philanthropy-undermines-democracy

BBC Ethics guide. (2014). Arguments against charity. Retrieved from http://www.bbc.co.uk/ethics/charity/against_1.shtml

Birn, A. E. (2014). Philanthrocapitalism, past and present: The Rockefeller Foundation, the Gates Foundation, and the setting(s) of the international/ global health agenda. Hypothesis Journal, 12(1): e8. doi:10.5779/hypothesis. v12i1.229.

Bishop, M. & Green, M. (2008). Philanthro-capitalism: How the rich can save the world. New York: Bloomsbury Press.
Breeze, Beth. (2013). How Donors Choose Charities: The Role of Personal Taste and Experiences in Giving Decisions. Voluntary Sector Review. 4. 165-183. 10.1332/204080513X667792.
Burnet, M. & White, D. O. (1972). Natural History of Infectious Disease, 4th edition. United States: Cambridge University Press.
Cable News Network (CNN). (2015, December 1). Who is Priscilla Chan? Retrieved from: http://money.cnn.com/2015/12/01/technology/priscilla-chan-facts/
Cassidy, J. (2015, December 2). Mark Zuckerberg and the rise of philanthrocapitalism. The New Yorker. Retrieved from http://www.newyorker.com/news/john-cassidy/mark-zuckerberg and-the-rise-of-philanthrocapitalism
Center for Disease Control (CDC). (1999, July 30). Achievements in public health, 1900-1999: control of infectious diseases. Retrieved from: https://www.cdc.gov/mmwr/ preview/ mmwrhtml/mm4829a1.htm#fig1
Center for Disease Control (CDC). (2017). Global health. Retrieved from https://www.cdc.gov/globalhealth/index.html
Chan Zuckerberg Initiative. (n.d.). The new frontier. Retrieved from https://czbiohub.org/
Chan Zuckerberg Initiative (2017). Homepage. Retrieved from: https://chanzuckerberg.com/
Chauhan, J.B., Borisagar, G. B. (2014). A comparative study on symptoms of microbiological status of tuberculosis in HIV positive persons. National Journal of Medical Research, 4(1), 23-26. Retrieved from: http://www.scopemed.org/?mno=156564
Cole, T. (2012, March 21). The white-saviour industrial complex. The Atlantic. Retrieved from http://www.theatlantic.com/international/archive/2012/03/the-white-savior-industrial complex/254843/
Collins, C. & Flannery, H. (2016, November). Gilded giving: What happens when billionaires dominate the charitable sector. Common Dreams. Retrieved from https://www.commondreams.org/ views/2016/11/17/gilded-giving-what-happens-when billionaires-dominate-charitable-sector
Conflicts of interest within philanthrocapitalism. (2011). In Global Health Watch 3: An Alternative Health Report (pp. 165-177). London: Zed Books.
Dredge, S. (2015, March 16). Facebook clarifies policy on nudity, hate speech and other community standards. The Guardian. Retrieved from https://www.theguardian.com/technology/ 2015/mar/16/facebook-policy-nudity-hate-speech-standards
Eisinger, J. (2015, December 3). How Mark Zuckerberg's altruism helps himself. The New York Times. Retrieved from http://www.nytimes.com/2015/12/04/business/dealbook/how-markzuckerbergs-altruism-helps-himself.html
Feldberg, G. D. (1995). Disease and class: Tuberculosis and the shaping of modern North American society (health and medicine series). United States: Rutgers University Press.
Fox, M. & Greene, K. (2014, May 24). The trouble with Zuckerberg's $100M gift: Pros. Retrieved from http://www.cnbc.com/2014/05/23/where-zuckerbergs-100-million-gift-went-wrong pros.html
Gates Foundation. (2017). What we do: Tuberculosis strategy overview. Retrieved from http://www.gatesfoundation.org/What-We-Do/Global-Health/Tuberculosis
Global Health Watch. (2008). Chapter D1.2—The World Health Organization and the commission on the social determinants of health. In Global Health Watch 2: An Alternative Health Report (pp.224-240). London: Zed Books.
Go forth and replicate [Editorial]. (2016, August 24). Nature, 536, 373. doi:10.1038/536373a
Helmuth, L. (2013, September 5). Why are you not dead yet? Retrieved from http://www.slate.com/articles/health_and_science/science_of_longevity/2013/09/life_expectancy_history_public_health_and_medical_advances_that_lead_to.html
Huet, E. (2017, January 9). Facebook's hiring process hinders its effort to create a diverse workforce. Retrieved from: https://www.bloomberg.com/news/articles/2017-01 09/ facebook-s-hiring-process-hinders-its-effort-to-create-a-diverse-workforce
Jackson, A. (2015, September 25). Mark Zuckerberg's $100 million donation to Newark public schools failed miserably – here's where it went wrong. Business Insider. Retrieved from: http://www.businessinsider.com/mark-zuckerbergs-failed-100-million-donation-to newark-public-schools-2015-9
Kalleberg, A. (2000). Nonstandard employment relations: part-time, temporary and contract work. Annual Review of Sociology, 26, 341–65. doi: 10.1146/annurev.soc.26.1.341
Kaiser, J. (2016, September 21). Can Facebook's billions stop disease? This neuroscientist aims to find out. Retrieved from http://www.sciencemag.org/news/2016/09/qa-can-facebook-billions-stop-disease-neuroscientist-aims-find-out
Kelly, A. & U. Beisel (2011). Neglected malarias: The frontlines and back alleys of global health. Biosocieties, 6(1), 71–87. Retrieved from: https://ore.exeter.ac.uk/repository/ bitstream/handle/10036/4072/Neglected%20Malarias%20Kelly%20%26%20Beisel.pdf?equence=8
Keshavjee, S., Farmer, P. E. (2012). Tuberculosis, drug resistance, and the history of modern medicine. New England Journal of Medicine, 367, 931-936. doi:10.1056/ NEJMra1205429
Kwak, J. (2015, December 3). Mark Zuckerberg's $45 billion loophole. Retrieved from https://medium.com/bull-market/mark-zuckerberg-s-45-billion-loophole 7dcff7b811b3#.5arjih4z0
Levine, M. (2016, November 04). CZI's BioHub: Who will benefit if it hits a health homerun? Retrieved from https://nonprofitquarterly.org/2016/11/04/czis-biohub-will-benefit-hits health-homerun/
Maloney, D. (2015, December 02). Priscilla Chan and Mark Zuckerberg's 99% pledge is born with strings attached. The Guardian. Retrieved from https://www.theguardian.com/ technology/2015/dec/02/mark-zuckerberg-and-priscilla-chans-99-pledge-is-born-with-strings-attached
McKinlay, J.B. & McKinlay, S. M. (1977). The questionable contribution of medical measures to the decline of mortality in the United States in the twentieth century. Health & Society, 405 428. Retrieved from http://www.columbia.edu/itc/hs/pubhealth/rosner/g8965/ client_edit/readings/week_2/mckinlay.pdf
National Institute of Health (NIH). (n.d.). Medical research initiatives. Retrieved from https://www.nih.gov/research-training/medical-research-initiatives
Neate, R. (2015). Facebook only hired seven black people in latest diversity count. The Guardian. Retrieved from https://www.theguardian.com/technology/2015/jun/25/facebook-diversity report-black-white-women-employees
Phillips, S. (2007, July 25). A brief history of Facebook. The Guardian. Retrieved from https://www.theguardian.com/technology/2007/jul/25/media.newmedia
Ramsay, A.M. & Emond, R.T. (1967). Infectious Diseases. Heinemann.
Raphael, D. (2014, July 04). Dealing with symptoms, not disease. Retrieved from http://www.thespec.com/opinion-story/4612455-dealing-with-symptoms-not-disease/
Sharpe, R. (1988). The Cruel Deception. Welling-borough, United Kingdom: Thorsons Publishing Group
Singer, N. & Isaac M. (2015, Dec 2). Mark Zuckerberg's philanthropy uses L.L.C. for more control. The New York Times. Retrieved from http://www.nytimes.com/2015/12/03/technology/ zuckerbergs-philanthropy-uses-llc-for-more-control.html?
The World Bank Group. (2017). Life expectancy at birth, total (years). Retrieved from http://data.worldbank.org/indicator/SP.DYN.LE00.IN?end=2015&name_desc=false&start 1980
Tran, M. (2011, November). Philanthropic foundations bringing new challenges to aid debate. The Guardian. Retrieved from https://www.theguardian.com/global-development/2011/nov/09/philanthropic-giving-challenge-aid-debateRetrieved from https://www.theguardian.com/global-development/2011/nov/09/philanthropic-giving-challenge-aid-debate
United States Department of Health & Human Services. (1980, July). Ten Leading Causes of Death in the U.S., 1977. Retrieved from https://stacks.cdc.gov/view/cdc/7655/cdc_7655_DS1.pdf
Waitzkin, H. (2015, July/August). Imperialism's Health Component. Monthly Review, 67(3), 114 129. http://dx.doi.org/10.14452/MR-067-03-2015-07_8
Weyer, K., Mirzayev, F., Migliori, G. B., Gemert, W.V., D'Ambrosio, L., Zignol, M., …, Raviglione, M. (2013). Rapid molecular TB diagnosis: Evidence, policy making and global implementation of Xpert MTB/RIF. European Respiratory Journal, 42, 252-271. DOI: 10.1183/09031936.00157212
Zuckerberg, M. (2015, December 5). A letter to our daughter. Retrieved from https://www.facebook.com/notes/mark-zuckerberg/a-letter-to-our-daughter/10153375081581634/