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Reimagining and Improving Student Education

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Introduction

The United States is facing perhaps the most perilous public health environment since the end of the COVID-19 pandemic. Even as its rivalry with China increasingly centers on dual-use biotechnologies, the American public health workforce is a shadow of its former self.

In contrast to other national security priorities, American biodefense strategy relies on a civilian workforce to identify novel pathogens, deploy to treat patients, and develop countermeasures. As during the pandemic, doctors, nurses, and other public health professionals, not the military, will be on the frontlines. Moreover, this workforce is essential in upholding American biomedical innovation, from running clinical trials to conducting after-market testing.

These dual roles have become more critical as Beijing seeks to become a leader in biomedical innovation and perceives biology as a potential future field of military conflict. Backed by a strong clinical trial system, Chinese biotech firms play a growing role within global pharmaceutical markets, both as a supplier to American and European firms looking to license new compounds and as an innovator in their own right.[1] While American pharmaceutical companies struggle to attract investment and maintain momentum, Chinese firms are now collectively worth $1.2 trillion, a nearly 50 percent increase over the past year.[2]

This rise promises profound strategic implications for Beijing in securing a source of potential military advantage and developing leverage over the United States and its allies and partners. The People's Liberation Army (PLA) has increased its interest and investments in biotechnologies, with some strategic writings noting that biology promises to become another domain of contemporary warfare and raising the prospect of future biologically enabled attacks.[3] Moreover, Beijing remains a key supplier within American pharmaceutical and medical supply chains, with nearly 41 percent of key starting materials for U.S.-approved, active pharmaceutical ingredients (APIs) being sole-sourced from China.[4] These avenues raise a range of national

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[1] Ben Fidler, "Drugs from China are reshaping biotech. Track the licensing deals here," *Biophramadive*, August 25, 2025. (https://www.biopharmadive.com/news/china-biotech-drug-licensing-deals-pipeline/758283); Sabri Ben-Achour, "China's pharma star is rising," *Marketplace*, June 27, 2025. (https://www.marketplace.org/story/2025/06/27/chinas-pharma-star-is-rising); Jack Burnham, "China Races Ahead in Biotech Trials. Is the U.S. Stuck in Second Place?" *Foundation for Defense of Democracies*, June 3, 2025. (https://www.fdd.org/analysis/2025/06/03/china-races-ahead-in-biotech-trials-is-the-u-s-stuck-in-second-place)

[2] "China's life-sciences industry is turning American," *The Economist*, November 6, 2025. (https://www.economist.com/business/2025/11/06/chinas-life-sciences-industry-is-turning-american)

[3] Craig Singleton, "Biotech Battlefield: Weaponizing Innovation in the Age of Genomics," *Foundation for Defense of Democracies*, January 15, 2025. (https://www.fdd.org/analysis/2025/01/15/biotech-battlefield); Dov Fox, "The Biotech Battlefield," *Foreign Affairs*, April 25, 2022. (https://www.foreignaffairs.com/articles/china/2022-04-25/biotech-battlefield)

[4] Niels Graham, "Pharmaceuticals are China's next trade weapon," *The Atlantic Council*, November 7, 2025. (https://www.atlanticcouncil.org/blogs/econographics/sinographs/pharmaceuticals-are-chinas-next-trade-weapon); Jack Burnham, "The US Will Rely on China to Defend Against the Next Pandemic," *Foundation for Defense of Democracies*, October 17, 2025. (https://www.fdd.org/analysis/2025/10/17/the-u-s-will-rely-on-china-to-defend-against-the-next-pandemic)

security risks, from allowing China to leverage key supply chains in the event of a crisis to fueling a new, more devastating form of warfare.

The United States is falling behind due to a shortfall of clinical personnel required to run cutting-edge clinical trials and offer long-term support to a thriving biomedical economy, as well as a lack of frontline health care workers tasked with securing the nation from biological threats. To reverse this slide, the Department of Education must invest in maintaining a strong public health and clinical workforce capable of driving biomedical innovation and serving as the backbone of U.S. biodefense planning efforts.[5]

China Poses a Strategic Risk to U.S. Biodefense and Biomedical Innovation

China's burgeoning biotech sector has positioned itself as a key economic competitor and a growing national risk to the United States. Having identified biotechnology, along with related medical products, such as pharmaceuticals and personal protective equipment (PPE), to be a national priority, Beijing has ramped up support for research, development, and manufacturing. Chinese firms now produce nearly half of all PPE imported by the United States, supply over a third of key starting materials for American active pharmaceutical ingredients, and run nearly as many clinical trials as American firms.[6] Moreover, China has transitioned from a "fast follower," producing drugs that improved on pre-existing pharmaceuticals, to a "first-in-class," key developer of treatments or novel medications that command significantly higher prices within global licensing markets.[7]

This surge in domestic biotechnology investment and innovation has increasingly combined with the PLA's growing interest in biotechnology as both a domain and enabler of contemporary warfare. Even just prior to the COVID-19 pandemic, Beijing had invested in dual-use public health institutions and measures, combining its goals to improve public health with institutions

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[5] Bureau of Health Workforce, "Nurse Workforce Projections, 2023-2038," December 2025. (https://bhw.hrsa.gov/sites/default/files/bureau-health-workforce/data-research/nursing-projections-factsheet.pdf); Government Accountability Office, "Public Health Preparedness: HHS and Jurisdictions Have Taken Some Steps to Address Challenging Workforce Gaps," January 29, 2025. (https://files.gao.gov/reports/GAO-25-107002/index.html)

[6] Samantha Ravich, Johanna Yang, and Jack Burnham, "Section 232 National Security Investigation of Imports of Personal Protective Equipment, Medical Consumables, and Medical Equipment, Including Devices," *Foundation for Defense of Democracies*, October 17, 2025. (https://www.fdd.org/analysis/2025/10/17/section-232-national-security-investigation-of-imports-of-personal-protective-equipment-medical-consumables-and-medical-equipment-including-devices); Jack Burnham, "The U.S. Will Rely on China To Defend Against the Next Pandemic," *Foundation for Defense of Democracies*, October 17, 2025. (https://www.fdd.org/analysis/2025/10/17/the-u-s-will-rely-on-china-to-defend-against-the-next-pandemic); "Chinese pharma is on the cusp of going global," *The Economist*, November 23, 2025. (https://www.economist.com/china/2025/11/23/chinese-pharma-is-on-the-cusp-of-going-global)

[7] Kerstin N. Vokinger, Guanqiao Li, and Olivier J. Wouters, "The Rise of Drug Innovation in China — Implications for Patient Access in the United States and Globally," *The New England Journal of Medicine*, August 30, 2025. (https://www.nejm.org/doi/10.1056/NEJMp2505821)

committed to domestic biodefense — including new legislation to improve coordination, heighten surveillance measures, and reform national security policy.[8] These measures have paralleled the PLA's emerging views on biotechnology as a domain of future conflict — including the possibility of defensive or offensive biological warfare — and as a source of possible advances in human physical and psychological performance.[9] These perspectives have also informed the PLA's growing ties to elements of China's biotechnology sector, particularly in research areas related to genetic editing and testing, a key avenue for future commercial investment and possible biological warfare research.[10]

While there is limited evidence to suggest that China is actively carrying out explicit biological warfare research, these emerging trends indicate that Beijing is actively concerned over the possibility of biotechnology playing a critical role in future conflicts. These trends also suggest that public health will remain an arena of competition, whether directly implicated in geopolitical tensions over supply chains and biomedical innovation, or indirectly as a necessary realm of U.S. national defense planning.

The U.S. Relies on a Strong Civilian Health Care Workforce To Safeguard Its National Security

To confront these growing threats, the United States must prioritize maintaining a capable network of public health professionals, nurses, doctors, and other providers as a core aspect of its national security policy. However, this workforce suffers from persistent shortages of trained personnel, potentially hindering the execution of U.S. biodefense strategy and threatening the pace of biomedical innovation. Independent estimates cited by the Government Accountability

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[8] James Haynes, "China's New Biosecurity Law Gives Limited Insight into Government Priorities and Next Steps," *The Jamestown Foundation*, August 17, 2021. (https://jamestown.org/chinas-new-biosecurity-law-gives-limited-insight-into-government-priorities-and-next-steps); Cong Cao, "China's evolving biosafety/biosecurity legislations," *Journal of Law and the Biosciences*, June 30, 2021. (https://academic.oup.com/jlb/article/8/1/lsab020/6311556); Peijie Chena, Fuzhong Li, and Peter Harmerc, "Healthy China 2030: moving from blueprint to action with a new focus on public health," *The Lancet Public Health*, September 2019. (https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(19)30160-4/fulltext)

[9] Craig Singleton, "Biotech Battlefield: Weaponizing Innovation in the Age of Genomics," *Foundation for Defense of Democracies*, January 15, 2025. (https://www.fdd.org/analysis/2025/01/15/biotech-battlefield); Dov Fox, "The Biotech Battlefield," *Foreign Affairs*, April 25, 2022. (https://www.foreignaffairs.com/articles/china/2022-04-25/biotech-battlefield); Ken Dilanian, "China has done human testing to create biologically enhanced super soldiers, says top U.S. official," *NBC News*, December 3, 2020. (https://www.nbcnews.com/politics/national-security/china-has-done-human-testing-create-biologically-enhanced-super-soldiers-n1249914)

[10] Jack Burnham and Johanna Yang, "U.S. at Risk of Falling Behind China in Biotechnology," *Foundation for Defense of Democracies*, April 15, 2025. (https://www.fdd.org/analysis/policy_briefs/2025/04/15/u-s-at-risk-of-falling-behind-china-in-biotechnology); Jack Burnham and Johanna Yang, "New U.S. Export Controls Seek to Prevent China From Weaponizing Biotech," *Foundation for Defense of Democracies*, January 21, 2025. (https://www.fdd.org/analysis/2025/01/21/new-u-s-export-controls-seek-to-prevent-china-from-weaponizing-biotech)

Office in a 2025 study suggest that the United States currently faces an overall shortage of 80,000 trained public health workers, including 54,000 local public health workers and 26,000 state public health workers.[11] Moreover, the Health Resources and Services Administration estimates that the United States will have a shortage of 358,170 full-time registered nurses by 2031, due to the increasing needs of the country's aging population and structural barriers to entry.[12]

This shortfall will likely complicate America's biodefense strategy, which relies on a largely civilian workforce, and harm biomedical innovation in the medium- to long-term. U.S. biodefense strategy is predicated on an integrated system of local, state, federal public health agencies, alongside the military and private hospitals, maintaining surveillance networks, preparing to surge stockpiled supplies, and acting rapidly to isolate and treat patients. In contrast to other national defense priorities, this strategy ensures that biodefense relies on inherently dual-use infrastructure, including public health reporting systems, pre-positioned stockpiles of key medical goods, and personnel trained in a range of medical fields.

Rather than a single overarching department or agency, the United States maintains a layered biodefense network, with local and regional public health services and providers inputting crucial data upward to federal agencies such as the Centers for Disease Control and Prevention and the Department of Health and Human Services.[13] These agencies, in turn, are responsible for surging support in the event of a crisis, including providing investigatory resources, delivering stockpiled medical countermeasures, and calling up additional personnel.[14] In addition to providing flexible response options, this structure drives strong demand for trained public health personnel across the country and across all levels of government.

Moreover, the structure of U.S. biodefense efforts inherently relies on dual-use infrastructure and civilian personnel in a range of roles, including those employed within the federal Public Health Service. While certain federal departments, such as the Department of Defense and the Department of Homeland Security maintain specialized programs, other aspects are entirely dependent on state and local efforts, such as early surveillance and distributing medical

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[11] Government Accountability Office, "Public Health Preparedness: HHS and Jurisdictions Have Taken Some Steps to Address Challenging Workforce Gaps," January 29, 2025. (https://files.gao.gov/reports/GAO-25-107002/index.html)

[12] "Nurse Workforce Projections, 2023-2038," Bureau of Health Workforce, December 2025. (https://bhw.hrsa.gov/sites/default/files/bureau-health-workforce/data-research/nursing-projections-factsheet.pdf)

[13] Executive Office of the President, "National Biodefense Strategy and Implementation Plan for Countering Biological Threats, Enhancing Pandemic Preparedness, and Achieving Global Health Security," October 2022. (https://www.govinfo.gov/app/details/GOVPUB-PR-PURL-gpo214382)

[14] Executive Office of the President, "National Biodefense Strategy and Implementation Plan for Countering Biological Threats, Enhancing Pandemic Preparedness, and Achieving Global Health Security," October 2022. (https://www.govinfo.gov/app/details/GOVPUB-PR-PURL-gpo214382); Ryan Scott Houser, "The Role of Public Health Emergency Management in Biodefense: A COVID-19 Case Study," *Disaster Medicine and Public Health Preparedness*, May 2022. (https://pmc.ncbi.nlm.nih.gov/articles/PMC9253437)

countermeasures in the event of a crisis.[15] This is particularly the case in efforts beyond immediate crisis response, such as in managing the emergence of novel diseases or maintaining national resilience — both of which remain central to the country's biodefense strategy.[16]

This dual-use structure also extends to the broader biotechnology landscape, particularly within regulatory settings. Along with managing biodefense efforts and overall resilience efforts, those within public health systems also remain critical to biomedical innovation, including determining distribution criteria for novel medications, designing and conducting clinical trials, and pursuing after-market testing.[17] The United States is currently suffering from a shortage of clinical nurses trained to conduct research trials, with a ratio of one trained clinical research nurse for every 10 openings — an issue that is projected only to grow worse as the nursing labor pool declines.[18] This shortfall will also hamper other interagency efforts to promote U.S. biotech competitiveness, particularly as the Food and Drug Administration has sought to increase the number of early-stage drug trials in response to China's growing trial market.[19]

Moreover, as America's public health infrastructure plays an increasingly significant role in driving the mass adoption of cutting-edge technologies, such as vaccines based on mRNA platforms or health tools based on artificial intelligence, this shortage will also slow the rollout of private sector innovation and federally funded research efforts.[20]

Recommendations

The Department of Education should reconsider its approach to implementing changes to its student loan program mandated by the One Big Beautiful Bill Act. While the department has

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[15] "A New Era in Health Security," *Center for International and Strategic Studies*, July 11, 2025. (https://www.csis.org/analysis/new-era-health-security); Erin Banco, "'It is embarrassing': CDC struggles to track Covid cases as Omicron looms," *Politico*, December 20, 2021. (https://www.politico.com/news/2021/12/20/cdc-covid-omicron-delta-tracking-525621)

[16] Executive Office of the President, "National Biodefense Strategy and Implementation Plan for Countering Biological Threats, Enhancing Pandemic Preparedness, and Achieving Global Health Security," October 2022. (https://www.govinfo.gov/app/details/GOVPUB-PR-PURL-gpo214382)

[17] Bastian Rake, Magnus Gulbrandsen, Maureen McKelvey, and Fiona A. Miller, "Rethinking medical innovation: organizing R&D, responding to crisis, delivering health services," *Innovation: Organization & Management*, February 5, 2025. (https://www.tandfonline.com/doi/full/10.1080/14479338.2024.2446894)

[18] Stephanie A Freel, Denise C Snyder, Kara Bastarache, Carolynn Thomas Jones, Mark B Marchant, Laura A Rowley, Stephen A Sonstein, Karen M Lipworth, and Susan P Landis, "Now is the time to fix the clinical research workforce crisis," *Clinical Trials*, June 2, 2023. (https://pmc.ncbi.nlm.nih.gov/articles/PMC10504806)

[19] Annika Kim Constantino, "FDA chief warns U.S. is losing ground to China in early drug development, calls for faster trial approvals," *CNBC*, February 18, 2026. (https://www.cnbc.com/2026/02/18/fda-chief-warns-us-is-losing-ground-to-china-in-early-drug-trials.html)

[20] Muni Rubens, Venkataraghavan Ramamoorthy, Anshul Saxena, and Nancy Shehadeh, "Public Health in the Twenty-First Century: The Role of Advanced Technologies," *Frontiers in Public Health*, November 10, 2014. (https://pmc.ncbi.nlm.nih.gov/articles/PMC4226139)

sought to lower the price of higher education by introducing loan reform, its current efforts may produce several unintended consequences that leave the United States less prepared to handle a public health emergency.

- **Reclassify nurses, nurse practitioners, and physician assistants as "professional degrees" for the purpose of loan eligibility calculations.** The department should classify nurses, nurse practitioners, and physician assistants as having "professional degrees," allowing graduate students to borrow up to $50,000 per year or $200,000 over the course of their education. While the department has argued most of these professions require less costly degrees that fall under the proposed cap, these limits may hamper health care professionals from pursuing advanced training, inadvertently causing future workforce shortages.

- **Reconsider methodology for calculating graduate loan caps.** The department should reconsider its methodology for calculating annual caps for individual borrowers. As education costs continue to rise, the limits proposed by the department may either become obsolete or force borrowers to turn to the private market, hampering access to sufficient capital to further their education. This issue may particularly affect nursing, as average tuition costs have risen due to fewer students pursuing nursing, fewer experienced nurses who can offer training, and rising costs of living.[21]

- **Consider introducing targeted support programs for public health education.** The department should consider introducing targeted loan support or forgiveness programs for students that go into public health settings. These programs would support the next generation of the American public health workforce during a period of growing threats without the need to dramatically alter current student loan practices.

[21] Sarah Wood, "20 Years of Tuition Costs at National Universities," *U.S. News and World Report*, September 24, 2025. (https://www.usnews.com/education/best-colleges/paying-for-college/articles/see-20-years-of-tuition-growth-at-national-universities); Geoff Bennett and Karina Cuevas, "Proposal to Declassify Nursing as 'Professional' Threatens Ability to Secure Student Loans," *PBS News*, December 3, 2025. (https://www.pbs.org/newshour/show/proposal-to-declassify-nursing-as-professional-threatens-ability-to-secure-student-loans)

Conclusion

By strengthening student loan programs to prioritize public health, the Department of Education can bolster U.S. national security while supporting investment in the American health care sector. Thank you for considering our comments.

We look forward to seeing how our input is incorporated into the Department of Education's ongoing policy work.