Thematic Report on Chinese American Contributions: Public Health
Public Health

Public health is essential to human well-being, social wellness and national competitiveness. A healthy population not only sustains a nation's labor force but also has significant fiscal and economic implications. Given rapid population ageing (in the US and globally) and rising health security risks exemplified by the COVID-19 pandemic, public health is likely to become even more central to national interests.

A robust health system defines a nation's ability to provide accessible, affordable and quality healthcare to its people and withstand health risks. It is reliant on a variety of key elements including the healthcare workforce, pharmaceutical manufacturing and research capability, among others. Chinese American healthcare professionals, scientists and researchers have played a significant role in strengthening the US health system in various venues.
Overview

Chinese Americans play an important role in supporting public health across varied occupations and industries. As of 2018, more than 240,000—or one in ten—Chinese Americans in the workforce are employed in healthcare and health support occupations. The majority are healthcare practitioners (Figure 1), with outsized representation as optometrists, pharmacists, dentists, surgeons and physicians. Roughly one in 20 healthcare practitioners across these occupations is Chinese American.1

**FIGURE 1**  Chinese Americans working in healthcare and health support occupations, 2018

![Breakdown of healthcare practitioners](chart)

Sources: US Census Bureau, 2018 American Community Survey one-year estimates, public use microdata sample (PUMS); The Economist Intelligence Unit analysis.

In addition to providing healthcare services, Chinese Americans represent a major force in driving scientific research and developing medicine and technology. As of 2018, there are more than 16,000 Chinese American biological scientists, medical scientists and other life scientists—accounting for 7% of the workforce in these occupations in the US.3 More than 80% are active within the pharmaceutical industry, research and development (R&D), hospitals and healthcare services, and universities (Figure 2).4

**FIGURE 2**  Distribution of Chinese American life scientists by industry, 2018

![Distribution of Chinese American life scientists by industry](chart)

Sources: US Census Bureau, 2018 American Community Survey five-year estimates, PUMS; The Economist Intelligence Unit analysis.
Despite their notable contributions to American public health today, Chinese Americans across generations have had to battle against various legal barriers and racial bigotry. The Chinese Exclusion Act, passed in 1882, barred Chinese-born individuals from acquiring US citizenship until the Act’s repeal in 1943.\(^5\)\(^6\) This legislation was the result of a growing anti-Chinese sentiment in the US.

Whereas foreign-born doctors were once seen as welcome additions to American society, they were soon caught up in the xenophobic and racist immigration policies of the late 19th and early 20th centuries. By the mid-1920s, more than half of all states required US citizenship as a pre-requisite for acquiring medical licenses, which made it all but impossible for first-generation Chinese immigrants to acquire medical licenses under the Chinese Exclusion Act.\(^7\)\(^8\)

The loss to American society stemming from the exclusion of Chinese Americans from medical practice is exemplified by the story of Joseph Chak Thoms, the first western-trained Chinese physician to practice in the US. When Dr Thoms first attempted to open a medical clinic in Brooklyn in the 1890s, his immigration status presented a barrier. Born in China, Dr Thoms was ineligible for American citizenship, a requirement of the process of obtaining professional licenses in New York and many states. Although Dr Thoms was able to exploit a loophole in the law to practice, he was only permitted to treat Chinese patients.\(^9\)

As the case of Dr Thoms demonstrates, the Chinese Exclusion Act greatly limited Chinese Americans’ entry into healthcare professions until its repeal in 1943. Even though such discriminatory laws were eventually revoked, racial bias against Chinese Americans and minority health practitioners have endured, in the forms of mistrust, harassment and, at times, outright discrimination.

According to a survey conducted in 2017, 59% of US physicians surveyed had been victims of offensive comments regarding their race, ethnicity or gender.\(^10\) Asian American and Black American physicians were the most likely to experience discriminatory comments regarding their race, and Asian Americans were the most likely to report overhearing patients speak negatively about their ethnicity or national origin.\(^11\) Such bigotry has been exacerbated by the COVID-19 pandemic.\(^12\) Chinese and other Asian healthcare workers have reported repeat incidents of racial harassment, often stemming from the (obviously untrue) perception that Asians are more likely to carry the virus.\(^13\)\(^14\)

In the scientific and research domain, since the mid-20th century Chinese American scientists (including both first-generation immigrants and US-born citizens) have played an important role in researching emerging diseases and developing innovative medicines and treatments. Despite notable contributions to public health in the US, Chinese American scientists have faced persistent distrust of their loyalty to the nation. This is particularly evident in the recent actions by US intelligence agents against top scientists.
and researchers of Chinese descent, a practice that is widely perceived as misguided, unfair and discriminatory harassment of a talented group of individuals making vital contributions to health and well-being.\textsuperscript{15}

Medical breakthroughs and fighting epidemics

Over the last century, novel health risks—including the HIV/AIDS epidemic and the current COVID-19 pandemic—have emerged, raising new medical challenges. At the same time, humankind has greatly benefited from a number of scientific and technological breakthroughs that have significantly improved human well-being and saved millions of lives. The US has been at the global forefront of tackling these health challenges and developing solutions, partly owing to the contributions of a vast number of healthcare professionals and scientists, including Chinese Americans.

One of the major medical breakthroughs in the 20th century occurred in the field of reproductive science. In 1978, scientists successfully created the first “test-tube baby” through in vitro fertilization (IVF) of human eggs, a technological advance that would not have been possible without the pioneering work conducted by Min Chue Chang, a Chinese American biologist. In 1959, Dr Chang became one of the first to successfully produce healthy rabbits through IVF, a process that he would continue to refine in the move towards eventual human trials.\textsuperscript{16} Today, the IVF technology that Dr Chang helped to fine-tune has brought hope and joy to countless people unable to conceive naturally. More than 8m babies have been born via IVF globally since 1978, while in the US roughly 1-2% of new births every year are via IVF.\textsuperscript{17,18}

In addition to his accomplishments in IVF, Dr Chang also co-developed the first oral contraceptive pill, which provided countless people in the US and worldwide with control over their own reproductive health and well-being. In addition to treating a number of debilitating health conditions, the birth control pill allowed women to invest in their

“One in ten Chinese Americans in the workforce is employed in healthcare and health support occupations.”
education and careers without the threat of unplanned pregnancy, a development that had a tremendous impact on the sexual revolution of the 1960s and human society as a whole.\textsuperscript{19}

Another area of research that benefited immensely from the contributions of Chinese American scientists is the study and treatment of HIV/AIDS. The US reported its first HIV case in 1981,\textsuperscript{20} and in the following years the virus continued to infect more individuals and claim significantly more lives in the US. By 1995, HIV/AIDS was the leading cause of death among Americans aged 25-44.\textsuperscript{21} However, since its peak, HIV/AIDS has been contained in the US as a result of a number of key developments in science and medicine.

In the fight against the HIV/AIDS epidemic, several Chinese American researchers made remarkable contributions to containing the epidemic and safeguarding public health. In the mid-1990s David Ho, a leading Chinese American physician, developed an HIV treatment known as combination antiretroviral therapy, which involves a combination of drugs that work together to help to treat HIV.\textsuperscript{22} This treatment proved to be a turning point for the epidemic: Dr Ho's therapy transformed AIDS from a fatal disease into a treatable, non-life-threatening condition. Since its implementation in 1996, combination antiretroviral therapy has helped to significantly reduce HIV/AIDS mortality in the US and beyond.\textsuperscript{23} So far, more than 25 million people worldwide have benefited from the treatment.\textsuperscript{24}

Another Chinese American, Flossie Wong-Staal, a molecular biologist, also played a significant role in identifying the workings of HIV, understanding how the virus infects humans, cloning it for research purposes and establishing the foundation for its treatment paths.\textsuperscript{25}

The rapid spread of COVID-19 since the beginning of 2020 is the latest major healthcare challenge to mobilize scientists and medical workers across the globe. As the US works to slow the spread of the virus, Chinese American medical practitioners, together with their peers, are working on the frontlines to save the lives of their fellow citizens.

Outside of healthcare facilities, Chinese Americans have made contributions to the fight against COVID-19 in different forms, including the development of essential personal protective equipment (PPE). The N95 respirator, one of the most protective masks available, has been used by healthcare workers on the frontlines of the virus. Peter Tsai, a Chinese American material scientist, who invented the N95 mask in 1995, has come out of retirement to assist in developing methods to clean and reuse the masks and to scale up their production in order to protect healthcare workers and those in the community.\textsuperscript{26}

The world is facing growing health risks, driven by various factors including climate change and demographic shifts, among others. Chinese Americans will continue to play an important role in efforts to protect Americans from various diseases and develop life-changing advances in medicine and treatment.
Life sciences

Each significant advancement in medicine and healthcare treatment is built upon numerous ostensibly small breakthroughs achieved in the pure and applied sciences, particularly in the biology and biomedicine. Bioengineering—the application of engineering principles of design and analysis to biological systems and biomedical technologies—has also experienced rapid growth and development in recent decades, contributing to major technological advances in healthcare in the process. Chinese Americans constitute a major portion of workforce in all three of these fields.

According to 2018 figures, Chinese Americans account for 15% of biological scientists, medical scientists and life scientists working in the pharmaceutical and medicine manufacturing industry, as well as comprising 7% of those working in universities and scientific R&D services. Between 1999 and 2018, an estimated 3.5% of all research doctoral degrees granted in the fields of biological and biomedical sciences went to Chinese Americans. Chinese Americans also accounted for 7% of research doctorates granted in bioengineering and biomedical engineering notably greater than their representation in the population of 1.2%.

In addition to contributing greatly to the discipline of bioengineering today, Chinese American scientists played a central role in the discipline's founding and early development in the US. One of the earliest pioneers was Yuan-Cheng "Bert" Fung, widely regarded as a founding figure of bioengineering and a man dubbed "The Father of Modern
A distinguished scholar, Dr Fung established the Biomechanics Symposium in 1973 under the American Science of Mechanical Engineering, which later turned into the annual Summer Bioengineering Conference. He was also one of the principal founders of the *Journal of Biomechanics*. In recognition of his exceptional contributions to the field of bioengineering, Dr Fung, who died in 2019 at the age of 100, was awarded numerous honors during his lifetime, including the National Medal of Science in 2000.

Following in Dr Fung’s footsteps, two prominent Chinese American scientists, Shu Chien and Van C Mow, greatly advanced the discipline of bioengineering with their research and leadership. Dr Chien made tremendous contributions in cellular, molecular and cardiovascular bioengineering and related fields, while Mow’s major contributions were in orthopedic engineering. They both served as founding fellows of the American Institute of Medical and Biological Engineering, which aims to bring together academia, industry, government and scientific societies to advance medical and biological engineering. Both Dr Chien and Dr Mow have also been active in promoting bioengineering education: Dr Chien helped to found the Department of Bioengineering at University of California, San Diego in 1994, and Dr Mow served as the founding chair of the Department of Biomedical Engineering at Columbia University from 2000 to 2011.

Despite the significant contributions that Chinese American scientists have made in advancing life sciences and supporting public health in the US, they face an ever-increasing risk of racial profiling in recent years from the public, their peers and, perhaps unexpectedly, the US government. Since August 2018, the National Institutes of Health
Public Health

(NIH) has sent nearly 190 letters to more than 80 US institutions about individual scientists that it believes have broken NIH rules, demanding full disclosure of all sources of research funding.\(^{36}\) The NIH’s request has reportedly targeted scientists who are ethnically Chinese: 82% of all scientists investigated were of Asian ancestry.\(^{37,38}\)

Although the NIH maintains that its concern about Chinese state involvement in intellectual property theft is legitimate, multiple cases have emerged in the past decade where Chinese scientists, including biologists, were unjustly targeted and accused of stealing trade secrets.\(^{39}\) For example, in 2013, two Chinese American biologists who were employed with the pharmaceutical giant Eli Lilly, Guoqing Cao and Shuyu “Dan” Li, were arrested, jailed and later placed on house arrest for allegedly stealing trade secrets and giving them to a pharmaceutical company in China. However, in 2014, the US Attorney completely dismissed the charges, stating that the two biologists were unfairly targeted and arrested.\(^{40}\)

Not only does such targeting impede the ability of Chinese American scientists to conduct their essential research, as evident in the Eli Lilly case, but the difficulties and poor optics created by such investigations has caused several institutions to cut ties with or fire scientists who have been targeted,\(^{41}\) causing concern and backlash not only within the Chinese American community but also among the broader US life sciences community. In October 2019 a group of almost 150 leading figures in US academic and industrial biomedical research and drug development signed an open letter expressing their concern that recent actions by government agencies and universities with respect to Chinese scientists, including “summarily dismissing” them from university positions, could create “a climate of fear and uncertainty” in the US biomedical community and ultimately “threaten US leadership in biomedical science.”\(^{42}\)

**Contributing to community-based healthcare services**

Chinese Americans’ contribution to American public health and well-being is by no means limited to hospitals and clinics, laboratories and research institutions. Today, many Chinese American healthcare professionals, alongside their peers, have focused on serving community members, particularly those who are vulnerable to social exclusion, such as low-income individuals and older adults.

Albert CM Wong, who began his career as a pharmacist, founded the New Oakland Pharmacy in 1984 to provide affordable, accessible medication to Oakland’s growing population. A long-time champion for the medically underserved community, Mr Wong has dedicated his career to serving low-income limited-English-speaking communities through pharmaceutical services, as well as working to ensure that immigrants and community members have the opportunity to pursue and sustain healthy lives.
In addition to providing vital medical services, Mr Wong and his staff have established an electronic bill-payment program for immigrant and older adults and host events that provide older adults with free lunches. Because of his deep commitment to community healthcare, Mr Wong’s influence has gone beyond the local community. Since 2012, he has twice been appointed to the California State Board of Pharmacy by the state governor, advising the organization to better protect and promote the health and safety of Californians by seeking ways to assure high-quality pharmacist care and appropriate use of pharmaceuticals.

Another prominent example is Jennie Chin Hansen, a trained nurse who has dedicated most of her life to serving older adults and advocating for their interests. Until her retirement as an executive director in 2005, she had spent 25 years working at On Lok, a nonprofit family of organizations providing community-based services to 6,000 older adults in San Francisco. The model of On Lok worked so well that it became the prototype for the Program of All-Inclusive Care for the Elderly (PACE), a Medicare/Medicaid program that was signed into legislation in 1997. Later, Ms Chin Hansen served as CEO of the American Geriatrics Society between 2010 and 2015, where she led a group of nearly 6,000 health professionals devoted to improving the health, independence and quality of life of all older people.

Both Mr Wong and Ms Chin Hansen are representative of many more Chinese American healthcare professionals, who are committed to building inclusive communities and ensuring all Americans have access to healthcare when needed.

Conclusion

Given rising health security risks and rapid demographic shifts, a robust public health system is becoming increasingly crucial to ensuring the overall wellness of Americans and safeguarding the sustainability of the long-term prosperity of US society. With their outsized representation in healthcare practices and scientific research, Chinese Americans are well positioned to help protect Americans from various diseases, support a healthier population and labor force, and generally improve wellness.
1 US Census Bureau, 2018 American Community Survey 1-year estimates, public use microdata sample (PUMS); The Economist Intelligence Unit analysis.

2 Health support occupations include home health and personal care aides, nursing assistants, and occupational therapy and physical therapist assistants and aides, among others. Healthcare technologists and technicians include clinical laboratory technologist and technicians, magnetic resonance imaging technologists, and radiologic technologists and technicians, among others.

3 US Census Bureau, 2018 American Community Survey 1-year estimates, PUMS; The Economist Intelligence Unit analysis.

4 US Census Bureau, 2018 American Community Survey 5-year estimates, PUMS; The Economist Intelligence Unit analysis.


9 Seligman, “Joseph Thoms: Defending America’s Chinese.”


11 Tedeschi, “6 in 10 Doctors Report Abusive Remarks from Patients, and Many Get Little Help Coping with the Wrongs.”

12 The anti-Asian sentiment around COVID-19 has its roots in the long history of American discrimination against Chinese and other Asian immigrants. The association between disease and immigrants was used as a catalyst for immigration restrictions on New York City’s Ellis Island in the 1920s. Many Chinese immigrants were quarantined and given invasive medical examinations and interrogations at the facility without their consent or actual evidence of disease. Public health authorities, in turn, misrepresented Asians as diseased carriers of incurable afflictions, like smallpox and bubonic plague, as a means to justify anti-immigration policy and to drum up hysteria against Asian immigrants, who were perceived as a threat to white Americans for jobs. (Source: Ivan Natividad, "Coronavirus: Fear of Asians Rooted in Long American History of Prejudicial Policies," Berkeley News, February 12, 2020, https://news.berkeley.edu/2020/02/12/coronavirus-fear-of-asians-rooted-in-long-american-history-of-prejudicial-policies/)


23 “David D. Ho, M.D."

24 Interview with David D. Ho.


27 US Census Bureau, 2018 American Community Survey 5-year estimates, PUMS; The Economist Intelligence Unit analysis.

28 Survey of Earned Doctorates, National Center for Science and Engineering Statistics, The Economist Intelligence Unit analysis. Data includes both citizens and permanent residents.

42 Holtzman et al., “Chinese Scientists and US Leadership in the Life Sciences.”