

4 The Language of Policy-Making Research and Advocacy through Health Demonstrations

The reduction of the death rate is the principal statistical expression and index of human and social progress. It means the saving and lengthening of the lives of thousands of citizens, the extension of the vigorous working period well into old age, and the prevention of inefficiency, misery and suffering. These advances can be made by organized social effort. Public health is purchasable.¹

The above passage is excerpted from an editorial in the *Monthly Bulletin of the Department of Health of the City of New York*, published in July 1911. The author of the editorial (presumably Hermann Biggs, the department's general medical officer)² calls for an organized effort to improve public health and asserts that the death rate could serve as the index of that improvement. As part of his effort to increase the budget for health within the department, Biggs coined one of the most famous adages in public health policy: "Public health is purchasable."³

This chapter traces how Biggs' motto was put into practice, from New York State to China in the interwar years. In particular, it justified the incorporation of vital and health statistics into budget calculations in order to rationalize public health programs. To show that health was

¹ Department of Health, "Monthly Bulletin of the Department of Health of the City of New York," October 1911 (New York: The Department of Health 1911), 226, <https://babel.hathitrust.org/cgi/pt?id=hvd.32044103093621;view=1up;seq=93>.

² The phrase "health is purchasable" is commonly attributed to Hermann Biggs. Nevertheless, the text that I read bore no trace of the author of the editorial.

³ The famous phrase has had enduring appeal. It has often been cited by public health experts from the time it was written to today. As recorded in the Milbank Memorial Fund archives, the phrase "health is purchasable" was widely quoted in various speeches from the 1910s to the 1940s. C. E. A. Winslow used it in his speech entitled "The Economic Values of Preventive Medicine," given to the WHO's Fifth World Health Assembly Technical Discussion in 1952. And public health publications of all sorts continue to use it in their introductions (C. E. A. Winslow and Gunnar Myrdal, "The Economic Values of Preventive Medicine [Fifth World Health Assembly Technical Discussion]," Geneva: WHO, 1952. apps.who.int/iris/handle/10665/101988.)

“purchasable,” Biggs persuaded the Milbank Memorial Fund to establish public health demonstrations in New York State: these were demarcated zones where a range of health services were implemented and their impact measured. The demonstrations included statistical collection and budget reporting, with the aim of proving not only that health was purchasable, but that investing in health was economically advantageous for local authorities. The demonstrations were therefore more than just a test-run for health services: they were small-scale health systems in which policies were integrated into a system whose financing and health outcomes were quantified and measured, as research by Martin Gorsky and Christopher Sirrs has defined.⁴ The episodes related in this chapter can be considered early prototypes of the type of health system metrics that Gorsky and Sirrs describe.⁵ I expand on their research by showing how the Milbank health demonstrations were transplanted to rural China, first by the Chinese National Association of the Mass Education Movement (MEM), and later emulated by the central government of the Republic of China in its public health research institute.

Drawing on archives from three continents, this chapter reveals the interwar transnational connections in the use of statistics in health system policy-making, both in terms of individual initiatives and the connection between them; these had previously sunk into historical obscurity.⁶

⁴ Gorsky and Sirrs use the term “health system” to refer to a comprehensive structure in which all health-related items – including services, financing, and outcomes – are interconnected (Gorsky and Sirrs, “World Health by Place,” 362–3.).

⁵ The authors mention the United States Committee on the Costs of Medical Care (CCMC) as one of the potential forerunners of health system metrics (*ibid.*). Notably, the CCMC and the New York State demonstrations had several key actors in common, including Edgar Sydenstricker and the Milbank Memorial Fund itself.

⁶ For accounts of the Milbank demonstrations, see, e.g.: Elizabeth Toon, “Selling the Public on Public Health: The Commonwealth and Milbank Health Demonstrations and the Meaning of Community Health Education,” in *Philanthropic Foundations: New Scholarship, New Possibilities*, ed. Ellen Condliffe Lagemann (Bloomington and Indianapolis, IN: Indiana University Press, 1999), 119–30; Daniel M. Fox, “The Significance of the Milbank Memorial Fund for Policy: An Assessment at its Centennial,” *The Milbank Quarterly* 84, no. 1 (2006): 5–36. Some rare exceptions on the Chinese end were: Iris Borowy, “Thinking Big – League of Nations Efforts Towards a Reformed National Health System in China,” in *Uneasy Encounters: The Politics of Medicine and Health in China 1900–1937*, ed. Iris Borowy (Frankfurt am Main: Peter Lang, 2009), 205–28; Yi-Tang Lin, “Waiguo weisheng zuzhi yu Minguo huangjin shinian de gonggong weisheng shiyan: Dingxian xiangcun baojian xi tong yu zhongyang weisheng sheshi shiyan chu de Jiangning shiyanxian (1928–1937)” [“Foreign Health Organizations and Public Health Experiments during the Nanjing Decade: Ting Hsien Rural Health Experiment System and the Central Field Health Station’s Jiangning County Experiment (1928–1937)”], *Yiliao shehuishi yanjiu [Journal of Social History of Medicine]* 3, no. 1 (2017a): 156–75.

I detail the implementation and appropriation of the health demonstration method in New York State, Ding Xian (or Ding County, historically known as Ting Hsien), and eventually other places in China, under the auspices of the Central Field Health Station (CFHS) – the research institute of the Chinese national health system – in collaboration with the League of Nations Health Organization (LNHO).

In the circuit of transference of health demonstrations and related statistical practices, experts who had been trained at the public health schools discussed in Chapter 2, and the LNHO officers introduced in Chapter 3, again took center stage. When LNHO statistician Edgar Sydenstricker returned to the United States from Geneva in 1924, he contributed statistical work to all three Milbank demonstrations and later used his Chinese connection to transplant Milbank's methods to the MEM's rural reconstruction program in Ding Xian, some 200 kilometers southwest of Beijing. Alumni of the Peking Union Medical College were eventually put in charge of reporting statistics from Ding Xian to their funding organizations in New York – first Milbank, and later the Rockefeller Foundation.

In both New York State and Ding Xian, public health staff working at different levels collected and communicated statistics to their partners and funding organizations. Both groups encountered similar difficulties and opted for comparable strategies when promoting their programs using statistics. There were discrepancies in both places as to whether such programs should be considered laboratories or demonstrations. The programs' founders first framed them as laboratories, since they were designed to test and tailor a financially feasible public health service for wider application; statistical reporting and budgeting were therefore at the core of the programs. Nevertheless, in both New York and Ding Xian, authoritative experts played salient advocacy roles while the numbers were still insufficient to make a strong case. Although a statistical collection system was considered indispensable when designing demonstrations, it was not indispensable for policy advocacy. In that regard, expert authority still held considerable sway. Experts from both programs were not ignorant users of statistics but were able to decide the extent to which they used statistics when advocating for their preferred policies. When the numbers did not support what their knowledge of public health work made them consider to be true, experts instead used their field knowledge to promote the demonstrations.

The final section of this chapter focuses on the CFHS and its demonstration areas. By collecting numbers, the CFHS generated an extensive array of quantified knowledge on public health, from chemical composition in nutrition to the cost of public health administration in

impoverished regions. And, yet again, CFHS officers wielded the authority to decide if the numbers collected in their demonstrations were applicable to real-world situations.

“Health is Purchasable”: The Background of the Milbank Demonstrations

When Albert Milbank took the helm of the 16-year-old Memorial Fund from his cousin in 1921, the organization was a purely grant-giving one, having contributed \$2 million between 1905 and 1921 to other associations working in aid relief, public health, and education.⁷ Albert Milbank was more ambitious, adding his family name to the foundation’s title and appointing John Kingsbury to be its first full-time chief executive.⁸

Kingsbury was part of an inner circle of American progressive reformers. He was the director of the Association for Improving the Condition of the Poor and was associated with the Charity Association Society, the American Association for Labor Legislation and *Russell’s Survey* magazine.⁹ When he started at the Milbank Memorial Fund, Kingsbury brought with him both the core concerns and campaign methods of his previous work, namely: the impact of medical costs on wage-earners’ family finances and advocacy that used statistical data to promote the need for compulsory health insurance.¹⁰ Under Kingsbury’s directorship, the Milbank Memorial Fund became a pioneer in the use of vital and health statistical analysis (including the enumeration of births, deaths, and disease cases, and the cost of health services) as a means of evaluating the public health programs it funded. Unlike its contemporaries during the 1920s – the Rockefeller Foundation, the biostatistics department of the Johns Hopkins School of Public Health, and the LNHO – all of which analyzed vital and health statistics to observe the evolution of a specific epidemic or to research the efficacy of a public health technology (such as vaccines),¹¹ the Milbank Memorial Fund was among the first to focus on studying the costs of health and to research the complex social environment in which community health administrations had been operating since the early 1920s. It was not until the Great Depression that the Fund’s contemporaries likewise shifted focus partly to community health.

⁷ Milbank Memorial Fund, “Twenty-Five Years of Philanthropy,” 1930, 1–2, IV/32/2 Historical records, twenty-fifth anniversary: charts and tables, Milbank Memorial Fund Archives, University of Yale.

⁸ Fox, “The Significance of the Milbank Memorial Fund for Policy,” 6.

⁹ Hoffman, *The Wages of Sickness*, 35–6.

¹⁰ *Ibid.*, 39–41.

¹¹ See Chapters 2 and 3 for statistical practices of the International Health Board and the LNHO.

Milbank and Kingsbury drew inspiration from the health demonstration in Framingham, Massachusetts, which was co-sponsored by the Fund and the Metropolitan Life Insurance Company.¹² Metropolitan Insurance’s statistician, Dr. Lee K. Frankel, set up the Framingham demonstration in 1917, probably with an eye to designing health insurance policies, with support from the National Tuberculosis Association. The goal was to determine the possibility of lowering the number of tuberculosis cases through organized public health campaigns.¹³ The Framingham demonstration was successful in delivering favorable statistics, as the tuberculosis death rate in the district declined from 121 cases per 100,000 inhabitants in 1909 to only 38 per 100,000 in 1916.¹⁴

Framingham’s success laid the foundation for New York State Commissioner of Health Hermann Biggs to develop a comprehensive public health administration that would decrease the death rate not only from tuberculosis but from all causes. Biggs was a firm believer in the significant role of economic investment in improving health conditions. He contended that, as the tuberculosis mortality rate was declining both within and outside the United States, it would be difficult to achieve a result that could justify such expenditure based on tuberculosis case rates alone. Speaking in front of the Milbank Memorial Fund’s advisory council, Biggs put the issue in financial terms:

[I]t is quite evident, I think, that we would not think of going into a community of 100,000 and spending \$100,000 or \$125,000 or \$150,000 a year to reduce deaths from tuberculosis which amounted to only 75 or 100 a year; it is quite evident on the face of it that there is no reason to assume that in four or five years we could accomplish anything which would justify the expenditure of such sums as this.¹⁵

Biggs further added that a general health demonstration would help to determine the cost of sound public health administration in rural areas.¹⁶

¹² Armstrong, “The Framingham Health Tuberculosis Demonstration,” 319.

¹³ Michael E. Teller, *The Tuberculosis Movement: A Public Health Campaign in the Progressive Era*, Contributions in Medical Studies 22 (New York: Greenwood Press, 1988), 124. The Framingham demonstration included four major initiatives: i) X-ray screening for tuberculosis cases; ii) hospitals for conducting surveillance and managing tuberculosis patients; iii) visits by public health workers to schools and factories to examine sanitary conditions; and iv) community health education (John A. Kingsbury, “The Effect of the Anti-Tuberculosis Campaign,” *The World’s Health Monthly Review of the League of Red Cross Society* 6, no. 2 (1925): 63–70). The article is found in II/24/10 Kingsbury, John A. Speeches/ 1898–1925, Milbank Memorial Fund Archives, University of Yale.

¹⁴ Teller, *The Tuberculosis Movement*, 124.

¹⁵ Milbank Memorial Fund, “Minutes of Meeting of the Milbank Memorial Fund Advisory Council,” November 16, 1922, 6, I/1/1 advisory council: minutes, proceedings and guests list, 1922 nov 16, Milbank Memorial Fund Archives, University of Yale.

¹⁶ *Ibid.*, 5–7.

His unspoken motivation was his pursuit of financial support for public health work. As the State Commissioner of Health Biggs was constantly troubled by the government's lack of financial support for health.¹⁷ In 1920, his call for the creation of mobile units that would bring consultation services to rural parts of the state was turned down by the state legislature, which drove him to seek support from the Milbank Memorial Fund.¹⁸

In response to Biggs' appeal, the Fund launched health demonstrations in three areas in New York State.¹⁹ The official principle of the demonstrations was to invest \$2 million over five years to determine an appropriate means of advancing disease prevention and health conservation.²⁰ Kingsbury's speech during the Fund's fourth annual meeting in 1923 sheds light on the Fund's motivation for embarking on the health demonstration project:

If I were asked to indicate how this demonstration may be distinguished from others, I should be inclined to say by its *universality*. It deals with larger groups of population than other demonstrations, the character of the population is more varied. It has a greater diversity of population and environmental conditions. ... [T]hey deal with health not in its narrowest sense, but rather in its *broadest* social setting and social implication. The demonstration of the Milbank Fund may be called efforts at social control of physical and mental welfare.²¹

Although neither Biggs nor Kingsbury mentioned it explicitly, the capacity of statistics to aggregate different aspects under a single scale was key to realizing Biggs' goal of determining the financial needs for health,²² as well as to Kingsbury's universalist vision that sought to comprehend health in its environment. By quantifying health status and social conditions and calculating them in terms of budget numbers, the Milbank demonstrations would be able to showcase a community health policy that was transferrable to other communities. It is thus unsurprising that statistics were at the center of discussions from day one of the demonstrations.

¹⁷ Ibid.

¹⁸ John M. Eyler, *Sir Arthur Newsholme and State Medicine, 1885–1935* (Cambridge: Cambridge University Press, 1997), 358.

¹⁹ The fund selected three districts – Cattaraugus County, the City of Syracuse, and Bellevue-Yorkville – to serve as laboratories of public health administration in a rural county, an industrial city, and a metropolitan area, respectively.

²⁰ Milbank Memorial Fund, "Minutes of Meeting of the Milbank Memorial Fund Advisory Council," 5–7.

²¹ Emphasis mine. John A. Kingsbury, "Progress in the Health Demonstration of the Milbank Memorial Fund," May 17, 1923, II/24/10 Kingsbury, John A. Speeches/1898–1925, Milbank Memorial Fund Archives, University of Yale.

²² Espeland and Stevens, "A Sociology of Quantification," 408.

Demonstrations or Laboratories?

The Milbank demonstrations were closely based on that in Framingham but attempted to correct one of the latter's flaws: a lack of statistical significance in its results. Although the tuberculosis mortality rate dropped over the course of the Framingham demonstration, Kingsbury informed the Fund's advisory committee that the small number of beneficiaries made it impossible to prove that it was the demonstration that had reduced the tuberculosis mortality rate.²³ Without explicitly citing him, Kingsbury was implicitly referring to the concept of statistical significance that originated in Karl Pearson's mathematical statistics. Pearson argued that, based on probability theory, any difference observed in a sampled population could be due to a sampling error. To determine if such a difference was "factual," he developed the chi-squared test method of statistical hypothesis testing.

The designers of the Milbank Fund's health demonstrations therefore selected areas with no fewer than 75,000 inhabitants, so that each was at least four times the size of Framingham.²⁴ The total population covered by the three demonstrations added up to half a million.²⁵ Site selection was critical, since the core principle of the demonstrations was to produce statistically significant results. The advisory committee eliminated nine potential test areas either because their populations were too small, their tuberculosis cases too few, or because hospitals were lacking.²⁶ Eventually, the committee selected Cattaraugus County as the rural health demonstration site. The tuberculosis mortality rate there had been more or less flat over the past ten years, which made it ideal for proving the effectiveness of the action undertaken. The population size was also ideal: large enough for achieving statistical significance without being too large for the available budget.²⁷

Despite the supposed focus on statistical significance and determining the cost of public health administration, in its first two years, the Cattaraugus demonstration served merely to collect basic vital information

²³ John A. Kingsbury, "Executive Session Advisory Council of the Milbank Memorial Fund," March 13, 1929, 2, II/24/13 Kingsbury, John A. Speeches, 1928–1932, Milbank Memorial Fund Archives, University of Yale.

²⁴ Kingsbury, "The Effect of the Anti-Tuberculosis Campaign," 69–70.

²⁵ John A. Kingsbury, "Demonstrations and Official Agencies: An Address on the Upbuilding of Official Agencies in the Tuberculosis Campaign," June 22, 1923, 7, II/24/10 Kingsbury, John A. Speeches/ 1898–1925, Milbank Memorial Fund Archives, University of Yale.

²⁶ Milbank Memorial Fund, "Minutes of Meeting of the Milbank Memorial Fund Advisory Council," 10.

²⁷ *Ibid.*, 11.

without any statistical research being conducted. When the demonstration was launched in 1923, statistics collection was placed under the responsibility of the tuberculosis bureau. It was not until the end of 1924 that the advisory committee recruited a full-time statistician to compile statistical data.²⁸ Prior to that, the Milbank Memorial Fund had relied on Otto R. Eichel, the head statistician at the New York State health department and an LNHO statistical veteran, to organize statistics collection at the demonstration sites.

Eichel subsequently called for all vital statistics collection to be put under the responsibility of a single director who would collaborate with the health department and the demonstration staff.²⁹ The recruitment process is a striking example of statisticians' low level of professionalization at the time.³⁰ Though the advisory committee agreed to hire a statistician, that did not mean a statistician with research skills; they saw the job as being one for a secretary familiar with bookkeeping techniques. They even proposed hiring someone who would split their time, working as both a secretary and a statistician. The Fund eventually hired a woman referred to in the minutes simply as "Miss Whitney" to compile vital records collected from the local authorities.³¹ Although her job title was "statistician," Whitney's work was very close to bookkeeping, as she was also put in charge of correcting and arranging disease case files by age group.³²

In 1926, Kingsbury delivered a speech at a health education conference that provided insights into how he navigated this fundamental discrepancy in the health demonstrations: they had been promoted as laboratories for determining the cost of public health services, but their statistical practices were only loosely organized. In his speech, Kingsbury explained that he preferred not to provide any statistics rather than give out faulty numbers. He stopped claiming that the Milbank

²⁸ C. E. A. Winslow, *Health on the Farm and in the Village: A Review and Evaluation of the Cattaraugus County Health Demonstration* (New York: The Macmillan Company, 1931), 2.

²⁹ Milbank Memorial Fund, "Minutes of Meeting of the Milbank Memorial Fund Advisory Council," 38.

³⁰ See, e.g.: Delphine Gardey, *Écrire, calculer, classer: comment une révolution de papier a transformé les sociétés contemporaines, 1800–1940* (Paris: Éd. La Découverte, 2008).

³¹ Milbank Memorial Fund, "Memorandum of Matters Taken Up at a Meeting Between Dr. Williams, Mr. Folks, and Mr. Kingsbury at One O'clock on Monday, November 3, 1924, At Fraunces," November 3, 1924, 1, I/10/75 Technical Board minutes books 1924, Milbank Memorial Fund Archives, University of Yale.

³² Milbank Memorial Fund, "Minutes of the Meeting of the Technical Board of the Milbank Memorial Fund," June 16, 1927, 398, I/10/77 Technical Board minutes books 1–4, pp. 303–636, 1926–1928, Milbank Memorial Fund Archives, University of Yale.

demonstrations were laboratories and instead referred to them as “demonstrations” in the true sense of the word, in that they served to illustrate the effectiveness of public health administration to county governments. He contended that, as the Fund had designed its demonstrations based on the Framingham demonstration, it was already certain that they were effective in reducing disease and death rates; their main purpose was actually to inspire similar policies in other places.³³ Indeed, probably thanks to Kingsbury’s speeches and articles published in the *Milbank Quarterly Bulletin* – which had readers throughout the world – 266 public health workers came to visit the Cattaraugus demonstration in 1929. Among the visitors, 217 were from the United States, while forty-nine came from other twenty-one countries, including Australia, Siam, Spain, China, and Japan, to name a few.³⁴

Biggs’ successor as New York State Commissioner of Health, Matthias Nicoll, Jr., held the same view that the function of the demonstrations was not to determine a model through trial and error but to serve as a showcase of public health administration. As Nicoll observed:

The statistics don’t demonstrate. ... It does not have any effect at all when it comes to a consideration of what it means to the average man in taxes, and until we demonstrate to that man that he is going to get benefit from these things to himself, not to his community or city so much, I think he is going to look on the tax bill and take his chance on death.³⁵

Nicoll thus understood the importance of demonstrating the concrete benefit of a public health system to his constituents.

Kingsbury’s change in discourse and Nicoll’s testimony reveal that the Milbank demonstrations were driven by two contradictory rationales: one laboratorial and one demonstrative. The first was aimed at scientific discovery; the second valued political impact. At the discursive level, Kingsbury and Biggs stood firmly behind the former stance at first, describing health demonstrations as laboratories for determining financially feasible public health administrations. However, when

³³ John A. Kingsbury, “Fostering a Wider Application by Other Communities of the Methods and Practices Developed in the New York Health Demonstrations,” April 9, 1926, 6, II/24/10 Kingsbury, John A. Speeches/1898–1925, Milbank Memorial Fund Archives, University of Yale.

³⁴ The twenty-one countries are Australia, Austria, Bulgaria, Canada, Ceylon, China, Denmark, England, France, Holland, Hungary, India, Italy, Japan, Jugo-Slavia, Mexico, Norway, Poland, Serbia, Siam and Spain. (Milbank Memorial Fund, “The Minutes of the Technical Board,” February 14, 1929, 646, I/11/78 Technical Board minutes books 1–4, pp. 637–908, 1929–1931, Milbank Memorial Fund Archives, University of Yale.)

³⁵ Milbank Memorial Fund, “Verbatim Report of Speeches at Dinner Meeting of Advisory Council of the Milbank Memorial Fund,” November 20, 1924, 26, I/1/5 Advisory council: dinner meeting transcripts extracts 1924 nov 20, Milbank Memorial Fund Archives, University of Yale.

statistical data remained insufficient over the first five years of the demonstrations, Kingsbury, as well as Nicoll, shifted to publicizing the demonstrations as awareness-raising tools for local authorities and residents. Despite this change in public discourse, in private Kingsbury did not abandon his belief in statistical analysis, and hired former LNHO statistician Edgar Sydenstricker first to tackle statistical analysis for the demonstrations and later to lead the Fund's research activities.

Health Demonstrations as Social Experiments

The situation changed when the Milbank Memorial Fund partnered with Edgar Sydenstricker – at that time still a statistician with the USPHS – to analyze the statistical data produced by the health demonstrations. Sydenstricker was rigorous about using statistical analysis to support his arguments. He made the demonstrations' scientific value a priority over efforts to increase their political visibility.³⁶

Sydenstricker aspired to transform social experiments into a fully-fledged branch of science. Blaming the scientific community's aversion to them on a lack of scientific rigor in such experiments, he strove to apply strict statistical methodology when analyzing social experiments himself. He embraced the idea that through meticulous statistical practices, the Milbank Fund's demonstrations could contribute to advancing the science of public health, writing:

Science too long has been ignorant in the field of social experiments, not because it can learn nothing, but because of a reluctance to regard the evaluation of the results of such experiments as essentially a part of the experimental method. In other words, we have not gone about the task in a scientific way.³⁷

Sydenstricker thought principles drawn from laboratory experiments should be applied to the health demonstrations and presented various

³⁶ Sydenstricker was also concerned about the rapid rise in health care costs in the United States; he was one of the fourteen founding members of the CCMC, and also the person who brought the Milbank Memorial Fund's attention to the CCMC in the first place. Likely considering that it was the CCMC's responsibility, not the Fund's, to gather information about health care costs, Sydenstricker separated the Milbank health demonstrations from related policy campaigns and focused his statistical analysis on each public health action implemented in the demonstrations (Jonathan Engel, *Doctors and Reformers: Discussion and Debate over Health Policy, 1925–1950*, Social Problems and Social Issues [Columbia, SC: University of South Carolina Press, 2002], 21–2).

³⁷ Edgar Sydenstricker, "The Statistical Evaluation of the Results of Social Experiments in Public Health," *Journal of the American Statistical Association* 23, no. 161 (1928a): 156.

means of achieving that goal. According to Sydenstricker, a demonstration could not be regarded as a single experiment but as a group of experiments, and the results of each public health action should be measured separately.³⁸ He also suggested setting up control groups, either by measuring outcomes in other areas with similar populations and socio-economic conditions, or in the demonstration areas after a certain time interval had passed.³⁹

Sydenstricker's conviction that social experiments should follow a laboratorial model explains why he was reluctant to use existing statistics from the health demonstrations when he first began to work with the Milbank Memorial Fund. He did not consider bookkeeping to be scientific and disparaged Eichel and Whitney's work, contending that the Fund should have included a statistical service within its demonstrations from the outset.⁴⁰ On several occasions, Sydenstricker contended that more time was needed for the Cattaraugus demonstration to accumulate statistical data and obtain demonstrable results. During a technical board meeting in 1929, six years after the health demonstrations began, Sydenstricker insisted that he still did not think it was possible to make an appraisal from a statistical point of view and that such an appraisal could only be made after several years.⁴¹ He stood firm on his principle of setting up control groups and insisted that the decreasing mortality rate did not prove the efficacy of the demonstrations in and of itself but was merely reference data that needed to be compared against future years.⁴²

Despite Sydenstricker's reservations, the Fund's advisory committee was impatient to obtain an expert endorsement that would confirm the demonstrations' achievements. And so, just as Kingsbury had promoted their demonstrative value while statistics were still being collected, the Fund looked to another authority to validate its demonstrations – an established public health researcher. In 1929, the Fund paid

³⁸ Edgar Sydenstricker, "The Measurement of Results of Public Health Work: An Introductory Discussion," in *The Challenge of Facts: Selected Public Health Papers of Edgar Sydenstricker*, ed. Richard V. Kasius (New York: Prodist, 1974), 47–8.

³⁹ *Ibid.*, 53.

⁴⁰ Milbank Memorial Fund, "Minutes of the Meeting of the Technical Board of the Milbank Memorial Fund," December 18, 1930, 822, I/10/78 Technical Board minutes books 1–4, pp. 637–908, 1929–1931, Milbank Memorial Fund Archives, University of Yale.

⁴¹ Milbank Memorial Fund, "Minutes of the Meeting of the Technical Board of the Milbank Memorial Fund," May 28, 1929, 691, I/10/78 Technical Board minutes books 1–4, pp. 637–908, 1929–1931, Milbank Memorial Fund Archives, University of Yale.

⁴² Milbank Memorial Fund, "Minutes of the Meeting of the Technical Board of the Milbank Memorial Fund," June 16, 1927, 397–8.

Charles-Edward A. Winslow, a distinguished professor and the founder of Yale University's department of public health, to conduct research on the three demonstrations.⁴³ Winslow accepted, though he stated openly that his research would be nothing more than a historical study that sought to make "an administrative, social appraisal of the undertaking."⁴⁴ Two years later, Winslow published a 400-page monograph on the Cattaraugus County demonstration that presented in detail its principles, programs, and budget. In the monograph, Winslow defended the substantial expansion of the demonstration's budget, which had been considered inappropriate given that financial feasibility was one of the demonstration's priorities. Winslow, however, decided that the high cost of the demonstration was standard for a rural health program, and that it showed that increased funding for rural health should be a top priority in public health work.⁴⁵ With an expert as distinguished as Winslow as its author, the monograph was an ideal piece of advertising for the Cattaraugus demonstration.

Sydenstricker eventually used Pearson's chi-squared test to demonstrate that the decline in the mortality rate in Cattaraugus County between 1925 and 1927 was not a mere sampling error. Applying the principle of control groups, Sydenstricker compared Cattaraugus' 1925–1927 data with data from three other counties with populations of roughly 50,000 that had set up tuberculosis sanatoria between 1900 and 1927; he also compared Cattaraugus' 1925–1927 data with its tuberculosis mortality rate between 1900 and 1922.⁴⁶ All statistical tests indicated that the drop in Cattaraugus' tuberculosis mortality rate during the demonstration (compared to the control groups) was statistically significant.⁴⁷ The Fund's demonstrations had finally obtained the type of results that Kingsbury had hoped for in 1922.

Kingsbury attached great value to Sydenstricker's dedication to statistics, likely more than he valued health demonstrations. In 1928, Kingsbury announced that the Fund would gradually withdraw from health demonstrations to concentrate on projects "which might have more

⁴³ Winslow originally asked for \$25,000, which the Fund sought to reduce to \$20,000. It is unclear how much the Fund eventually paid (Milbank Memorial Fund, "Minutes of the Meeting of the Technical Board of the Milbank Memorial Fund," October 7, 1929, 707–10, 1/10/78 Technical Board minutes books 1–4, pp. 637–908, 1929–1931, Milbank Memorial Fund Archives, University of Yale).

⁴⁴ *Ibid.*, 708.

⁴⁵ Winslow, *Health on the Farm and in the Village*, 231.

⁴⁶ Edgar Sydenstricker, "The Decline in the Tuberculosis Death Rate in Cattaraugus County," in *The Challenge of Facts: Selected Public Health Papers of Edgar Sydenstricker*, ed. Richard V. Kasius (New York: Prodist, 1974a), 376.

⁴⁷ *Ibid.*, 373.

bearing on problems of wider territorial scope.”⁴⁸ The Fund then created a research division with Sydenstricker at the helm. As head of the division, Sydenstricker’s research had a dual focus: first, improving the quality of vital statistics and how public health activities were measured; and second, studying factors with a potential impact on mortality and morbidity rates, such as nursing services, maternal hygiene campaigns, and economic conditions.⁴⁹ He abandoned the demonstrations’ original aim of evaluating health system as a whole and instead sought to evaluate individual public health actions.

The Creation of a Chinese Public Health Laboratory

Coincidentally, the same year that Edgar Sydenstricker and the Milbank Memorial Fund shifted away from health demonstrations in New York, the seed was sown for a Cattaraugus-style demonstration in China. James Yen, founder of the Chinese National Association of the MEM, was traveling in the United States in 1928 in search of financial support for his association’s rural reconstruction program in the county of Ding Xian. He considered the county to be a typical Chinese rural area and called the program a rural reconstruction laboratory that would be applied countrywide once proven effective. Swayed by John Dewey’s theory that knowledge could be generated and tested only through experiments, Yen contended that, like a laboratory experiment, Ding Xian’s rural reconstruction measures would produce data that would help in later efforts.⁵⁰ The county’s entire population would be test subjects, and rural reconstruction efforts – including cultural programs, the introduction of

⁴⁸ Milbank Memorial Fund, “Minutes of the Meeting of the Technical Board of the Milbank Memorial Fund,” December 20, 1928, 629, I/10/77 Technical Board minutes books 1–4, pp. 303–636, 1926–1928, Milbank Memorial Fund Archives, University of Yale.

⁴⁹ Sydenstricker listed the division’s projects as follows: “1. Studies in the measurement of results of public health activities, to find out how successful certain public health activities or programs actually are. Not only in accomplishing their specific purposes, but in improving the health of the population; 2. Studies in vital statistics: to indicate and to collect statistical data for use in studying the results of public health activities in specific localities; 3. Nursing service; 4. Epidemiological field studies in Cattaraugus and Syracuse; 5. General survey in rural health 6. Disease and impairment of human life; 7. Population studies.” (Milbank Memorial Fund, “Minutes of the Meeting of the Technical Board of the Milbank Memorial Fund,” February 20, 1930, 750, I/10/78 Technical Board minutes books 1–4, pp. 637–908, 1929–1931, Milbank Memorial Fund Archives, University of Yale.)

⁵⁰ Barry Keenan, *The Dewey Experiment in China: Educational Reform and Political Power in the Early Republic* (Cambridge, MA: Council on East Asian Studies, Harvard University, 1977), 90.

advanced agricultural techniques, public health campaigns, and political education – would be experimental trials aimed at tackling poverty, ignorance, physical weakness, and civic disintegration, the four key problems faced by inhabitants of rural China, according to Yen.

Yen's idea of referring to Ding Xian as a laboratory of rural reconstruction bore an uncanny resemblance to the rhetoric used in the Milbank health demonstrations, which had also called its health demonstrations "laboratories" for determining the cost of health. Although there is no source proving that Yen's laboratory idea came directly from the Milbank Memorial Fund, it is undeniable that the Fund was one of the earliest sponsors of the Ding Xian health program. Specifically, Sydenstricker was probably the key person behind Milbank's support of the Ding Xian experiment. Sydenstricker had a special connection to China: he had been born into an American missionary family in China, and his sister, the writer Pearl S. Buck, had remained there. He and Yen had both attended Yale University, and the two men had probably crossed paths during Yen's 1928 fundraising tour in the United States. Another trace of the connection between the Milbank demonstrations and the Ding Xian program lies in the fact that the Fund referred to the latter as the "Chinese Cattaraugus," in reference to its health demonstration in Cattaraugus County.⁵¹ Indeed, because the Ding Xian program involved designating a specific area for various rural reconstruction campaigns, it provided the ideal setting to implement a Milbank-style health demonstration in China, which would also test the feasibility of public health administration in a predetermined area before it was applied to other areas with similar conditions.

In the beginning, statistical collection in Ding Xian encountered a similar problem to the New York health demonstrations: a lack of administrative capacity on the ground. Sydenstricker arrived in Ding Xian in March 1930, six months after the official launch of the program, and his visit led the Milbank Memorial Fund to change its original plan. Sydenstricker had been planning to conduct a comprehensive statistical survey and tailor the Cattaraugus demonstration to China. But after conferring with staff in Ding Xian, he learned that the selection of the experimental site had been more or less random and that the statistical data produced was not trustworthy, let alone comparable to what had been collected prior to the MEM.⁵² Although village elders regularly reported births

⁵¹ Charles Wishart Hayford, *To the People: James Yen and Village China* (New York: Columbia University Press, 1990), 132.

⁵² Edgar Sydenstricker, *The Proposed Public Health Program for Ting Hsien, China, of the Chinese National Association of the Mass Education Movement in Collaboration with the Milbank Memorial Fund* (New York: Milbank Memorial Fund, 1930), 28.

and deaths to the local government, they had not been trained to report comprehensively. It was extremely difficult to collect vital statistics for the health actions in Ding Xian.⁵³

Not only did this situation disappoint the statistically-minded Sydenstricker, the overall situation in China made him realize that it would be impossible to construct a vital and health statistics apparatus there. Prior to Sydenstricker's trip, Victor Heiser of the Rockefeller Foundation had entrusted him with inquiring into the possibility of developing a practical, fit-for-purpose system for vital statistics collection in China.⁵⁴ Sydenstricker visited the Central Statistics Bureau and the National Health Administration (NHA) in Nanjing and eventually came to a pessimistic conclusion. In a memo to Heiser, he listed three essential conditions for the development of vital and health statistics: first, the government must be functional and provide support to collection staff; second, vital statistics must be seen as an essential government function; and third, statistics must be regarded as a social institution and a custom.⁵⁵ None of these conditions had been met in China at the time. Sydenstricker told Heiser that even if vital statistics collection gradually developed in China, it would not be well established for many years.⁵⁶

Given these difficulties, Sydenstricker abandoned his efforts to implement systematic statistical collection in Ding Xian and gave up on the idea of transplanting the Cattaraugus demonstration to China.⁵⁷ He redirected the Milbank Memorial Fund's \$10,000 donation to hospital construction in Ding Xian and adopted a more conservative goal, writing: "Proper provision should be made for measuring the results of the experiment" and adding, "It should be fully realized that these results cannot be attained in a few years."⁵⁸

Affordable Statistical Practices Through Local Connections

Despite Sydenstricker's decision to give up leading Ding Xian's statistical practices, the idea of making Ding Xian a "health demonstration"

⁵³ Victor Heiser, "Memo on the Conference with Sydenstricker," October 7, 1930, RF/2,1930/601/46/379, Rockefeller Archive Center.

⁵⁴ Victor Heiser, "A Letter to Sydenstricker," January 31, 1930, RF/2,1930/601/46/379, Rockefeller Archives Center.

⁵⁵ Edgar Sydenstricker, "Memo on Vital Statistics in China," October 21, 1930, RF/2,1930/601/46/379, Rockefeller Archive Center.

⁵⁶ Ibid.

⁵⁷ Heiser, "Memo on the Conference with Sydenstricker."

⁵⁸ Sydenstricker, *The Proposed Public Health Program for Ting Hsien, China*, 44.

area remained, at least nominally. When Chen Zhiqian (Ch'en Chih-Ch'ien, commonly known as C. C. Ch'en) – a former student of John B. Grant at the Peking Union Medical College – took over health work and related statistical practices in Ding Xian in 1931, he continued to claim to his sponsors in New York (i.e. the Milbank Memorial Fund and, later, the Rockefeller Foundation) that the Ding Xian rural reconstruction project was a “laboratory.”

On a practical level, the Ding Xian project had evolved. Chen no longer aspired to collect statistics that would make Ding Xian a universally applicable model; instead, the program used statistics only to grasp the preliminary outcomes of public health work in the county. Chen came to prioritize financial feasibility in his statistical collection, and no emphasis was placed on setting up a collection model for other rural reconstruction programs.

Chen relied on Li Jinghan (Lee Ching-Han), the head of the MEM's survey department, to obtain information about household incomes and medical practices in Ding Xian. Li reported that the average family of five spent \$1.50 per year on medical treatment, basically the cost of herbal medicine.⁵⁹ That put the average household budget for health care at only \$0.30 per person annually; Chen therefore argued that people in Ding Xian could not afford a “modern” doctor.⁶⁰ And as relatively few people lived in the county seat, only a small percentage of inhabitants could take advantage of health services offered at the district- or subdistrict-level.⁶¹

Taking into account the socioeconomic and health conditions in Ding Xian, Chen came up with four ground-rules for a new system that would provide affordable health services to the community: “[The new health system] must be grounded in the village – the basic administrative unit of the districts; cost must be in accordance with the economic resources of the village; its basic personnel must come from the village; its proper functioning must be the responsibility of the village leadership.”⁶²

Chen also applied the above rules to his statistical practices. In order to keep costs low, he trained laymen to become village health workers and provide simple first-aid care to their fellow villagers as well as collect vital statistics. Though modestly paid, most of these workers were highly

⁵⁹ James Y. C. Yen, “Chinese Mass Education Movement, a Summary,” 1934, RF/1/601/8/78, Rockefeller Archive Center.

⁶⁰ A “modern doctor” being one trained in Western medicine, as opposed to a practitioner of traditional Chinese medicine.

⁶¹ C. C. Ch'en and Frederica M. Bunge, *Medicine in Rural China: A Personal Account* (Berkeley, CA: University of California Press, 1989), 76.

⁶² *Ibid.*, 76.

motivated and regarded the job as a great honor. Moreover, because they served in their own villages, their fellow villagers were more likely to accept their care and answer surveys. The simple first-aid care provided by village health workers was the first modern health care in the area.⁶³ Using village health workers not only solved economic difficulties, it also improved rural inhabitants' access to health care and understanding of scientific medicine. In the *Chinese Medical Journal*, Chen explained the principle upon which he had based his idea:

Recent public health administration has placed emphasis on expertise, and so people think vital statistics can only be entrusted to statistical experts, and school health education can only be undertaken by school health education experts. ... Since experts are expensive, the local society and economy cannot afford them, making such activities unsustainable. I therefore believe that rural health in Chinese conditions cannot be overly reliant on experts.⁶⁴

Chen was a pragmatist: he preferred to channel all available resources – which were scarce – into actions themselves rather than collect statistics for research purposes. Statistical collection was thus of secondary importance to him. In an article written in Chinese, he insisted that collecting vital statistics would exhaust Ding Xian's limited resources.⁶⁵ Moreover, collecting reliable statistics required a well-designed system, which Ding Xian did not have. In a document prepared for the Rockefeller Foundation, Chen wrote:

It is true that we cannot be too ambitious about getting reliable figures in such a place where the statistical idea has never been developed in the minds of the people, and it is perhaps useless for us to devote too much time and energy to secure figures which may be of no practical importance.⁶⁶

Chen may have accorded only secondary importance to statistical practices, but he did not hesitate to use terms like “research” and “science” in the English-language articles he wrote for the *Milbank Memorial Fund Quarterly*. In one, he stressed the experimental nature of the program, portraying it as being aimed at devising a public health system that was well adapted to rural China. He contended that “it would be a great contribution to the application of science in the whole country if

⁶³ Bullock, *An American Transplant*, 167.

⁶⁴ Translated from: Chen Zhiqian, “Hebei Dingxian shiyan xiangcun weisheng [Experimental Rural Health Program in Ding County, Hebei],” *Zhonghua yixue zazhi [National Medical Journal of China (Shanghai)]* 20, no. 9 (1934a): 1125.

⁶⁵ Chen Zhiqian, “Dingxian shehui gaizao shiye zhong zhi nongcun weisheng shiyan [Reform of the Rural Health Experiment in Ding County],” *Weisheng yuekan [Health Monthly]* 4 (1934b): 6.

⁶⁶ C. C. Ch'en, “Implanting Rural Health by the Mass Education Movement,” n.d., 12, RF/1/601/7/69, Rockefeller Archive Center.

we could in the two years or so work out an adequate system of medical relief for the Chinese rural people.”⁶⁷ In another article published in the same journal, Chen used death and birth rates to compare the health situation in rural China with that in the United Kingdom and the United States, countries that the Chinese authorities considered advanced. This led Chen to shift his focus from lowering death rates to lowering birth rates:

The average death rate is about twice that of England or the United States, but the birth rate is even higher. On the top of the already over-populated condition, there is still such an excessive number of births! For improvement of public health and of general socio-economic conditions, the reduction of birth rate is perhaps just as important in this country as the reduction of death rate, if not more so.⁶⁸

Statistical reasoning led Chen’s actions in this sense, as he understood vital statistics to be key indicators of the health conditions of a given population. Just as his teacher, Grant, had sought to lower death rates through public health actions, Chen attempted to lower birth rates through birth control education. Although the issues that Chen and Grant identified as the source of Chinese “backwardness” were different, the ways in which they used vital statistics to represent a given population’s health and determine the most efficient way to improve it were extremely similar, if not identical.

One statistical calculation used by Chen that did not come from Grant’s work at the Peking First Health Station (PFHS) was health cost per capita, which Chen calculated by taking the total expenses of health administration and dividing it by the number of local inhabitants. Chen’s focus on health cost per capita reflected Milbank’s work in Cattaraugus. Chen concluded that the per-capita cost of the Ding Xian program was even lower than the villagers’ former annual spending on traditional health care; the program came to be known as the cheapest public health system of its time.⁶⁹ Chen’s calculations were nonetheless controversial; Grant reflected that the low number might be due to a significant portion of the population never having obtained health services through the program.⁷⁰

Despite Grant’s reservations, the Ding Xian program became famous among its contemporaries thanks in part to Chen’s low estimation of

⁶⁷ *Ibid.*, 9.

⁶⁸ C. C. Ch’en, “Public Health in Rural Reconstruction at Ting Hsien,” April 13, 1934, 6, RF/1/601/8/77, Rockefeller Archive Center.

⁶⁹ *Ibid.*, 39.

⁷⁰ Oral History Research Department, Columbia University, “Reminiscences of Dr. John B. Grant (Vol. 3),” 1961, 132, RF/13/2/3, Rockefeller Archive Center.

its cost per capita. Chen's design for collecting vital statistics inspired several similar registration systems in China. Specifically, his method shifted the focus away from the use of a central statistical authority with specialized inspectors that aimed to collect statistics throughout its jurisdiction, and toward the reinforcement of local organizations of all grades that relied solely on health care providers and laymen's reporting.⁷¹ In so doing, Chen renounced any claim to scientific rigor in his statistical practices, instead making use of local social connections. Xu Shijin (Hsu Shih-Chin), another of Grant's students and a vital statistician who organized statistics collection in various localities from the 1930s, also agreed on the importance of local connections. As he noted when he visited Ding Xian and other experimental collection sites: "with well-organized local organizations, vital statistical collection is not very difficult."⁷²

Statistics as Fundraising Jargon: Yen and Chen's Uses of Statistics

Perhaps equally as impactful as Chen Zhiqian's use of village health workers in the Ding Xian program was James Yen's fundraising rhetoric. In every report and speech to his philanthropic sponsors, Yen consistently described Ding Xian as a laboratory for studying rural China. Calling it a "typical Chinese rural area," Yen claimed the results achieved at Ding Xian would help tailor reconstruction measures to rural China while also serving as model for similar areas elsewhere.⁷³ By using the term "laboratory," Yen contended that the numbers collected at Ding Xian gave the project with universal implications. He used statistical analysis to bolster his claim that the MEM's rural reconstruction measures were feasible throughout rural China; moreover, with statistical backing, the model tested in Ding Xian was expected to provide a relevant model for rural reconstruction work throughout the world.

Chen's use of statistics in his English-language reports and articles, as presented in the previous section, resonated with Yen's discourse. Although Chen was aware that the statistics collected in Ding Xian were of questionable quality, he did not hesitate to cite them in his reports to various sponsors, including the Milbank Memorial Fund and the

⁷¹ This was a counterexample to I. C. Yuan's design for the PFHS.

⁷² Translated from: Xu Shijin, "Wo ruhe banli weisheng tongji [How I Implemented Public Health Statistics Collection]," *Fuwu yuekan [Service Monthly]* 2, no. 3–4 (1929): 18.

⁷³ Yen, "Chinese Mass Education Movement, a Summary"; Pearl S. Buck, "Tell the People: Mass Education in China" (American Council Institute of Pacific Relations, 1945), Family/2.OMR/G/3/16, Rockefeller Archive Center.

Rockefeller Foundation.⁷⁴ This optimistic vision contrasted, however, with the blunt observations of a health worker charged with collecting statistics, which were published in a Chinese public health journal:

People thought the world was going to the dogs again. They thought the government was either enlisting young men or increasing taxes as in the past. They could not imagine any other reason why the authorities would want to know how many people were in their families, and how many were male or female. ... In reaction, they either responded that there was no one at home, or locked their doors and left their houses through the back door; those who could not manage to escape would simply respond to questions with ambiguous answers. When they responded, health workers had to treat their brush-offs as scientific material, how ridiculous is that?⁷⁵

Furthermore, despite Yen's assertion that Ding Xian represented a "typical Chinese rural area," in reality the MEM's choice of rural reconstruction site was essentially random and based on local connections.⁷⁶ In a report submitted to the Rockefeller Foundation, Yen contended that Ding Xian had been chosen based on a social survey that had concluded the county to be a "typical" rural area with a population size well suited to such an experiment.⁷⁷ In fact, no preliminary study had been made when the MEM moved into Ding Xian in 1926. Moreover, when the MEM launched its integrated rural reconstruction actions in 1929, only one study had been conducted in the area, covering only 400 families, or approximately 0.5% of the county's population.⁷⁸ How could the MEM have concluded that Ding Xian was "typical"? Yen spoke frankly in an interview with Pearl S. Buck in 1945: "One other reason why we went to Ting Hsien [Ding Xian] was that there was a famous old civil-service examination hall of Sung architecture. The gentry told us that if we

⁷⁴ C. C. Ch'en, "Scientific Medicine as Applied in Ting Hsien: Third Annual Report of the Rural Public Health Experiment in China," *The Milbank Memorial Fund Quarterly Bulletin* 11, no. 2 (1933): 97–129; "Public Health in Rural Reconstruction at Ting Hsien: Fourth Annual Report of the Rural Public Health Experiment in China," *The Milbank Memorial Fund Quarterly* 12, no. 4 (1934): 370–8; "The Rural Public Health Experiment in Ting Hsien, China," *The Milbank Memorial Fund Quarterly* 14, no. 1 (1936): 66–80; "Ting Hsien and the Public Health Movement in China," *The Milbank Memorial Fund Quarterly* 15, no. 4 (1937): 380–90.

⁷⁵ Translated from: Wu Zhengji, "Dao min jian qu! Banli xiangcun weisheng de kunnan [Go to the People! The Difficulties in Implementing Rural Health Programs]," *Weisheng yuekan [Health Monthly]* 1–2 (1935): 109.

⁷⁶ Buck, "Tell the People: Mass Education in China," 15.

⁷⁷ Yen, "Chinese Mass Education Movement, a Summary."

⁷⁸ The study was conducted by Sidney Gamble (1890–1968), the grandson of one of the founders of Procter & Gamble and a graduate of Princeton who was involved in the YMCA's social work in China (Sidney David Gamble, *Ting Hsien: A North China Rural Community* [New York: Institute of Pacific Relations, 1954], 23).

would come to Ting Hsien they would give us that hall for our headquarters. I could not resist it.”⁷⁹ Yen had never mentioned this fact during the interwar years, when the project was still ongoing. To his sponsors, Yen always advertised it as a scientific endeavor. Even though the Ding Xian experiment was largely dependent on personal connections and local networks, these were seldom mentioned in progress reports submitted to the Rockefeller Foundation.

As with the Milbank health demonstrations, no matter how much effort was put into presenting Ding Xian as a laboratory, the project became famous largely because of Yen’s eloquence, which charmed the program’s sponsors. Statistical data eventually became of secondary importance. From the outset, the Ding Xian demonstration had never lacked attention; it was “swamped with visitors” from both within and outside China.⁸⁰

The CFHS: Statistics for Chinese National Health Research

The Ding Xian demonstration and its statistical practices left their mark on the Chinese national health system. One concrete result was the creation of the CFHS by the NHA. The CFHS was China’s first national health research institute, with demonstration areas for testing the economic feasibility of different policies. Statistical practices at the CFHS served for more than just demonstration, however. Thanks to the financial and technical support of the LNHO, the Station had the expertise and facilities to collect all sorts of quantified data, on everything from bacteria to social levels, in order to establish a picture of public health in China.

The work of the CFHS is representative of the process by which actors with different aims came together, with their visions crystallizing into distinctly different statistical practices within the Chinese national health system. The Station’s principal designer was Liu Ruiheng (J. Heng Liu), the director of the NHA. In a draft submitted to the League of Nations Health Committee, Liu envisioned the CFHS as the nucleus of Chinese public health administration and policy.⁸¹ Its work would include social hygiene and bacteriological research; it would be composed of ten departments,

⁷⁹ Buck, “Tell the People: Mass Education in China,” 26.

⁸⁰ G. E. Hodgmen, “To M. Beard,” June 13, 1931, RF/1/601/7/70, Rockefeller Archive Center.

⁸¹ LNHO, “Health Committee: Minutes of the Sixteenth Session,” December 1930, C.627,M.248,1930, III., League of Nations Archives, 58.

ranging from sanitary engineering to health education and vital statistics; and it would run experiments in three areas with varying levels of urbanization where it could test the outcomes of public health actions.

Liu was pragmatic when it came to geographic scope. He argued that the NHA could not establish an institution in charge of public health research and actions covering the entire Chinese territory right away; instead, he supported concentrating research and policies on a given area in China. The CFHS would work with local authorities to devise its three experimental areas: a rural area (Tangshan), an urban area (a district of Nanjing), and the entirety of Jiangning County.⁸² Much like the New York and Ding Xian demonstrations, the CFHS demonstrations would involve public health campaigns and investigations in the experimental areas to gather facts, based on which the CFHS would “furnish the central authorities with the data on which to base the future health policy for the country.”⁸³ The NHA hoped that, after some years of work, the Station could be reorganized into a national field health service and be put in charge of setting public health policy for all of China.⁸⁴ After organizing a consultation with participants in the Conferences of Directors of Schools of Hygiene, mostly based in Europe,⁸⁵ the LNHO agreed on a total budget of \$514,640 for the first three years, of which \$138,000 was allocated annually to each of the three experimental areas.⁸⁶ Director-General Ludwik Rajchman gave a speech during his 1930 visit to China in which he explained why the LNHO was backing the CFHS:

[I]t would be doubtful wisdom to elaborate a general scheme of sanitary reconstruction for the whole country in the absence of reliable data as a basis. Accurate information must be sought by means of exploration and surveys, while a tentative application of preliminary schemes in selected localities should reveal appropriate measures of solving numerous health problems.⁸⁷

⁸² *Ibid.*, 91.

⁸³ Republic of China, “Proposals of the National Government of the Republic of China for Collaboration with the League of Nations on Health Matters,” 44.

⁸⁴ LNHO, “Annual Report of the Health Organisation for 1929,” July 1930, 15–16, A.9.1930.III, League of Nations Archives.

⁸⁵ There are no direct sources indicating which countries participated in the 1930 conference. However, the conference report includes work from public health schools in seven European countries: Czechoslovakia, France, Germany, Great Britain, Hungary, Poland, and Yugoslavia (LNHO, “Report on the Work of the Conferences of Directors of Schools of Hygiene, Held in Paris, May 20th to 23rd, 1930; and in Dresden, July 14th to 17th, 1930,” 1930, C.H. 888, League of Nations Archives).

⁸⁶ John B. Grant, “To Victor Heiser: Three Year Plans for the Chinese National Health Service,” April 25, 1931, RF/2,1931/601/61/501, Rockefeller Archive Center.

⁸⁷ Ludwik Rajchman, “Proposals of the National Government of the Republic of China for Collaboration with the League of Nations on Health Matters – Secretary General Speech,” February 13, 1930, 10, R5906/8A/18022/10595, League of Nations Archives.

Combining laboratory research and social surveys, the CFHS was designed to further science and take concrete action at the same time. However, it remained unclear how those two goals were to be balanced, even to public health workers at the time. The confusion surrounding the name of the Station is a case in point: whereas the LNHO was satisfied with the name “Central Field Health Station,” the Rockefeller Foundation officers usually referred to it as the “National Institute of Health,” and its Chinese name, literally translated, was the “Central Bureau of Experiments on Public Health Measures.”⁸⁸ This is indicative of the different ways that these different entities understood the Station. The LNHO’s name stressed the importance of public health actions in the field; the Chinese name focused on the experimental element, which included both action and science; and the Rockefeller Foundation’s radically different wording suggests that they saw it primarily as a research institute. Experts were aware of the confusion surrounding the name. Marshall Balfour, a Rockefeller officer in China, once complained bitterly that “Central Field Health Station” was another League of Nations misnomer, since the Station actually acted as the technical branch of the NHA, similar to the United States National Institute of Health vis-à-vis the United States Public Health Service.⁸⁹

Balfour’s understanding was not entirely correct, as he was unaware of the Eastern European social medicine tradition that had inspired the CFHS, which would explain the use of “Field Health” in the name.⁹⁰ The CFHS was clearly based on the Institute of Social Medicine in Zagreb; Berislav Borčić, the LNHO expert involved in designing the CFHS, had once worked for the Zagreb institute and had experience implementing rural health services focused on empowering local communities in Croatia.⁹¹ Borčić arrived in China in 1930 and visited Ding Xian, Beijing, and Tianjin to familiarize himself with the country’s situation.⁹² Riding

⁸⁸ In Chinese: 中央衛生實驗院, Zhongyang weisheng shiyanyuan.

⁸⁹ Marshall Balfour, “Marshall C. Balfour’s Diary,” May 22, 1939, RF/12 Officers’ Diaries/12/23, Rockefeller Archive Center.

⁹⁰ For more on Eastern European social medicine, see, e.g.: Lion Murard, “Designs within Disorder: International Conferences on Rural Health Care and the Art of the Local, 1931–1939,” in *Shifting Boundaries of Public Health: Europe in the Twentieth Century*, 141–173.

⁹¹ B. Johan, “To Boudreau,” March 6, 1930, R5906/8A/18366/10595, League of Nations Archives. It is interesting to note that the LNHO sent the Institute’s founder and one of its doctors (Andrija Štampar and Berislav Borčić) to oversee the LNHO’s involvement in Chinese public health. Štampar was tasked with establishing basic health structures in the northwestern and southern provinces, Borčić with setting up the CFHS (Ludwik Rajchman, “To Borčić,” May 22, 1930, R5906/8A/18807/10595, League of Nations Archives; LNHO, “Report to the Council on the Work of the Twenty-First Session of the Health Committee,” 16).

⁹² LNHO, “Health Committee: Minutes of the Sixteenth Session.”

the wave of the MEM's rural reconstruction efforts, the Zagreb model, which correlated public health with living standards while emphasizing local communities' participation, was well received by Chinese experts. The convergence of the Eastern European tradition and the Chinese rural reconstruction movement popularized the concept of a public health framework that aimed to mobilize local communities.

The CFHS was established in September 1932. In the end, Borčić's design did not differ from Liu's original proposal: the CFHS was to conduct a wide range of activities, such as collecting vital statistics, controlling epidemics, conducting chemical analysis on food and pharmaceutical substances, building sanitary engineering infrastructure, training public health workers, and improving local health services. Its three experimental health areas would serve as the testing grounds for these functions.⁹³

Collection of quantified facts was at the center of these disparate activities. The CFHS relied on statistics for its core missions to: 1) gain an understanding of the health situation and lifestyles in its experimental areas; 2) document its activities; 3) assess the results and financial feasibility of public health services; and 4) document the laboratorial results. A table from the Station's 1936 annual report (see Table 4.1) shows these four categories of statistics and gives a general picture of how each CFHS department used them and which types of content were presented in quantified language.

The first core mission (collecting statistics to grasp health situations) resembled Grant's work at the PFHS, presented in Chapter 2. Specifically, the CFHS vital statistics department was responsible for collecting statistics from hospitals and health units and analyzing them using machines (see Figure 4.1). The presentation of vital and health statistics was very much in line with the standards of the time, e.g. birth and death rates categorized by common criteria such as sex, age, and cause of death. Xu Shijin, the head of the department during its first five years, had received a standard education in vital and health statistics: he had been trained by Grant at the PFHS from 1926 to 1929, during which time he was associated with the compilation of the Chinese International Classification of Diseases, and subsequently spent one year at the Johns Hopkins School of Public Health in 1929. Before joining the CFHS, he was in charge of statistics collection at the Shanghai Municipal Health Bureau, from 1930 to 1932.⁹⁴ Xu designed initiatives for collecting data on the numbers of births, deaths, and patients with communicable

⁹³ J. Heng Liu and P. Z. King, "Annual Report of the Central Field Health Station: For the Year Ending December 31, 1936" (National Economic Council, 1937), R5682/50/19116/980, League of Nations Archives.

⁹⁴ *Ibid.*, 60.

Table 4.1 Categories of statistics presented in the annual report of the CFHS* for the year ending December 31, 1936**

Department	Categories of statistics	Items
Vital statistics service	Vital and health statistics; lifestyle	<ul style="list-style-type: none"> • Notifiable disease cases • Age group of communicable disease cases among hospital patients • Birth and death numbers/rates • Death rates by sex/age group • Death rates by cause • Death rates by age group • Maternal deaths • Blindness • Medical expenses
	CFHS activity numbers	<ul style="list-style-type: none"> • Hospital reports received • Hospital inpatient and outpatient cards • Health records of school children received • Questionnaires received regarding maternal deaths
	Health service costs	<ul style="list-style-type: none"> • Registration cost per capita
Prevention and control of epidemic diseases	CFHS activity numbers	<ul style="list-style-type: none"> • Door-to-door fumigation campaign (burrows, rooms, communicating holes) • Rat-proofed food containers and food shops • People vaccinated • Plague investigation stations established • Counties receiving vaccination training • Calf lymph doses • Strain numbers of <i>B. typhosus</i> under study • Samples of sputum collected • Bacteriological and parasitological examinations
	Laboratory results	<ul style="list-style-type: none"> • Rat index • <i>Clonorchis sinensis</i> infections among freshwater fish • Tuberculosis positivity rate • Serological examination results
Investigation and control of parasitological diseases	CFHS activity numbers	<ul style="list-style-type: none"> • Free kala-azar treatments provided • Quinine tablets distributed • Villages covered by sandfly distribution survey • Malaria epidemic areas visited • Children examined for spleen and parasite indices • Mosquito breeding places (number, surface area) under control • Patient visits to clinics • Stool specimens under examination • Snails killed

Table 4.1 (cont.)

Department	Categories of statistics	Items
	Laboratory results	<ul style="list-style-type: none"> • Kala-azar infection rate for three species of sandflies • Spleen indices, parasite indices • Percentage of positive schistosome ova of examined stool specimens • Kala-azar infected villages and infection rate
Drug studies, manufacture, and control	Vital and health statistics; lifestyle	<ul style="list-style-type: none"> • Pharmaceutical products sold
	CFHS activity numbers	<ul style="list-style-type: none"> • Foods and drinks under review • Total samples of native common salts • Samples received for chemical examination
	Laboratory results	<ul style="list-style-type: none"> • Percentage of drugs and patented medicines meeting pharmacopeia standards • Chemical examination results • Source and fluorine contents of common salt samples
Sanitary engineering and environmental sanitation	Vital and health statistics; lifestyle	<ul style="list-style-type: none"> • Percentage of huts built from earth and straw
	CFHS activity numbers	<ul style="list-style-type: none"> • Latrines constructed and holes dug • Houses improved (plastering or whitewashing, skylights, ventilation) • Experimental wells • New refuse containers • Wells and latrines examined • Water and sewage analyses conducted • Shops inspected • Equipment manufactured (surgical instruments, full and partial leg prostheses for crippled soldiers)
	Health service costs	<ul style="list-style-type: none"> • Construction cost of bore-hole latrines • Construction cost of reinforced mud walls (0.5 m thick and 1.5 m high) • Housing improvement costs
	Laboratory results	<ul style="list-style-type: none"> • Parasitological survey results • Percentage of ascariasis and hookworm infection among children • Percentage of helminthological infestation (any type) among children
Promotion of school health	CFHS activity numbers	<ul style="list-style-type: none"> • Participants in national school health conference • Staff sent to schools; students covered • National Boy Scout camps • First-aid kits distributed to students

Department	Categories of statistics	Items
Popular health education and preparation of teaching materials	CFHS activity numbers	<ul style="list-style-type: none"> • Total materials distributed (posters, charts, models, molds, specimens, slogans, photos) • Specimens produced • Summary of publications • Public health education and propaganda produced (radio shows, news items, visitor groups, exhibitions, health talks, lantern-slide and movie shows)
Industrial health	CFHS activity numbers	<ul style="list-style-type: none"> • Reports on factory provision of health care • Analysis of attendance numbers: Yungli Ammonia and Acid Plant health service
Training of health personnel*	CFHS activity numbers	<ul style="list-style-type: none"> • Publications in the library • Summary of training courses given • Fellowships awarded
Promotion of health service	CFHS activity numbers Laboratory results	<ul style="list-style-type: none"> • Counties with new health organizations • Results of examination of stool and blood samples collected from army hospitals and field clinics

Source: J. Heng Liu and P. Z. King, “Annual Report of the Central Field Health Station: For the Year Ending December 31, 1936” (National Economic Council, 1937), R5682/50/19116/980, League of Nations Archives

* The numbers regarding other organizations that partnered with the CFHS have been excluded from this table.

** Some item names have been edited for clarity.

diseases in the experimental areas. Much as Grant had done at the PFHS, the police, medical practitioners, and midwives were put in charge of reporting births, deaths, and cases of communicable diseases in Jiangning County. To ensure the quality of the data collected, these individuals were given statistical training.⁹⁵ In its 1936 annual report, the CFHS proudly described the reporting system it had constructed: some 1,000 hospitals regularly submitted patient numbers for nine notifiable diseases, 204 of which also sent in numbers on nineteen communicable diseases.⁹⁶ Quantified data on inhabitants’ lifestyles – such as the quantity of pharmaceutical products sold and the percentage of habitations consisting of straw-and-mud huts – were also collected by other departments.

In addition to the routine collection system, Xu calculated birth and death statistics that reflected the socioeconomic context. The NHA, for

⁹⁵ *Ibid.*, 1.

⁹⁶ *Ibid.*



Figure 4.1 Statistical service of the Central Field Health Station. "Photo of Statistical Service," n.d., CMB.Inc/1048/25/302, Rockefeller Archive Center. Courtesy of Rockefeller Archive Center.

instance, conducted an infant mortality investigation in Nanjing by visiting families with babies born in the past year.⁹⁷ The report used pivot tables that showed how infant mortality varied depending on the parents' occupations, the monthly household revenue, and the newborn's birth order.⁹⁸ These pivot tables were purely descriptive, as Xu did not conduct mathematical tests to gauge the sampling error. Presenting his

⁹⁷ Xu Shijin and Wang Zuxiang, "Nanjing shi yinger siwanglu diaocha [Infantile Mortality Investigation in Nanjing City]," *Gonggong weisheng yuekan [Public Health Monthly]*, no. 4 (1935): 23–7.

⁹⁸ *Ibid.*

statistics as facts, Xu relied on his knowledge of infant care to make sense of the differences in numbers. His arguments included: families with higher incomes had the benefit of specialized facilities for infant care; the first two children born suffered from the mother's lack of experience and thus had a higher mortality rate; and heightened mortality rates for children born fifth or later were due to the mother being unable to take care of so many children. Sometimes Xu simply let the statistics stand: "it is not easy to explain why the infant mortality rate [for children with parents working] in the transportation sector was only 106.2 per thousand."⁹⁹

Almost all CFHS departments used numbers to show the scope of their activities. The statistics were so diverse, and sometimes focused on such minor aspects of the Station's activities, that it is difficult to list them all succinctly (see Table 4.1). Some of the information was of the type commonly reported for public health actions at the time, including vaccination numbers, number of facilities and other infrastructure constructed, number of schools, children, samples, shops and factories surveyed, as well as the number of samples of salts, food, and food smears collected. But numbers were also collected on the materials used in public health work, which was less common. In a section entitled "Popular Health Education and Preparation of Teaching Materials," the 1935–6 report chronicles the number of posters, charts, models, molds, specimens, posters, slogans, photographs, etc. that had been produced and distributed.¹⁰⁰

The third type of statistical practices employed at the CFHS were for evaluating the results and economic feasibility of public health services, including health administration structures, vital statistic registration, and sanitary infrastructure. In terms of health administration, this strongly resembled the Ding Xian program. Although no source indicates a direct connection between Ding Xian and the CFHS, it is worth noting that Xu and Chen were both students of Grant at almost the same time, and it is certain that they knew each other and were informed of each other's work. Specifically, the CFHS copied Ding Xian's three-tiered public health model for its Jiangning demonstration area, and Xu was tasked with designing statistical investigations to gauge the model's feasibility. He concluded that public health administration in Jiangning was economically feasible, given that health expenses per capita were only \$0.10 and were paid by the local population and the

⁹⁹ *Ibid.*, 25.

¹⁰⁰ Liu and King, "Annual Report of the Central Field Health Station: For the Year Ending December 31, 1936," 33–7.

county government.¹⁰¹ Xu conducted the same investigation in Tangshan, the CFHS's rural experimental area. Having obtained favorable results, the CFHS promoted the three-tiered model to provincial governments.¹⁰² It should be noted that favorable statistical results did not directly translate into concrete action. CFHS officers were aware of the significant difference in administrative capacity between the demonstration areas and the other places, and that the Tangshan experiment's success was thanks to the additional administrative capacity that most provincial governments did not have. They thus did not insist on the tiered system being fully implemented in other provinces, only the aspect of using county hospitals as local health centers. By 1934, the CFHS had set up health centers at thirty-five locations in eight provinces.¹⁰³

Just as in Ding Xian, vital statistics investigation was itself the subject of financial examination by the CFHS. In 1934, the CFHS hired eighteen investigators to collect vital statistics in Jurong, a small county near Nanjing. With the help of local gentry, the investigators concluded after one month that Jurong had 280,000 inhabitants, and that the cost of investigation per capita was 0.005 Chinese silver dollars.¹⁰⁴ Starting in 1935, Xu was also mandated to devise a vital statistics collection system in the city of Nanjing. He devised a system with nine statistical investigators acting as intermediaries between the police in charge of civil registration and health service providers; these investigators were responsible for verifying and synchronizing the reports sent in by health service providers that had municipal civil registration records. Xu's collection system cost the government 5,040 silver dollars annually, with each birth or death reported costing 0.12 silver dollars.¹⁰⁵ After carrying out vital statistics collection in Nanjing, Jurong, and other counties, Xu concluded that the key to successful collection was to mobilize communities. When the local community was involved, vital statistics collection was not particularly difficult.¹⁰⁶ Xu thus reached a similar conclusion to

¹⁰¹ Berislav Borcic, "Public Health Activities in China From 1929–1935," November 23, 1935, 16–17, r/5711/50/21438/6501, League of Nations Archives.

¹⁰² *Ibid.*, 17.

¹⁰³ Yip, *Health and National Reconstruction in Nationalist China*, 57.

¹⁰⁴ Xu Shijin, "Shiban Jurong xian shengming tongji ernian lai gaikuang [Two Years after Implementing Vital Statistics Collection System in Jurong]," *Gonggong weisheng yuekan [Public Health Monthly]* 1–6 (1936): 153.

¹⁰⁵ Xu Shijin, "Nanjing shi shengming tongji lianhe banshichu diernian gongzuo baogao [The Second Annual Report of the United Vital Statistical Office of Nanjing City]," October 1936, 10, Shanghai Library.

¹⁰⁶ Xu Shijin, "Wo ruhe banli weisheng tongji [How I Implemented Public Health Statistics Collection]," 18.

Chen's in Ding Xian, where village health workers were used instead of highly trained experts.

Xu's method had a limited impact, as the Second Sino-Japanese War broke out shortly afterward. A report published in 1937 by Jin Baoshan and Xu himself found that funding for vital statistics in provincial capitals and special municipalities represented a mere 0.6–2.0 percent of their total budgets.¹⁰⁷ Lin Jingcheng, a public health officer, wrote in an article that “[m]any thought vital statistical work was not worth the money, because it was difficult for everyday people to understand its value.”¹⁰⁸ Lin's observation shows that, unlike public health services that directly improved the health conditions of local people, the collection of statistical data to evaluate and design public health actions remained an abstract, insignificant endeavor in the eyes of the public.¹⁰⁹

Sanitary infrastructure faced the same scrutiny. The CFHS also estimated the cost – and thus the economic feasibility – of improving sanitary infrastructure in its experimental areas. Following a general sanitation and water survey, forty-one latrines, two experimental wells, and seventy-eight new refuse containers were constructed in three districts of Jiangning County. The CFHS concluded in its 1936 annual report that the experiment was successful because it was inexpensive, and that the local residents were willing to pay for the material cost of the improvements.¹¹⁰ Similar reconstruction work was done to improve housing in the county. The CFHS led initiatives to plaster or whitewash walls, open glass skylights, add ventilation holes, and repair leaky straw roofs.¹¹¹ A total of 152 houses were improved with financial contributions from villagers; those who could not contribute money contributed labor. The reported numbers were straightforward, enumerating the average cost of improving one room, one house, one ventilation hole, etc.¹¹² These

¹⁰⁷ Jin Baoshan and Xu Shijin, “Geshengshi xianyou gonggong weisheng sheshi zhi gaikuang [The Current Conditions of Public Health Services in Provinces and Municipalities],” *Zhonghua yixue zazhi [National Medical Journal of China (Shanghai)]* 23, no. 11 (1937): 1246.

¹⁰⁸ Translated from: Lin Jingcheng, “Zhongguo gonggong weisheng hangzheng zhi zhengjie [The Problems of Chinese Public Health Administrations],” *Zhonghua yixue zazhi [National Medical Journal of China (Beijing)]* 22, no.10 (1936): 966.

¹⁰⁹ Despite local people's indifference, Xu's expertise in vital statistics registration survived the Second Sino-Japanese War (1937–1945) and the Chinese Civil War. After the People's Republic of China was founded in 1949, the government mandated Xu to devise vital statistics collection systems in 73 localities across China (see Chapter 7).

¹¹⁰ Liu and King, “Annual Report of the Central Field Health Station: For the Year Ending December 31, 1936,” 25.

¹¹¹ *Ibid.*

¹¹² *Ibid.*, 27–8.

examples demonstrate the spirit of social experimentation behind the CFHS's initiatives: the Station would start by conducting field surveys in order to understand villagers' living conditions; then, public health initiatives were specifically designed for each experimental area to test their financial feasibility and gauge social reaction. Just as in Ding Xian, the CFHS made public health actions commensurate to their cost, and mobilized the local community to reduce the latter.

Lastly, the CFHS's also relied on quantified data to document its laboratory results, ranging from bacteriological and parasitological tests on people and animals to tests of chemical ingredients in food and drugs (see Table 4.1). The CFHS laboratory collected human biological samples to gauge the prevalence of various bacteria and parasites. Animals were also put under microscopic scrutiny. Rats, fish, and sandflies were collected to check the prevalence of parasites. Every year, the CFHS also conducted hundreds of tests on the components in substances ranging from patented drugs to salt collected throughout China.¹¹³ By analyzing component statistics, the CFHS gained an understanding of the Chinese population's pharmaceutical and nutritional habits. This food and drug research continued to gain importance during the Second Sino-Japanese War, when lack of food and resources spurred the NHA to seek nutritional substitutes.

Since its establishment, the CFHS had an overall plan for conducting experiments related to public health services, vital statistics collection, housing, water supply systems, and substance analysis. As in Ding Xian, the CFHS designated geographic areas that were considered representative of Chinese urban and rural environments. The statistical practices of the CFHS reveal its diverse goals: it was not focused solely on public health actions but also aimed to build an overall understanding of the Chinese population's health and related behavior. However, despite an apparent dedication to quantification, the CFHS officers still relied considerably on non-quantified information, using their knowledge of Chinese society to explain differences in vital statistics in their reports. In addition, although the demonstrations were presented as laboratories in which Chinese health policies could be tested, the CFHS officers were themselves aware that the quantified data collected from the demonstration areas was not directly applicable to the real world, given that the demonstration areas had greater administrative capacity than any other

¹¹³ The results of these examinations showed that most of the patented drugs used in China did not adhere to international pharmaceutical regulations, and that the salt did not have any nutritional value (*ibid.*, 18).

province in China. Their knowledge of the local conditions therefore continued to be crucial in policy-making.

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From New York to Ding Xian to Nanjing, the circuit of health demonstrations and related statistical practices is illustrative of efforts to test public health policies in their socioeconomic context. Although there were some differences in the way statistics were collected and analyzed in the three places, it cannot be denied that statistical collection and analysis had become an integral part of health system programming. Experts in all three places used similar rhetoric to frame health demonstrations as laboratories, at least at the beginning. By implying that the results from demonstration areas could be applied to other places, statistical collection was a way to abstract local realities and give them universal implications.

What exactly, then, were these “laboratories” supposed to be testing? In line with Hermann Biggs’ famous motto, “health is purchasable,” the financial aspect was a key part of public health campaigns in New York, Ding Xian, and Nanjing alike. In all three places, vital and health statistics were calculated against budget numbers to estimate the price of health. However, despite the clear lineage and connections uniting them, Cattaraugus and its sister demonstrations in China positioned themselves differently when it came to the cost of public health work. The Cattaraugus experts put less emphasis on making health affordable and instead aimed to show that the rate of return would nonetheless be high enough to benefit local economies, so that the local authorities would agree to spend more on health. In Ding Xian and at the CFHS, however, the impoverished state of rural China and the financial constraints faced by local governments were key factors. The Chinese experts therefore aimed to make their actions as affordable as possible, mobilizing the local population to compensate for budgetary constraints.

Armed with their knowledge of public health conditions, experts in all three places were able to choose whether or not they used the numbers they collected, the extent to which those numbers were indispensable in promoting their demonstration areas, with whom they shared the numbers, and whether their numbers could be applied to the real world outside of the demonstration area. In both Cattaraugus and Ding Xian, the experts adjusted their rhetoric based on their policy advocacy needs. Having incomplete statistics did not prevent them from selling their programs to a larger audience, nor did it impede the effectiveness

of their salesmanship. In New York, Kingsbury promoted his program by framing the demonstrations as an awareness-raising tool and resorted to the authority of public health researcher C. E. A. Winslow to promote them. Sydenstricker's mathematical statistical analysis was produced only later. In Ding Xian, James Yen used laboratory rhetoric, whereas Chen Zhiqian used orthodox vital and health statistical analysis in papers published in the United States, while downplaying the unscientific manner in which the site had been selected and the statistics reported. In contrast to New York and Ding Xian, favorable data that came out of the CFHS experimental areas were not used to promote policies to provincial governments, as the CFHS officers were well aware of the difference between their demonstrations and the real-world administrations.

The demonstration method, like other interwar circuits through which statistical practices were transferred, was eventually doomed to peter out. Growing hostility and outright war between countries prevented the exchange of epidemiological information as public health work in warzones such as China came to focus on emergency relief. It was not until World War II began to come to an end that the LNHO, alongside the newly founded United Nations Relief and Rehabilitation Administration (UNRRA), and eventually the WHO, revived the international epidemiological intelligence network that had lain dormant during the war. In the following chapter, I investigate the renaissance of international epidemiological intelligence as well as the WHO's design for an all-encompassing statistical system. Chapter 6 focuses on the WHO's communicable disease control campaigns, in which the laboratory/demonstration discourse re-emerged.