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ROCKEFELLER FOUNDATION INTERNATIONAL HEALTH BOARD IN COLONIAL INDIA AND IMPERIAL CHINA: A STUDY OF THE ANTI-HOOKWORM CAMPAIGN FROM 1913 TO 1920S

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Rockefeller Foundation International Health Board in Colonial India and Imperial China: A Study of the Anti-Hookworm Campaign from 1913 to 1920s

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Abstract: The Rockefeller experts dispatched to Asia revealed hookworm as an international problem with prevalence rate alarming both in India and China. The extraordinary sanitary conditions of the Tamil coolies settled in plantation sites in India and labors in mining areas in China created ideal ecologies for the reproduction of the parasite and increased the levels of soil pollution. Just as the hookworm disease posed threat to workers in the colonial plantations in India, it became a menace for the workers in the mines and labors in central and south China. The scientific framework proposed by the International Health Board of the Rockefeller Foundation replicated from the US south faced challenges in the Indian and Chinese context. In India, addressing soil pollution was linked to access to water and proper sewage, which was mostly concentrated in European enclaves or houses of elite Indians. In China, nightsoil was the prime fertilizer, which was an essential part of Chinese agriculture, and any attempt to bring reform would have huge economic consequences. This study traces the history of RF's anti-hookworm campaign in colonial India and Imperial China from 1913 to the 1920s. Based on archival sources and scientific publications in the late 19th and early 20th centuries, the study attempts to explore the various sanitary measures adopted, the relationship between hookworm science and migrant labors, the extent and depth of the anti-hookworm program and the overall implications of the program on disease control in China and India.

George E. Vincent, second president of the Rockefeller Foundation in a review of the Rockefeller Foundation′s philanthropic activities from January 1, 1920, to December 31st, 1920, notes:

> Science knows no national boundaries. It is a world product, a common fund of knowledge to which all nations contribute and upon which each may freely draw. To keep open the channels of communication by personal migration and by printed page, to encourage the training of specialists, to foster the growth of institutions, to stimulate research, to encourage the application of scientific knowledge to the needs of nations, communities, and individuals, are tasks upon the successful performance of which largely depends on the progress of the world in economic efficiency, physical health, and international good-will. It is the aim of the Rockefeller Foundation to have a part in this great movement by helping to increase the common store of knowledge about the causes of disease, and through demonstrations and the services of trained experts to diffuse this information as widely as possible among all peoples. Thus, does the Foundation seek to fulfil its chartered purpose "to promote the well-being of mankind throughout the world.[1]

Introduction

The needs of the east had attracted John D. Rockefeller since 1908. To explore this avenue, Rockefeller funded the first Oriental Commission comprising of Dr. Ernest D. Burton, professor of theology and Dr. Thomas D. Chamberlin, professor of geology of the University of Chicago to survey possibilities for philanthropic action in China, Japan and India, "for the broad investigation of educational, social and religious conditions in the far east".[2] This mission on behalf of Rockefeller was also known as the Chicago Commission and the Oriental Education Commission. The commission spent six months in Japan, China and India.[3] This period was also a time of significant scientific optimism in the United States. Medicine had been revolutionized in the late 19th century as a result of advances in biological discoveries and bacteriology. This new form of scientific medicine was built upon the discoveries of Louis Pasteur (1822–1895) and Robert Koch (1843–1910) in Europe. Following these new discoveries, American medical practice started changing its course which is reflected in the gradual acceptance of European scientific

[1] Rockefeller Foundation (1920), 63-64
[2] Peking Union Medical College, Historical sketch and description of buildings, Addresses and papers, dedication ceremonies and medical conference, Peking Union Medical College, 15-21 September 1921, SFA324, box 12, folder 108, Rockefeller Records, Rockefeller Archive Centre
[3] Ibid, Matysiak (2014), 24

developments by the 1870s. These changes were observed in the form of many American medical professionals flocking to train in famous German and Austrian medical schools. Approximately 15,000 American physicians were trained in Germany alone between 1870 and the outbreak of World War I. Some of these medical professionals who returned, put their efforts into developing laboratory-based medicine in the US.[4] With the birth of this new understanding in medicine, one could finally talk about eradicating and curing disease.[5]

Motivated by this new scientific movement, In October 1909, the Rockefeller's Sanitary Commission (RSC) launched its mission to eradicate hookworm disease in China and India. The sanitary commission under the directorship of Dr. Wickliffe Rose, a humanities professor and an advocate of southern educational reform was appointed as the first head of the Rockefeller Sanitary Commission. Under his leadership the Commission mounted an assault on hookworm from 1909–1914 in the American South first and later China and India followed as a special focus of the Commission in the Orient. Near the end of the five-years of the work of sanitary commission, a Special Act of Legislature of the state of New York established the Rockefeller Foundation (RF), as a major vehicle of Rockefeller's philanthropy whose corporate purpose was 'Wellbeing of all mankind.[6] The International Health Board since the early years of its inception had drawn its interest towards China and India ranging from prevention and control of infectious diseases to institutionalization of medical education as part of their goal of building modern scientific medicine.

This essay traces the history of RF's anti-hookworm campaign in colonial India and imperial China from 1913 to the 1920s. Based on archival sources and scientific publications on the late 19th and early 20th centuries, the study attempts to explore the various sanitary measures adopted, the relationship between hookworm science and labors, the extent and depth of the anti-hookworm program and the overall implications of the program on disease control in China and India. A number of scholars have studied the role of RF in health and medicine quite extensively, covering all aspects of their health programs from disease control, public health to medical education.[7] These studies cover both critical and complimentary aspect of the foundation's philanthropy. John Farley's '*To cast out disease: a history of the international health division of*

[4] Brown (1979), 72
[5] Andrews (2015), 8; Bullock (2014), 14
[6] Birn and Fee (2013), 1618; Rockefeller Foundation (1913-14), 7
[7] Bu and Yip (2012), 5

the Rockefeller foundation (1913-1951)' is one of the most well documented study of the International Health Division of the RF. Farley narrates in detail, the history of the RF's transnational disease campaigns conceptualized under the rubric of eradication.[8] The role of RF in China and India have also been examined separately by historian Mary Brown Bullock (China) and independent researcher Shirish Kavadi (India).[9] Although Mary Brown through her two books have given an extensive account of RFs philanthropy in China, her main focus has mostly highlighted the institutionalisation of medical education though the China Medical Board and the Peking Union Medical College. Much of the disease control programs of the International Health Board is limited or absent from her analysis. On the Indian side, Shirish Kavadi has given a detailed account of RF's decade long activity at trying to combat hookworm in India. A comparative study between China and India focusing on the role of RF in disease control program from an interdisciplinary approach however has not been attempted so far.

The RF has been one of the most influential players since the early 20th century in the global development of public health not only through their grant-making but also by shaping concepts and policies. Both China and India have been at the heart of Rockefeller philanthropy since the inception of the Foundation. The campaign against hookworm in the southeastern United States was one of modern philanthropy's first forays into the public health realm.[10] The hookworm campaign being one of the first approaches of Rockefeller philanthropy opened up the doors for the RF to exercise their newly found ideas in China and India. This opened up different avenues for the IHB to exercise these ideas to work. A detailed study of the RFs anti-hookworm campaign in both the countries will help us further understand the influence and effect of RFs philanthropy in disease control in both the countries and how this has over the years shaped the policies that informed combating infectious diseases over the decades.

The Beginning

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[8] Murad and Zylberman (2005)

[9] Mary Brown's *The oil prince's legacy: Rockefeller philanthropy in China (2011)* and *An American Transplant: The Rockefeller Foundation and Peking Union Medical College (1980)* chronicles the legacy of RF's philanthropy in China through the eyes of cultural internationalism and recounts the effect of Rockefeller philanthropy. Shirish Kavadi *Rockefeller public health in colonial India 1916-1945 (2016); 'Parasites lost and parasites regained': Rockefeller foundations anti-hookworm campaign in Madras presidency (2007); "Clear stream of reason…lost its way into the dreary desert sand of death habit: The All India institute of Public health and hygiene 1922-1945 (2012)* gives a detailed account of post war Rockefeller philanthropy in public health and the reconstruction of All India institute of public health and hygiene in India.

[10] Palmer (2010), 151-152

In the summer of 1897 while vacationing at the Catskills, Frederick T. Gates, an evangelical Baptist minister and John D. Rockefeller's close associate, read William Osler's *Principles and practices of medicine,* a lengthy survey on American system of medicine published in 1892. It proved his long suspicion that 'medicine as a taught subject in the United States was practically ineffective' especially related to the knowledge on disease and illness but it also introduced him to the potential of scientific research to unravel the mysteries related to diseases. He was profoundly influenced by Osler's explanation of medical advances and consequential alleviation of suffering due to death and illness. In the next decades, transformation of American Medicine became his new mission.[11] Being John D. Rockefeller's close aid, he was finally able to convince the oil mogul to divert his wealth for the 'betterment of society' which led to the creation of the 'Rockefeller Institute for Medical Research' in 1901, changing the field of medical research in the decades to come. Both JDR Sr. and Gates believed that good health was of prime importance for overall well-being. Gates noted, "If science and education are the brain and nervous system of civilization, health is its heart. It is the organ that pushes the vital fluid into every part of the social organism, enabling each organ to function and measuring and limiting its effective life...Disease is the supreme ill of human life, and it is the main source of almost all other human ills - poverty, crime, ignorance, vice, inefficiency, hereditary taints, and many other evils."[12] To address this supreme evil of diseases, the RF officials were highly committed to seeking answers in scientific approach to medicine. In the words of Wickliffe Rose, first director of the International Health Board "Science is the key to such dominion as man may ever acquire over his physical environment. Appreciation of its spirit and technique, moreover, determines the mental attitude of a people, affects the entire system of education, and carries with it the shaping of a civilization."[13] Dr. Charles Stiles, a zoologist with the US public health service introduced Gates to 'Hookworm disease'. Dr. Stiles strongly advocated combating hookworm in the American South. This disease was seen to be a major cause of low productivity in the industrial south.[14] Hookworm as a disease was found to be easily preventable; the challenge was to create awareness amongst the local populace. The larvae of hookworm enter the body through contact with the soil. The main cause for this was open defecation that contaminates the soil and increases the risk of exposure to

[11] Bryan (1997), 150; Baick (2004)
[12] Kavadi (1999), 49 cited in Neilson (1972)
[13] Ibid, 50
[14] Schindler (1909), 5; Birn (2014)

reinfection. This risk was greater for individuals who worked barefoot, which was a common sight in most of the colonies. It required permanent sanitary infrastructure to avoid re-infestation. The idea was to convince the planters to install privies and borrow pits to avoid exposure to infection and to engage them in the prevention of the disease. With his newfound knowledge, Gates was drawn to the challenge of addressing the disease.[15] The campaign against hookworm in the Southeastern United States was one of modern philanthropy's first forays into the public health realm. Hookworm campaign was also deemed a perfect fit due to its high infection rate globally that coincided with many tropical territories with increasing US interest. By instilling public health awareness, the Rockefeller Sanitary Commission (RSC) would impart public health training to the local political and medical elites with the hope that the responsibility of public health would be taken over by the locals in the coming decades after the disbandment of the IHD.[16]

Rockefeller Medicine: The Perils of Hookworm in the Orient

With the creation of the Rockefeller Foundation (RF) as an official body in 1913, the IHC anti-hookworm campaign stretched to British Guyana, the English-speaking islands in the Caribbean, Central America, Mexico, Brazil, Egypt, India, Ceylon, British Malaya, and beyond.[17] The Rockefeller experts dispatched to Asia highlighted hookworm as an 'international problem' that needs serious attention. Prevalence rate showed as high as 50 percent in both China and India. Immediately after the completion of the hookworm survey, the International Health Commission (IHC) of the RF started having conversations with local officials in both the countries to collaborate for developing public health campaigns. The IHC followed three main strategies to combat hookworm: survey to access the prevalence rate, microscopic examination for diagnosis and monitor those infected and finally standard guidelines for sanitary measures to stop soil contamination. Within few years of its campaign, the IHC realized that it was impossible to eradicate the disease and opted for "relief and control".[18]

The first global campaign against hookworm began in British Guiana in 1914. The IHC in British Guiana worked with labors in sugar plantations and rice farms whose origins could be

[15] Elman, McGuire and Whitman (2014), 48
[16] Palmer (2010), 151-152
[17] Palmer (2006), 113; Web (2020), 2
[18] Matysiak (2014), 62-63

traced back to East India, China and Africa.[19] A population census carried out in 1911 suggested Indian ethnicity to be around 40 percent of the colony in British Guyana. The East Indian labors in the British Guyana in comparison to the Chinese indentured labor continued to work in the agricultural and farming sectors even after the termination of their contracts.[20] Most of the Indian labors had migrated from the north central united provinces of British India.[21] Simultaneously, the 'Uncinariasis Commission to the Orient'[22] (UCO) was established by the IHC in British Malaya in 1915. The UCO carried out its anti-hookworm campaign in British Malaya till 1917. The population composition in British Malaya plantations were both Tamil and Chinese labors. Tamil coolies were more in number as compared to their Chinese counterparts since the British preferred hiring labors from Ceylon where they had already employed them in large numbers to work on their coffee and tea plantations. The Chinese labors were hired mostly in the Malayan rubber plantations. To tackle the language barriers, the British officials also hired Chinese contractors as intermediaries.[23]

With the number of Tamil coolies in the plantations in British colonies much higher as compared to other indentured labors, they were thought to be major carriers bringing the disease even to the United States. High rate of hookworm infections was also found in labors in the plantation sites in Ceylon. By 1815, Ceylon was taken over completely by the British crown and slowly became the economic capital of the British colony. The bitterness of the war stopped the Singhalese to join the labor market in the British plantations in Ceylon.[24] To counter this labor shortage, coolies were hired in large numbers from the southern state of Tamil Nadu in India. This period of immigration coincided with the growth of coffee, tea and rubber plantations.[25] Most of the labors immigrating from southern India were from the lowest strata of Hindu caste hierarchy and expected to take up the most menial occupations that was available. The British colonial administration took advantage of this situation and continued exploiting the labors of their situation for many decades.[26] The laborers lived in an extremely unsanitary conditions which created spaces

[19] Ibid, 61-62
[20] Palmer (2006), 24
[21] Ibid
[22] Appointed in 1915 by the RF to determine the degree of Uncinariasis infection and study the impact of the infection to the health and working efficiency of the people in the Orient.
[23] Webb (2020), 2
[24] Hewa (1994), 74
[25] Ibid
[26] Ibid, 76

for parasitic infections.[27] Considering the rising cases of hookworm, a study was carried out by the British colonial Indian Research Fund Association (IRFA) in Negapam in the Madras Presidency from 1916 to 1923.[28] This study proved the very high prevalence of hookworm amongst coolies from plantations. Negapatam was chosen as a principal site of study because it was the main depot from where coolies were hired and send to plantations.[29] Also, according to the British, sick coolies brings economic loss. The IRFA study did not achieve desired results of lowering the infection rate citing cultural insensitivity from the locals. The idea of feces pollution insulted the upper caste notion of purity.[30] Hence, many Hindu labors were unwilling to collect samples for examination. This further accelerated the RFs frustration who were already facing challenge in garnering support both from the colonial officials and plantation owners.

Victor Heiser to China and India: The International Health Board Hookworm Survey

After his appointment as director of the east, Victor Heiser took a trip in 1915 of the East covering India, Ceylon, and British Malaya. He then travelled towards East Asia covering multiple countries which led him to Imperial China in 1916. Throughout his travels in the East, he encountered discouraging tones from the colonial officials. According to them, the East cannot be sanitated because of their attachment with ancient rituals and traditions which they were not willing to do away with. But Heiser on the other hand disagreed with their preconceived notion. He stressed the natural history of diseases stating disease never stays at home and has the tendency to contaminate those his clean neighbors. He reiterated as long as the orient remains disease-ridden, he would be a constant threat to the occident. Heiser was also concerned about the economic value of colonial labor emphasizing direct monetary value of labor lives with health and productivity. He echoed health in terms of both economic and humanitarian point of view.[31]

The widespread hookworm infestation in the British colonies through the flocking Tamil labors from southern India was already a known subject when Heiser started his travel towards the east. His stop in Colombo proved RF′s interest in pursuing the IHC′s anti-hookworm program in Ceylon, the prized British colony of the Orient. Apart from displaying interest in Ceylon because

[27] Ibid, 77
[28] Webb (2020), 3
[29] Palmer (2006), 115
[30] Ibid
[31] Heiser (1936)

of its economic prosperity, the RF had other palpable reasons for selecting Ceylon as the first colony in the Orient for implementing its full-fledged hookworm program. If the hookworm program in Ceylon proved to be successful, other British colonies would try to emulate it and thus would serve as an entering wedge in other places in the Orient. Since Ceylon was the hub of plantations, the RF had to first build ties with the large estates and make sure to secure the economic interests of the plantation owners. When the RF selected Ceylon as its first demonstration centre for hookworm program, there was an annual influx of about hundred thousand Tamil coolies with their families. The economic interests of the plantation owners and the RF coincided when Heiser was able to convince the Chairman of the Estate Agents Association who represented the landlords of England by assuring that the RF hookworm program would increase the number of healthy labors and productivity. It would both save the cost of hospitalization and provide an opportunity to breed their own cohort of labors. Many of the Tamil women in the plantations had become sterile because of the rising cases of anemia. Heiser explained to the chairman, if the woman could reproduce without any health issues, they would not have to bring in fresh labors but raise their own. This ignited the interest of the plantation owners and finally the RF was able to start its Ceylon anti-hookworm demonstration.[32]

After a series of hookworm campaign in Ceylon, it was now time to launch an attack on the epicenter of the disease, the Madras Presidency in southern India. Madras was considered as the radiating centre of rising infections because of its popularity in exporting huge number of Tamil labors to colonies across the Orient. After his duties in Ceylon were fulfilled, Heiser left for Madras. The perception related to eradicating hookworm voiced the same pessimistic tone as in other colonies, the task was impossible to achieve. Heiser started off by interviewing people in Delhi, Shimla and Calcutta trying to sell his idea of eradicating hookworm. In his many interviews, he discovered the source of authority to be Sir Charles Pandey Lukis, Director General of the Indian Medical Service (IMS). Immediately after, he planned a meeting with Sir Lukis to discuss his plans and RF′s interest in working with hookworm issue. Though he was not very convinced with the data on hookworm infection that Heiser produced, Sir Lukis was eventually receptive. One of the important tasks for Heiser was to influence the IMS officials. In the initial conversation, the IMS officials were not convinced regarding the number of infections as highlighted by Heiser.

[32] Heiser (1936), 327-331

To check this statement, they arranged their own survey and were astonished with the enormity of the problem. With the government of India finally freed from the obligation of war, they approached the RF to turn the newly discovered knowledge of hookworm disease to practical use. They started their hookworm survey by examining all the labors in emigration camps. After a succession of surveys, it was apparent that heavy infestations came from certain locations. The plan was to first clean up the source, the less infected centers would eventually become free of hookworm. By eliminating hookworm from those locations, the RF planned to move towards freeing the tropical world from the burden of hookworm.[33]

Heiser then took a trip to Peking in 1916 via Tokyo where the China Medical Board (CMB) was already working. His main mission in China was to open the 'golden window of the east' to the gospel of health by sharing the knowledge of science with an ultimate aim to being about overall health. while he was still stationed in Madras, the IHB had already started its hookworm survey in China through Dr. Norman Stoll and Dr. John Grant. Grant was one of the most intriguing personalities that Heiser had met during his work in the east whose popularity in China and Japan was unparalleled. Once in China, he realized the most daunting challenge of working towards public sanitation was prime importance of human excreta, also known as 'Night Soil,' for Chinese agricultural economy. He found the circulation of human disposal across rural and urban provinces kept the farming economy going since night soil was used as the primary fertilizer and was also widely available. Every night the night soil would be collected in wooden buckets by coolies and taken to barges along the river which are then pushed up the streams and canals. It was a common sight to see farmers purchasing those collected night soil from coolies for specifically using in their rice and mulberry farms. Most of the workers or farmers in those fields worked barefoot which becomes an easy target for hookworm. Thus, Heiser noticed a light infection had the tendency to carry the infections all around the country through the export/import of night soil. However, in Shanghai, Heiser was successful in convincing the authorities to build water purification plants and sewers.[34]

Unhooking the Hookworm: Rockefeller Foundation's Anti-Hookworm Campaign in Ping Hsiang Colliery and Madras Presidency

[33] Ibid, 340-343
[34] Heiser (1936)

The earliest recorded engagement of RF′s anti-hookworm campaign in China transpired through the IHB′s collaboration with the medical college of the Yale in China located in Changsha. Founded in 1913 by an agreement between the Yale-in-china mission and the Governor of Hunan, Tan Yankai, the Hunan-Yale medical college was directed by Dr. Edward Hicks Hume, a John Hopkins graduate. Through the establishment of the medical college, Dr. Hume sought to build a centre of modern medicine and scientific research in China modeled after his alma mater. Many cases of hookworm infection were observed in Hunan since the establishment of the hospital. When Dr. Hume was introduced to the public health interest of the RF, he saw an important source of funding for furthering his vision of developing modern public health in Hunan Yale. Finally, after acquiring a funding from the RF, the Hunan Yale medical college undertook a number of surveys on four selected sites from 1913 to 1916. These series of surveys discovered the mining district of Ping Hsiang with the highest number of hookworm infections. With the infection rate as high as 80 percent of the total population and 90 percent in underground miners, Heiser and Norris were convinced that although hookworm was difficult to overcome in China, it was important to at least address this issue in the mining colliery of Ping Hsiang. Compared to the agricultural districts, the mining area was more feasible to work on. Following this, the IHB approved a funding request from the Hunan Mining Board in 1917 for relief and control of hookworm. Taking Dr. Hume′s suggestion, the IHB appointed Dr. Yan Fuqing of Hunan Yale to direct the program with the help of Dr. John B. Grant of John Hopkins who was stationed as the IHB′s field director.[35]

The survey revealed high number of both surface and mine infections. Various estimates of the study showed; around 50 percent of the entire population, around 90 percent of the farming community with infections seen to be extremely widespread throughout the southern two-thirds of the country. The main and largest source of infection was seen to be the Canton Delta and the Yangtze valley. A 40 percent infection rate was shown in central and south China. Nearly all the mission hospitals located in Central China showed cases of hookworm infections. Hookworm disease in the south was mainly located in farming districts prevalent in lowland and paddy fields. In the Yangtze Kiang agricultural community, the infection rate reached as high as 90 percent. Hookworm disease is usually contracted to a greater extent through raw vegetables planted in the

[35] Jiang (1990)

farms in China. This claim is supported by the following facts observed in the study carried out by the IHB: hookworm ova was observed in the stools of Chinese women with bound feet who never walked barefoot; disease was also seen in a large proportion of Chinese merchants who, after staying in the US, returned to China for a year or so but did not engage themselves in any agricultural activities. Also, staying in the US had made them get use to the habit of wearing shoes which puts them in a lesser chance of contracting the disease; large proportion of hookworm was detected in people from Canton and Hongkong who have never lived in a rural district. Adding to this observation, study for surface infections also took place in the provinces Chihli, Shantung, Anhui, Chekiang, Kiangsu, Fukien, Kwantung and Hunan.[36]

Apart from high number of infections, many other factors favored the selection of Ping Hsiang Colliery. Firstly, it was the largest and most organized mines in China. Secondly, its underground working was extensive. And lastly, the German staff gave facility and opportunities to function smoothly. The mine was started with a collaboration between German engineers and Chinese company.[37]

The hookworm campaign in the mining colliery however was halted in the autumn of 1915 and the following winter following political upheavals when Yuan Shih-kai attempted to become the emperor by restoring monarchy. This attempt created political disturbances throughout all south China, making it impossible to extend the survey in Hunan over as wide an area as originally planned. Considering the unsettling political situation coupled with the need for urgent state of increasing hookworm infections, an effort of hookworm survey was made in the agricultural district of Changteh which was very distant from the mining areas. Followed by another survey at Shinwa, a smaller mining district located in the centre of the province, in the summer of 1916.[38] Subsequent to the approval from the IHB in 1917, a demonstration project was undertaken in Ping Hsiang in Kiangsi province. The first step of this project involved mass survey of the mining community in the Colliery. After observing the survey results which showed very high level of infections, on April 6th, 1918, the systematic examination and treatment of the employees from the mining community began. Inorder to extend provision towards the hookworm campaign, the mining corporation of the colliery gave financial support towards the cause. Part of this funding

[36] Reports China, International Health Board/Division, 1917, SFA (601), Box 55, Folder 352, Rockefeller Foundation, Rockefeller Archive Centre
[37] Reed (1914), 1137; Hume (1917), 1889
[38] Hume (1917), 1889

was used to establish a permanent sanitary department. The idea of establishing this department was to take over the hookworm work after the initial demonstration ended. A well-trained Chinese engineer was to be appointed to direct the new department.[39]

The coolies working in the mines lived in large boarding houses owned and operated by the company. The condition of the boarding houses was not ideal for a safe and hygienic environment. Latrines were located outside the boarding houses in the form of small brick structures. There were storage pits dug to collect the feces. The feces from the latrines are then collected by the farmers and taken to their fields. This arrangement in a way reduces the chances of contact with the infected soil for mine coolies. But on the other hand, feces which are carried away by the farmers from the mining to the farming locations tend to be highly infected. This created a situation where there was constant and large stream of hookworm infections which were distributed from the mining to the agricultural areas. It was found that, not only was controlling infection in the colliery important but at the same time efforts to stop the flow of infections from the mining areas to the rest of the country was equally essential.[40]

Hookworm parasites bred very easily in the rainy climate and wet soil of the coastal districts of Madras in south of India. The task of hookworm survey in Madras before the RF was taken over by the Indian Research Fund Association (IRFA). The survey was supervised under the guidance of Dr. K S Mhaskar of the King Institute of Preventive Medicine.[41] Following the RF's strategy, they started their work by first covering small communities of emigrating labor, plantation labor, agricultural labor, sweepers, police personals, factory workers, school children, hospital patients in Negapatam, rural Tanjore, Dindigul and Trichinopoly towns and convicts from Trichinopoly and Coimbatore Jails.[42] The surveys revealed a high rate of infections. The IRFA efforts consist of developing educational materials to inform the public about the dangers of hookworm infection and stressed the need to work on feces disposal. The sanitation education program of the IRFA was not successful in achieving its desired results.[43] The research epidemiologists were however appalled by the results of the survey undertaken. The research highlighted most of the infected individuals were apparently in good health and not showing any

[39] RF report (1918), 175
[40] Reed (1914), 1146-47
[41] Kavadi (2007), 131
[42] Ibid
[43] Webb (2020), 3

serious symptoms even with roundworm and whipworm infections. Cases relating to anemia and emaciation was rarely seen.

An inflammation of the sensitive areas between the toes and dermatitis which was a common hookworm symptom observed in the US industrial south was invariably absent in the survey carried out in the Madras presidency. Added to that, the scores on the hemoglobin indexes that determined anemia did not match up with the degree of hookworm infection. All this information created a web of confusions related to the diagnostic criteria for determining hookworm disease. Confusion around cure also created another conundrum. The survey unveiled those changes in feces disposal without the mere use of drugs would be adequate to bring down the rate of infections.[44] Bombarded with this new information, the RF soon realized that the strategies that worked for US South was not going to be effective in Southern India. The RF officials however decided to overlook the research findings and go ahead with their plan of execution.

"Infection rates were estimated between 52 per cent and 75 per cent for the general population, 70 per cent to 90 per cent for plantation labor and 65 per cent to 90 per cent for Indian immigrants to the colonies".[45] RF's annual report of 1922 reiterates this further by recording more than 36 million people being infected out of the total population of 40 million in Madras Presidency.[46] The RF started its hookworm campaign through the medium of education. For expanding this information, a convincing experiment was undertaken amongst 298 students at the Madras Medical College who were initially skeptical of the prevalence of the disease. The experiment found 241 of them infected with hookworm. The RF after this experiment hoped the cured doctors would advocate hookworm control in those districts where they undertake private practice.[47]

Another investigation by Lieu Colonel Clayton Lane carried under the auspices of the IRFA in a group of Tea gardens located in Assam revealed 63 percent of the 33,590 persons examined to be infected, and a second inquiry carried out by the same investigator under the same auspices, in the jails of Bengal presidency, demonstrated the infection of 71.3 per cent of the 12,570 prisoners examined. A total inspection of 26 jails showed a startling result of 47.9 percent

[44] Ibid, Palmer (2006), 116-117
[45] Kavadi (2007), 130
[46] RF Annual Report (1922), 130
[47] Ibid, 132-133

in the presidency jails of Calcutta and as high as 86 percent in the Hooghly jails.[48] The Tea estates were also chosen because of its special characteristics where the labor population could be kept under tight scrutiny. The campaign by Clayton encountered many challenges, from facing difficulties with getting cooperation from the population, fear of being enlisted in the army after being cured to clashes with cultural beliefs, there was a lot of distrust that accompanied the whole campaign. The collection of feces for the purpose of study was challenged with cultural beliefs which considered touching human feces with hands as an act of defilement which went against the Hindu notion of purity.[49] Inorder to gain support for his purposed campaign, Clayton had to convince the planters that controlling hookworm would bring labor productivity. Sure enough, investigations on the Darjeeling Tea estates did show improvement which was cited in a report by Clayton. In 1918, after the treatment had administered, there was improvements seen in the number of absent labors in the Tea gardens.[50]

When news of this campaign by Col Clayton reached Heiser, he was convinced that worker productivity was a major issue of concern related to hookworm disease. By April 1920, George Paul from IHB arrived in Madras to expand these campaigns. Paul became very discouraged with the workings of the campaign after some time. The lack of privies was causing the rise of reinfections. He informed Heiser about the overall situation of the hookworm problem. According to his observations, around 83 percent of Tamils were infected with hookworm disease showing moderate to severe clinical symptoms. Their physical condition was in very poor state which becomes an easy target for the disease to reside. He further explained, even if the plantation estates provide them with privies, the efforts become useless when they go back to their villages where the chances of reinfection are high. Very few urban areas had the resources to build privies, to find latrines in the rural areas was out of question. Open defecation was a common sight especially in the rural villages. The IHB realized that the mission to control hookworm in British India was clearly a monumental task.[51]

Rising Nationalism and IHBs Hookworm Campaign in China and India

[48] RF 1918, 113
[49] Farley 67
[50] Ibid, 124-26
[51] Farley 68

Rockefeller Foundation entered China and India at a time when both countries were looking for answers in modern medicine to as a means of regaining their lost sovereignty.

Britain experienced a weakened economy after the blow from the first World War. At the same time, Indian nationalist through the Indian National Congress was gaining momentum in its struggle to free India. This slowly loosened Britain's political grip in India. These developments led to the creation of India Act 1919.[52] This Act brought public health under the control of the provincial government.[53] This Act ensured Indians of their representation in the government sectors. It was a bargain made by the British Raj after the World War I to bring Indians closer instead of giving full freedom.[54] All matters related to medicine and public health came under the authority of the provincial governments. Following this Act, the Madras Presidency created a board of public health in 1920 but the board remained inactive most of the time.[55] Before this Act, colonel authorities had confined public health measures to European enclaves, except in cases of epidemics.[56] Because epidemics if not controlled, could become a threat to European lives. The post-world war witnessed a change from enclavist model to a more Indian centred model in public health. These changes brought about transference of public health authority from the central to the provincial government. Along with the transfer of power followed reduction in public health funding from the central government. The transfer of authority was not much about devolving power in the hands of Indians but more about retracting from the responsibility of public health in the guise of *laissez faire* policies.[57] The curtailment of funds would put the provincial government under unnecessary stress who were not well equipped to handle the whole responsibility. For provinces that were suffering from lack of funds, the coming of the IHB acted as a boon. Madras presidency was one such province which was facing the brunt of funding reduction. Hence, the coming of the IHB was more about consolidating funds and not much about the content of the program. The need for provincial governments to organize public health activities coincided with the RF's interest in taking up various public health activities. If the RF's funding support seemed favorable for the British officials who were already looking towards *laissez faire* policy with regard to public health, at the same time it played out well for the Indian nationalist who were

[52] Anwar (2017)
[53] Kavadi (2007), 133
[54] Anwar (2017)
[55] Kavadi (2007), 133
[56] Ibid
[57] Kavadi (1999), 7

looking for political authority. With growing interest in modern medicine, this development was further facilitated by advances in medical research, sanitary practices and growing Indian involvement.

When the IHB started its hookworm survey in China, the RF through the China Medical Board established in 1914 was already in the process of establishing an institution of scientific medicine in Peking. The entry of the RF in China coincided with reforms instituted by key Chinese leaders. The activities formulated by the RF in China happened within a changing intellectual context. The Foundation's scientific approach spoke to the new movement by Chinese intellectuals in its effort to campaign for science and criticize the old culture of traditional medicine.[58] With the demise of the Confucian education system in 1905 followed by the fall of the Qing dynasty, Chinese intellectuals were looking for new ways to strengthen the country's frail economy. Understanding that the old culture would not suffice to survive in the new world, China's elites gazed towards Western science for answers. Thus, the timing of the RF entry was a perfect fit for China's political situation. In contrast to the medical missionaries who had arrived centuries earlier, China was ready and welcoming to Rockefeller's gift of science.[59] China at the turn of the century offered a market for all types of 20th century progressive American reform. The rapidly growing interest in China was both accompanied by domestic and international affairs. It was the right mixture of economic, political, cultural and ideological factors.[60] The fear that "the Yellow Peril" might become a great threat if not addressed properly became the backbone of Rockefeller public health activities in China.[61] "The story of the RF china project reveals a unique case and a formative influence in the gradual shift of the quest to "reform" China from the efforts of missionaries to Christianize China to a larger secular attempt to westernize China".[62] In similarity to the Indian situation where hookworm campaign was influenced by labor productivity, the IHB's hookworm campaign in China was also driven by the same motivation. But unlike India, the IHB faced a very challenging domestic issue related to the use of Night Soil which was the prime resource of agricultural economy.

[58] Ma (1995), 3
[59] Bullock (2011), 47
[60] Ibid
[61] Borowy (2009), 43
[62] Ibid, 45

The Issues of Addressing Soil Pollution in China and India

The main reason for hookworm infection in both China and India was found to be soil pollution. Hookworm mostly inflicted poor people who worked barefoot on soil infected with hookworm larvae that has been shed in human feces. The larvae enter the body through the skin of the feet and migrate to the intestinal lining, where they feed on blood in the capillaries and lay eggs.[63] In China, addressing soil pollution was related to the widespread use of human feces as fertilizers in farming communities.[64] Night soil was one of the prime fertilizers and had a high commercial value. Dealing with that meant the IHB had to look for replacement for Nightsoil with economic value which proved to be a mammoth task and nearly impossible. In India, it was linked to access to water and proper sewage which was mostly concentrated in colonial enclaves. The survey also faced challenges with the Hindu religious beliefs of purity. According to Hindu religion, touching feces with hands was an act of defilement. Science and culture intersected in this whole process of the IHB's campaign against hookworm in China and India.

The economic importance of human excrement was also an important source of state revenue in China. Because of this reason, China had no provision for sewage system. The circulation of feces from the mining areas to the farmlands spreads the infection to a larger extent. Since most of the farmers who works in the fields infected with hookworm larvae are also employed in hundred thousand numbers as miners, the disease had the capacity to circulate throughout the country. The transfer of feces from urban to rural areas can also become a serious factor in spreading the disease to agricultural districts.[65] Relative to the disease distribution, it was found that sericulture cultivation in central and south China accounted for its spread whereas the climate in northern China was too cold for its spread. In some southwestern provinces it was however seen that the spread of the disease was most likely not related to sericulture but depended on the method of cultivation and the amount of fertilizer used.[66]

The RF's anti-hookworm campaign in India also faced difficulties related to public health education on sanitary measures. They cited high level of illiteracy as being conducive to the parasitic infections. The conditions were not altogether supportive. There was the elite Indian class who showed interest in matters related to sanitation and the provincial government who were

[63] Matysiak (2014), 21 and 45
[64] RF 1918, 175-176
[65] RF 1916, 63-64
[66] Couacaud (2014), 355

equally sympathetic of their efforts. However, since the campaign depended much on educating the public which they saw as a difficult task to achieve, the program did not yield the desired results.[67] Another reason cited was lack of support shown by British officials of the IMS to build latrines or privies coolies. The central government was willing to provide support only for educational campaign and treatment, building latrines was to be left to the village folks.[68] This created much hassle to solve the problems of soil pollution since according to them most of the rural folks did not understand the extent of the problem and at the same time building latrines would require financial help.

Conclusion

The IHB's anti-hookworm campaign opened door for the RF to enter the Asia in a large extent. The hookworm campaign in both China and India did not achieve RF's goal of eradication. Cases of rising reinfections challenged their campaign further. The RF realized improving sanitation and hygiene was a long and difficult process. Sanitary surveys proved to be expensive and very slow. Added to that, the sanitation program excluded non-medical concerns like social, political and economic concerns which was an important component of public health. China and India offered different problems with the IHB's hookworm program. It was important to include socioeconomic concerns, institutional and environmental factors with sanitation technology while dealing with Chinese and Indian populations. When the RF entered both China and India, they came with the preconceived notion of modern medicine's superiority which removed all spaces of dialogue with already existent indigenous system of medicine. The high value given to technological solutions to public health problems like hookworm missed the tree for the wood. Despite these disappointments however, the legacies created by the RSC was significant. The campaign had successfully instilled in public an interest towards scientific medicine and public health while encouraging programs in sanitation which in the days to come would become the blueprint of public health in both China and India.

[67] Kavadi
[68] Farley, 78