Urban History, **32**, 2 (2005) © 2005 Cambridge University Press Printed in the United Kingdom
doi:10.1017/S0963926805002981

'Stop kissing and steaming!': tuberculosis and the occupational health movement in Massachusetts and Lancashire, 1870–1918

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ABSTRACT: Historians have argued that American social welfare reformers looked to Europe for examples of successful programmes. This article provides a counter-case where a progressive American state, Massachusetts, developed public health reforms prior to their British counterparts. Social concerns about reducing cases of tuberculosis in Massachusetts' cotton manufacturing cities led to the transference of the public health discourse from the urban living environment to the workplace. This same relationship could have been applied within the Lancashire industry. Instead, the urban public health discourse focused on living conditions. In both countries, local and state political structures influenced health campaigners' actions.

Historians of Progressive Era labour legislation and public health have portrayed European governments as leaders in welfare provision, with the United States following their models.[1] In the late nineteenth and early twentieth centuries, Great Britain, in particular, has been characterized as moving towards a 'highly interventionist state apparatus', after it surpassed France during the mid-nineteenth century in terms of leadership in public health reform.[2] American Progressives, on the other hand, adopted many of the European urban sanitary reform initiatives.

* Research for this article was funded by the Economic and Social Research Council (Grant No. R000 22 3483) and the Wellcome Trust (Grant No. 066526). My thanks to Sally Horrocks, John Pickstone, Michael Worboys, Geoff Tweedale, the editors of *Urban History* and two anonymous reviewers for their comments on earlier drafts of this article.

[1] D. Rodgers, *Atlantic Crossings: Social Politics in a Progressive Age* (London, 1998), chapters 4 and 5; Melosi has argued that America adopted its sanitary systems from Europe, but the timing differed throughout the states due to local circumstances. M.V. Melosi, *The Sanitary City: Urban Infrastructure in America form Colonial Times to the Present* (Baltimore, 2000), chapters 1 and 3.

[2] La Berge persuasively argues that France provided the first model for public health in the late eighteenth and early nineteenth centuries, well before Britain. A.F. La Berge, *Mission and Method: The Early Nineteenth-Century French Public Health Movement* (Cambridge, 1992), esp. chapter 8. See also A. Sutcliffe, 'In search of the urban variable: Britain in the later nineteenth century', in A. Sutcliffe and D. Fraser (eds.), *The Pursuit of Urban History* (London, 1983), 263. For a broad summary of the history of European public health, see S. Sheard and H.

They were appealing because they ignored class and promised many community benefits.[3] Yet, on both sides of the Atlantic, the relationship between the working environment and this broader urban, public health movement has largely been ignored. Medical historians have analysed cotton workers in terms of their general well-being, including health, safety and compensation, or specific illnesses, such as byssinosis, and have emphasized industrial structures or the disease itself.[4] They have also stressed how Europe instigated many of these reforms before their American counterparts.[5] Rarely have scholars considered the urban and factory environments together. This article seeks to redress this imbalance with an example from the turn of the twentieth century when Massachusetts' doctors transferred the urban public health discourse surrounding tuberculosis, the primary health scourge of the time, to the weaving room floor with campaigns against the occupational practices of steaming and shuttle kissing and took them to the State Legislature for action. This was in marked contrast to Lancashire where the same public health concerns could have been applied to the same weaving practices, but were not. Instead, the institutions of governance, both central, with Parliament, and local, with the town councils, as well as physicians, kept separate the urban and factory environments. This article demonstrates that public health and medicine provide a distinct contrast to other welfare and labour issues, with Massachusetts' reforms pre-empting Britain's by many years.

Power, 'Body and city: medical and urban histories of public health', in S. Sheard and H. Power (eds.), *Body and City: Histories of Urban Public Health* (Aldershot, 2000), 1–16.

[3] Melosi, *Sanitary City*, 106; M. Keller, *Regulating a New Society: Public Policy and Social Change in America, 1900–33* (Cambridge, 1994), esp. 190–1. See also D.R. Goldfield and B.A. Brownell, *Urban America: A History*, 2nd edn (Boston, MA, 1990), 230; W.D. Miller, *Memphis during the Progressive Era, 1900–17* (Memphis, 1957), esp. 113. Two notable exceptions to this trend have been C. Sellers, 'Factory as environment: industrial hygiene, professional collaboration and the modern sciences of pollution', *Environmental History Review*, Spring (1994), 55–83, and A. McEvoy, 'Working environments: an ecological approach to industrial health and safety', *Technology and Culture*, 36, 2 (1995), S145–S172. However, Sellers stresses the importance of the Progressive Era 'development in industrial hygiene which later influenced post-World War II environmental policy', but barely considers work practices, see esp. 58; and McEvoy emphasizes relationships between technology, accidents and safety, not other work hazards.

[4] For example, M. Aldrich, 'Mortality from byssinosis among New England cotton mill workers, 1905–1912', *Journal of Occupational Medicine*, 24, 12 (1982), 977–80; E.H. Beardsley, *A History of Neglect: Health Care for Blacks and Mill Workers in the Twentieth Century South* (Knoxville, 1987); R.E. Botsch, *Organizing the Breathless: Cotton Dust, Southern Politics and the Brown Lung Association* (Lexington, 1993); C. Levenstein, G.F. DeLaurier and M. Lee Dunn, *The Cotton Dust Papers: Science, Politics, and Power in the 'Discovery' of Byssinosis in the U.S.* (Amityville, 2002); S. Bowden and G. Tweedale, 'Poisoned by the fluff: compensation and litigation for byssinosis in the Lancashire cotton industry', *Journal of Law and Society*, Dec. (2002), 560–79; L. Fowler, *Factory Acts: Laissez-Faire Interrupted* (Diskcopy Viewbook, 1987); A. McIvor, 'Health and safety in the cotton industry: a literature survey', *Manchester Regional History Review*, 9 (1995), 50–7; A. McIvor, 'Manual work, technology, and industrial health, 1918–39', *Medical History*, 31 (1987), 160–89; T. Wyke, 'Mule-spinners' cancer', in A. Fowler and T. Wyke (eds.), *The Barefoot Aristocrats: A History of the Amalgamated Association of Operative Cotton Spinners* (Littleborough, 1987), 184–96.

[5] C. Sellars, *Hazards of the Job: From Industrial Disease to Environmental Health Science* (Chapel Hill, 1997), esp. 40–3.

Science in relation to the ideology of health reform will only succeed if the institutions of governance, local and state, allow both policy innovation and the constituents to mobilize, and if these constituents allow the changes to be implemented.[6] The importance of these relationships in the late nineteenth and early twentieth centuries is evident through an examination of the local and state government structures in Lancashire and Massachusetts and the responses to the working as compared with the living environment. Britain's centralized government meant that legislative decisions came from London; however, town councils played a pivotal role in the interpretation and implementation of Acts of Parliament and, in some cases, opposed them.[7] Local health reforms had to be approved by town councils as ratepayers paid for them. While some town councils, such as Birmingham and Manchester, were active in battling what they perceived to be the contributors to high death rates, including poor sanitation, other councils, including Preston, Lancashire and Bradford, West Yorkshire, were more reluctant to invest money in improving their residents' health.[8] In these towns, councillors did not believe that the investment would bring sufficient return. Workplace health issues fell further down the priority list, as many town councils viewed these to be the duty of both the state, who should broaden and enforce its policies, and local employers. Furthermore, scientific and medical interest in air quality and diseases centred on the home, not the workplace or the outdoors.[9]

The United States' government comprised a federalist system where more power was held by individual states than the central government in Washington, DC. Prior to the 1930s, considerable variations in working conditions were found between states as individual state governments determined health legislation, not the federal government. Within this structure, Massachusetts was a highly autonomous political entity, being

[6] Koven and Michel make the former argument in relation to maternalist politics in France, Germany, Great Britain and the United States between 1880 and 1920. S. Koven and S. Michel, 'Womanly duties: maternalist politics and the origins of welfare states in France, Germany, Great Britain, and the United States, 1880–1920', *American Historical Review*, 95, 4 (1990), 1076–108.

[7] The strength of the British government in occupational health reform initiatives is emphasized in T. Carter, 'The biology of occupational diseases and the pace of prevention: an historical study of UK control measures', *Policy and Practice in Health and Safety*, 1, 2 (2003), 83–96.

[8] M.E. Pooley and C.G. Pooley, 'Health, society and environment in nineteenth-century Manchester', in R. Woods and J. Woodward (eds.), *Urban Disease and Mortality in Nineteenth-Century England* (London, 1984), 148–75; R. Woods, 'Mortality and sanitary conditions in late nineteenth-century Birmingham', in Woods and Woodward (eds.), *Urban Disease and Mortality*, 176–202; B. Thompson, 'Infant mortality in nineteenth-century Bradford', in Woods and Woodward (eds.), *Urban Disease and Mortality*, 120–47; R. Millward and F. Bell, 'Choices for town councillors in nineteenth-century Britain: investment in public health and its impact on mortality', in Sheard and Power (eds.), *Body and City*, 143–65; N. Morgan, *Deadly Dwellings: The Shocking Story of Housing and Public Health in a Lancashire Cotton Town, Preston from 1840–1914* (Preston, 1993).

[9] S. Mosley, 'Fresh air and foul: the role of the open fireplace in ventilating the British home, 1837–1910', *Planning Perspectives*, 18 (2003), 1–21.

a pioneer of Progressive legislation for both labour and public health, forming a State Board of Health (BOH) in 1869. Many city governments appointed local, voluntary, BsOH in the mid–1870s, which became mandatory from 1907. From the start, local and state BsOH focused on contagious diseases, placing preventive responsibility on physicians and epidemiologists, with a methodology that combined sanitary science with social reform.[10] Thus, science and the ideology of reform were incorporated into government policy at all levels. The BsOH authority grew during the latter quarter of the nineteenth century, as medical professionals' initial fear and resentment of state intervention into what they perceived to be their domain of health waned. Urban physicians, particularly those in the larger cities of Boston, Lowell, Fall River, Holyoke and New Bedford, realized that if they helped strengthen and broaden the powers of the local and state BOH, they could extend their powers and authority. As a result, city and town BOH physicians found it advantageous to show an active interest in the effect that local working environments had on their patients' health and to seek reforms at both the local and state level.[11] Industrial health was now firmly incorporated into Massachusetts' urban and state health agendas, which allowed for public and specifically occupational health concerns to be linked.

The unhealthy weaving practices: medical knowledge and the transmission of tuberculosis

Massachusetts and Lancashire were the worlds' two leading cotton manufacturers between 1870 and 1918 and both weaving trades practised steaming and shuttle kissing. Steaming involved adding artificial heat and humidity to cotton weaving rooms. High humidity and high temperatures were believed both to decrease thread breakages and to minimize dust levels from the size, a kind of glue commonly used to give cloth a heavier, firmer appearance. The practice rapidly increased during the American Civil War when the quality of available raw cotton was poor and continued into the twentieth century to allow the manufacturing use of many grades of cotton. The damp mill conditions and frequent recycling of water for humidifiers, along with cotton and size dust, created what were seemingly ideal conditions for the diffusion of contagious diseases, particularly in poorly ventilated weaving sheds. Thus, the specifically occupational hazards of fatigue and respiratory problems caused by dust

[10] B.G. Rosenkrantz, *Public Health and the State: Changing Views in Massachusetts, 1842–1936* (Cambridge, MA, 1972), 1–2.

[11] D. Rosner and G. Markowitz, 'The early movement for occupational safety and health, 1900–1917', in J. Walzer Leavitt and R. L. Numbers (eds.), *Sickness and Health in America: Readings in the History of Medicine and Public Health* (Madison, 1985), 507–21; Melosi, *Sanitary City*, chapter 6; J. Duffy, 'The American medical profession and public health: from support to ambivalence', *Bulletin of the History of Medicine*, 53, 1 (1979), 1–22.

were compounded by the public health risk of spreading contagious diseases such as tuberculosis.

Shuttle kissing was the practice of loading new cops (bobbins) of thread into weaving shuttles. After weavers placed a fresh cop inside the wooden shuttle, they placed the end of the thread against the shuttle eye, put their lips over the outside of the eye and sharply inhaled, thus drawing the thread through the eye, ready for use. During this procedure, weavers directly inhaled dirt, fine lint, size and potentially poisonous chemicals if the thread was dyed. Weavers repeated the process a minimum of 300 times per day and many years of weaving could cause respiratory illnesses. In addition, shuttles were rarely singular to one weaver. Other weavers or the overseer might also 'kiss' weavers' shuttles, raising questions about the risk of spreading disease, particularly tuberculosis.

Medical knowledge about contagious diseases was in its infancy in the late nineteenth century. The study of diseases correlated causes and cures and clinical consensus about the aetiology of a particular disease was rare. After Robert Koch discovered the tubercle bacillus in 1882 and that it was infectious, a new medical science was formed based on bacteria and scientific analysis. However, little progress was made toward understanding how diseases spread or what affected the outcome of infection, because while most physicians accepted the reality of Koch's bacillus, they debated its meaning and tried to fit its properties into existing ideas of contagion and their clinical experience.[12] Theories abounded, but they were all speculative, with Koch's being dominant in both Britain and America. For more than 40 years, Koch and his supporters argued that the tubercle infection was transmitted by dried sputum carried through the air by dust particles. Infection was unlikely through the inhalation of wet sputum from an ill person sneezing or coughing because it was too large and too heavy to remain airbound for long.[13]

Dr Charles Chapin, Health Officer for Rhode Island, proposed a competing theory to Koch's that fuelled Massachusetts' campaigns to ban the suction shuttle and added scientific 'evidence' to campaigns for reforming the humidification process and improving factory ventilation. Chapin believed that close and prolonged contact between people was necessary to spread the tubercle infection, rather than brief encounters with the bacilli in the air in the street. The primary place of infection was the mouth, rather than the lungs, which raised social concerns in New

[12] M. Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865–1900* (Cambridge, 2000), chapter 6, esp. 206.

[13] *Lancet*, 28 Sep. 1912, 869–70; *British Medical Journal* (*BMJ*), 3 Apr. 1915, 605; R. Koch, 'Aetiology of tuberculosis', *American Veterinary Review*, 13 (1894), 205–8; T.M. Daniel, *Pioneers in Medicine and their Impact on Tuberculosis* (New York, 2000), chapters 2 and 5; W. Mass, C. Levenstein and G.F. DeLaurier, '"Kiss of death": banning the suction shuttle in Massachusetts", in Levenstein *et al.*, *Cotton Dust Papers*, 16.

England factory towns about the connection between tuberculosis, spitting and kissing, which was then transferred into the weaving sheds.[14]

The medical establishment through the American Medical Association (AMA) acknowledged a relationship between dust, the spread of tuberculosis and the urban living environment, but not workplace.[15] It was Hermann Biggs, Chief Medical Officer for New York City's Health Department, who, in 1889, connected the infection and contagion of tuberculosis to dust and *any* close contact between people including in the workplace.[16] He convinced the New York Board of Health to require state notification of tuberculosis cases from 1894 and campaigned for education about tuberculosis prevention. Other northeastern states followed, with Rhode Island legislators requiring the notification of TB cases in 1894 and their Massachusetts' counterparts in 1907, with both states emphasizing prevention.[17] The Massachusetts' Legislature singled out the textile industries for close factory inspections because vegetable dusts, as opposed to animal, mineral or metallic dusts, were considered the most irritating to the throat, causing increased coughing and 'expectoration', thereby increasing the potential for transmitting TB.[18] Because the state BOH controlled public health matters and city BOH physicians reported directly to the state, factory town councils, particularly those in large cotton manufacturing towns of Lowell, Fall River, New Bedford, Holyoke and Chicopee were forced to address TB in the workplace. City councils had to either encourage manufacturers voluntarily to reform work practices or lobby the state to legislate on the issue to try and reduce the cases of illness. Most councils combined the two approaches, as their constituents were rarely united on the best way to respond to public health concerns in the workplace.

In contrast to New England, British medicine did not base itself around bacteriology until after 1895, and there was no medical consensus before at least 1900 that consumption was a contagious disease.[19] Instead of seeking and addressing environmental causes of disease, most doctors and social reformers emphasized personal responsibility, hygiene habits and morality as keys to disease prevention. Physicians accepted Koch's

[14] C.V. Chapin, 'The state of tuberculosis', Fiske Fund Prize Dissertation (1900); Mass *et al.*, '"Kiss of death"', 15–28; *Boston Globe*, 27 Mar. 1911.

[15] *Journal of the American Medical Association* (*JAMA*), 30 July 1887, 155; 3 Aug. 1889, 165–6; 23 Nov. 1889, 745; 31 Mar. 1906, 976; 29 Feb. 1908, 709.

[16] H.M. Biggs, T.M. Prudden and H.P. Loomis, *Report on the Prevention of Pulmonary Tuberculosis to the Board of Health of New York City, 1889*, as cited in Daniel, *Pioneers*, 113–16.

[17] 'An Act to Authorize the State Board of Health to Define What Diseases to be Dangerous to the Public Health', *Acts and Resolves*, Ch. 183 (8 Mar. 1907), 139; 'An Act to Provide for the Compulsory Notification of Tuberculosis and other Diseases Contagious to the Public Health', *Acts and Resolves*, Ch. 480 (6 Jun. 1907), 436–8; and D. Rosner and G. Markowitz, *Deadly Dust: Silicosis and the Politics of Occupational Disease in Twentieth-Century America* (Princeton, NJ, 1991), 22–3.

[18] *Annual Report of the State Board of Health of Massachusetts* (*ARSBHM*), 1904, 1906, 1909, 1911 and 1914.

[19] Worboys, *Spreading Germs*, 231.

discovery, but reserved bacteriological analysis for confirming clinical habits and judgements or for use in doubtful cases.[20] Therefore, while TB's contagion was accepted, the 'how' remained debatable and responsibility shifted from physicians to local sanitary authorities, including the Medical Officers of Health (MOsH).[21] Environment and public health reforms were primarily the responsibility of town councils, with only sporadic state involvement, making both industry-wide and regional policy innovation difficult. MOsH were directly responsible to their local councils and had to adhere to the councils' priorities, which hampered efforts to control TB in the workplace or caused conflict over whether notification was necessary, such as in Manchester. Local authorities were reluctant to regulate the cotton industry as it might provide economic advantages to manufacturers in neighbouring towns and general practitioners (GPs) were afraid of losing patients to the MOH.[22] As a result, Lancashire town councils, including those in Preston, Blackburn and Burnley, and their rate paying constituents prioritized the living environment. Addressing issues surrounding TB were further hampered because Parliament did not make compulsory the notification of TB until 1911.[23] Tackling TB in the workplace, including whether or not steaming and shuttle kissing spread TB, was difficult because medical opinion on these issues varied by and within towns. This was because most provincial doctors were slow to learn of developments in clinical and aetiological knowledge, leaving many on the margins of the profession.[24] While Massachusetts' doctors faced a similar problem, they benefited from their proximity to Boston and New York, which were increasingly becoming centres of medical and scientific knowledge and from the social movement for health reforms. Some Lancashire doctors, including Manchester's MOH, Dr Arthur Ransome, championed scientific developments, other MOsH, such as Preston's Henry Pilkington, held less interest due to their position in the local authority, or had less access to clinical developments in London or abroad. The lack of medical consensus about the aetiology of tuberculosis in Lancashire, the MOsH dependency on the town council for employment, their narrowly defined roles in medicine and their low status within the medical profession, minimized their efforts in campaigns for legislative reform and kept occupational health issues in the local domain.

[20] *Ibid*., 236 and 215.
[21] *Ibid*., 206–9.
[22] *Ibid*., 230.
[23] *Lancet*, 23 Aug. 1902, 536–8; Lancashire County Record Office (LRO) HRBL 2/1/5 *Blackburn Annual Reports for 1893*, 54; 2/1/6 *1894*, 46; and 2/1/8 *1898*, 76. A. Ransome, *The Causes and Prevention of Consumption* (London, 1890), as cited in Worboys, *Spreading Germs*, 230.
[24] LRO CBP/22/11 *Preston Annual Reports for 1888–89*, 12; 22/12 *1889–90*, 18; LRO CBP/22/38 A.M. Hewat, 'Report on tuberculosis', *Preston Annual Report 1915–16*, 8; LRO HRBL/2/1/1 *Blackburn Annual Report for 1887*, 9; Worboys, *Spreading Germs*, 201–11; and J. Woodward, 'Medicine and the city: the nineteenth-century experience', in Woods and Woodward (eds.), *Urban Disease and Mortality*, 65–78.

Lancashire, 1870–1910: the lack of unity about occupational health

The attitudes and efforts of individual MOsH towards public health reform greatly influenced the local discourse on occupational health reform. British historians have argued that during the nineteenth century, state-appointed MOsH played a key role in battling infectious diseases and sanitary reform in the urban living environment.[25] Yet it was also these urban doctors, not clinical scientists, who recognized workplace health hazards, treated the ill and injured workers, and some of whom sought reforms. Three contrasting cases of doctors' actions towards health in the workplace are found in Todmorden, Blackburn and Preston. In 1872, at the behest of the Todmorden weavers' amalgamation, Dr George Buchanan (MOH) analysed the effects that the steaming and sizing processes had on health. He concurred with the weavers that these practices caused various respiratory illnesses and leant his support to a document sent to Parliament requesting reform.[26] While weavers gladly accepted his support, response to this paper from either the town council or the state was minimal. In the principle cotton weaving town of Blackburn, the four MOsH between 1880 and 1911 promoted factory health reform, citing public health concerns, whereas their sole Preston counterpart during this period, Dr Henry Pilkington, did not. The Blackburn MOsH appealed to both local authorities and cotton manufacturers to reform work practices that could spread disease, including minimizing the spread of germs via workers' spitting, and the regular cleaning of dusty and dirty floors. They sought an end to steaming, arguing that when operatives left hot, damp weaving sheds in wet clothes for the cold winter air, they could contract consumption or other diseases.[27] Should steaming be deemed economically essential to the industry, to decrease the risk of contagion, the MOsH recommended that cloakrooms be provided, ventilation improved and clean water used in the humidifiers – with some success.[28] These campaigns gained the town councillors' attention because they fitted the broader urban public health agenda and were relatively inexpensive, with

[25] Daniel, *Pioneers*, chapter 6; C. Webster, 'Medical Officers of Health – for the record', *Radical Community Medicine* (1986), 10–14; J. Welshman, 'The Medical Officer of Health in England and Wales, 1900–1974: watchdog or lapdog?', *Journal of Public Health Medicine*, 19, 4 (1977), 443–50; G. Kearns, 'Town hall and Whitehall: sanitary intelligence and the relations between central and local government, the case of Liverpool, 1840–63', in Sheard and Power (eds.), *Body and the City*, 89–108.

[26] British Parliamentary Papers (BPP) 1872 (203) LIV, *Cotton. The Sizing Process Used at Todmorden and the Influence upon Health*. The Lancashire/West Yorkshire border ran through Todmorden until 1888, when the border was shifted so that all of Todmorden was in West Yorkshire.

[27] LRO HRBL/2/1/1 *Blackburn Annual Report for 1887* (Dr William Stephenson, MOH), 9; 1/3, *1891* (Dr Barwise, MOH), 26; *1898* 1/8 (Dr James Wheatley, MOH), 79, 66; 1/9, 76–9; and 1/10, *1902* (Dr Alfred Greenwood, MOH), 125, 143–4.

[28] LRO HRBL/2/1/3 *Blackburn Annual Reports for 1890*, 26; 1/8 *1896*, 60–1; 1/8 *1897*, 62–6; 1/10 *1902*, 143–4; *Public Health*, Feb. (1903), 284.

manufacturers' main investment being the provision of cloakrooms and improving ventilation, most probably with fans.[29] Shuttle kissing was not considered as dangerous to health. In 1911, sharing shuttles reputedly caused three cases of Blackburn weavers' consumption and death. The MOH, Dr Alfred Greenwood, dismissed shuttle kissing as the cause of illness after all three weavers were found alive.[30] Little clinical evidence supported a ban on shuttle kissing and a change of practice would require manufacturers to make a substantial financial investment in alternative weaving technologies, of which many were available including hand threaders and automatic looms.

In Preston, a combined spinning and weaving town, the approach to health issues differed. The MOH, Dr Henry Pilkington, believed only issues that directly affected the entire town, such as sanitation and urban planning, were the town council's responsibility. Similar to many other urban MOsH, including in Manchester and Birmingham, Pilkington worked to improve urban living conditions and successfully lowered the town's mortality rates.[31] He noted unhealthy working conditions, including the excessive use of steam in weaving sheds and considered these a contributory factor to weavers' high death rates from respiratory diseases, but he did not argue for reform.[32] Rather, Pilkington believed industrial reform was the responsibility of central, not local, government. Moreover, current legislation was adequate, including the Cotton Cloth Factories Act and the Factories and Workshops Act; it simply required effective enforcement by the Factory Inspectors.[33]

The actions of the MOsH from Todmorden, Preston and Blackburn demonstrate the extent of local variations in beliefs about the responsibility for health within a small region. The MOsH all held similar views of state responsibility for workers, in that costly workplace reforms for health improvements were a legislative responsibility, but they differed in how to bring about appropriate legislation. The Todmorden and Blackburn MOsH appealed directly to Parliament and their town councils for change, while Pilkington simply called for better enforcement of existing laws. Yet, as the Blackburn example demonstrates, one MOH could influence local factory

[29] The importance of cost in manufacturers' attitudes towards technological investment purely for health reasons is clear in E. Gaskell, *North and South* (Harmondsworth, 1854–5; 1970), 146.

[30] LRO HRBL/2/1/18 *Blackburn Annual Report for 1911*, 154; the Darwen MOH agreed that shuttle kissing was not dangerous to weavers' health, *Textile Mercury* (*TM*), 3 Jun. 1911, 448.

[31] Pooley and Pooley, 'Health, society and environment'; Woods, 'Mortality and sanitary conditions'.

[32] LRO CBP/22/18, *Preston Annual Report, 1896–97*, 16–17; Morgan, *Deadly Dwellings*, chapters 2 and 3; N. Morgan, *An Introduction to the Social History of Housing in Victorian Preston* (Preston, 1983), 46; Millward and Bell, 'Choices for town councillors', 158.

[33] LRO CBP/22/11 *Preston Annual Reports for 1888*, 12; 22/12 *1889–90*, 18; 22/15 *1892*, 11; 22/18 *1896*, 16–17; 22/25 *1902*, 17; and 22/26 *1903*, 17.

health reforms, demonstrating that the efforts of individual physicians were paramount to instigating local health reforms.

Physicians were less likely to achieve health reforms at an industrial, rather than local, level. They lacked a clinical consensus concerning the tubercular hazards associated with steaming and shuttle kissing, which hampered policy innovation. Articles in the *Lancet* and *British Medical Journal* called for further studies about the effects that inhaling dusty and damp air had on weavers' health.[34] Moreover, most physicians viewed weavers as case studies for health problems and as contributors to their own ill health, making connections between class, illness, heredity and unhealthy personal habits, but not type of employment. Most medical professionals kept to their assigned roles and chose not to seek out new problems.[35] Combined, class attitudes, the lack of consensus about TB's contagious properties and the MOsH deference to their employers' priorities diminished the MOsH power in effecting industry wide legislative factory reforms.

Factory Inspectors represented central government in local communities. Lancashire inspectors were initially sceptical about a relationship between work and illness, but by the late 1880s, this had changed, probably influenced by recent clinical developments. Dust inhalation was now considered 'one of the most unwholesome features of all cotton weaving where there is inadequate ventilation, and which contains fermentation cells, and other floating germs'.[36] As a result, in 1889 and again 1901, Factory Inspectors sought, and achieved, legislative regulation of steaming and ventilation in cotton weaving sheds. They did not seek abolition of the practice because manufacturers deemed steaming necessary for production and they overlooked the potential for disease to spread via shuttle kissing, either through dust inhalation or sharing shuttles. These were sanitary issues and were the local authorities' responsibility. The state sought to balance health concerns about Lancashire workers with national economic concerns and the vital role that the cotton industry played within this. The latter was the priority.

It was the Lancashire weavers from many towns, including Blackburn, Burnley, Preston, Nelson, Colne and Darwen, among others, who mobilized to take their campaigns to minimize occupational health

[34] *Lancet*, 15 Dec. 1883, 1049; 23 Feb. 1884, 359; 12 Jun. 1909, 1718; *BMJ*, 24 Jun. 1882, 952; 21 Apr. 1883, 782; 15 Mar. 1884, 520; and 12 Mar. 1927, 451; P.W.J. Bartrip, *Mirror of Medicine: A History of the BMJ* (Oxford, 1990), 9–11, 61–2; A. Wohl, *Endangered Lives: Public Health in Victorian Britain* (London, 1983), 199; J. Wheatley, 'Influence of the cotton industry on the health of the operatives', *Public Health*, Apr. 1896, 218–24; F.G. Haworth, as cited in 'Humidity in textile mills', *Textile World Record*, 34, 5 (1908), 565–7.

[35] Carter compares this and other administrative conventions to various occupational diseases at the start and end of the twentieth century. Carter, 'Biology of occupational diseases', 91.

[36] BPP 1884–85 [Cd 4369] XV, *Factory Inspector's Report*, 17; BPP 1892 [Cd 6720] XX, *Factory Inspector's Report*, 9; BPP 1896 [Cd 8067, Cd 8068] XIX, *Factory Inspector's Report*, 124; BPP 1899 [Cd 223] XI, *Factory Inspector's Report*, 286–91.

risks, including steaming, size dust and shuttle kissing from local to central government as they considered legislation necessary to achieve industrial health reform.[37] Although they did not always understand clinical explanations for disease contagion, their testimony at Home Office enquiries and in the operatives' newspaper, the *Cotton Factory Times*, demonstrates that weavers linked their ill health to the factory environment, especially the humidity, dust and tuberculosis, and that they used scientific explanations about their causes for evidence – possibly transferring some of the anxieties about harmful air pollutants in their homes to the factories.[38] In 1888 and again in 1906, the Weavers' Amalgamation petitioned Parliament to ban steaming in cotton mills on health grounds, but without widespread medical and societal support for change, they failed.[39] Instead, Parliamentary occupational health legislation focused on visible workplace hazards, including decreasing the number of accidents, providing compensation for injuries and improving factory sanitation. It neglected risks specific to individual tasks and invisible occupational illnesses – in this case, respiratory. Accidents, public health and occupational illnesses were distinct areas of government interest and responsibility in Britain. While some town councils, such as Blackburn, sought industrial reforms in the immediate area, the urban health agenda of most Lancashire town councils, including Manchester and Preston, prioritized building regulations, sanitation and sewers, over issues affecting specific occupations, industries or groups of individuals.[40]

Massachusetts, 1880–1918: the success of urban public responsibility

Progressive Era social reformers in Massachusetts sought to control work hazards, including accidents, hygiene, sanitation, ventilation and some specifically occupational risks, such as industrial poisons. Alongside this, welfare campaigners urged manufacturers voluntarily to improve safety

[37] Fowler, *Laissez-Faire*, chapter 3; BPP 1872 (203) LIV, *Cotton*; BPP 1889 [Cd 8348] XVIII, *Minutes of Evidence.*

[38] For example, *Cotton Factory Times* (*CFT*), 20 Jan. 1911, 7; 27 Jan. 1911; 11 Aug. 1911, 4; 1 Dec. 1911, 1; 10 May 1912; 1 Aug. 1913; BPP 1909 [Cd 4485] XV.657, *Report of the Departmental Committee on Humidity and Ventilation in Cotton Weaving Sheds* (Minutes of Evidence), 57, 61, 63; *Report of a Joint Conference of Employers and Operatives at Blackburn, Relating to the Ventilation of Cotton Mills, Held Monday, October 19, 1903* (Blackburn, 1903); Mosley, 'Fresh air and foul'.

[39] Neither the Blackburn nor Preston MOsH mentioned the 1906 and 1907 campaigns. *TM*, 8 Dec. 1906, 434; 5 Jan. 1907, 3; 9 Nov. 1907, 347; 30 Nov. 1907, 404; LRO DDX 1123/1/2/83 Results of the Ballot on the Question of Steaming in Weaving Sheds, 1906; LRO DDX1123/6/2/228 *Petition to Parliament against Heavy Sizing.*

[40] Pooley and Pooley, 'Health, society and environment', 148–85; Morgan, *Deadly Dwellings*, chapters 3 and 4.

standards and encouraged workers to avoid carelessness on the job.[41] Educational campaigns sought to teach people appropriate personal hygiene standards and practices. This broad reform movement influenced cotton town physicians, who combined these priorities with specifically local health concerns and those pronounced by the State Board of Health. The Massachusetts' BOH incorporated public interest in sanitary science into its agenda for preventing the spread of contagious diseases. They targeted densely populated factory towns where TB incidents were the highest in the state, including the cotton towns of Fall River, New Bedford, Lowell and Chicopee. The Legislature extended the Board of Health's authority into the workplace after scientists linked TB closely to the dusty trades in 1905. Cotton town BOH doctors gained the power to examine mill operatives for infectious and contagious diseases and to inspect working conditions. They repeatedly connected cotton dust with respiratory illness amongst operatives.[42] These urban public health doctors had acquired a clinical role that their British counterparts lacked, although their authority and willingness to act was limited. The legislation had not granted BOH doctors the authority to remove ill workers from the factory and raised concerns about preserving patient/physician confidentiality. For example, the Fall River BOH physician, Dr Adam MacKnight, saw cotton operatives as private patients and noted health problems ranging from occupational injuries to tuberculosis and other respiratory illnesses that he suspected were contracted at work. Yet, MacKnight found few operatives willing to file a report that stated the cause of their illness or injury and that included their name. This was because time off work reduced incomes that were already barely sufficient to survive; a tuberculosis diagnosis could have long-term economic repercussions for the patient's family; and, as a result, they would be unable to pay for medical care.[43] Thus, patient loyalty made local doctors reluctant to report tuberculosis cases to the State Board of Health, even after this became mandatory from 1907. Cotton town physicians argued that reporting TB cases broke doctor–patient confidentiality, infringed professional autonomy, challenged medical judgement and could end a physician's ability to prescribe individual treatments.[44] These professional limitations in aiding sick individuals led some local BOH doctors to strive for broader reforms at both the local and state level. They encouraged personal hygiene and safety, promoted

[41] Rosner and Markowitz, 'Early movement', esp. 518–20; Rosner and Markowitz, *Deadly Dust*, chapter 1; and Sellars, *Hazards of the Job*, chapter 3.

[42] *ARSBHM*, 1904, 1906, 1909, 1911 and 1914; *JAMA*, 31 Mar. 1906, 976; 29 Feb. 1908, 709.

[43] *Massachusetts Commission to Investigate the Inspection of Factories, Workshops, Mercantile Establishments and other Buildings, Hearing 1910* (*Hearing*), 254; and C. Gersuny, *Work Hazards and Industrial Conflict* (Hanover, NH, 1981), 37. Duffy, 'American medical profession', 10.

[44] H. Biggs, 'The administrative control of tuberculosis', *First Annual Report of the Henry Phipps Institute* (1905), 171, and G.D. Feldberg, *Disease and Class: Tuberculosis and the Shaping of Modern North American Society* (New Brunswick, NJ, 1995), 84.

employer welfare and took specifically local health concerns to the State Legislature for resolution through industrial regulation.

Medical men's collective urban health reform efforts included improving water supplies and sewage and refuse removal, as well as people's general health. They found partners with public-minded citizens and engineers, working under the banner of sanitary science.[45] In textile towns such as Lowell and Lawrence, they fought to switch water supplies from the polluted Merrimack River to local wells, while the towns of Chicopee and Holyoke underwent similar campaigns to prevent sewage being dumped in the water supplies. The water-borne bacteria were connected with the high death rates from certain water-borne diseases, particularly typhoid.[46] This campaign was transferred to public places, as 'knowledgeable' reformers posted circulars in public places and factories to educate the public about unhygienic private behaviours, including washing, spitting and kissing.[47] They appealed to their town councils to regulate or ban spitting in public places in an effort to minimize the number of TB cases. Cotton town physicians, such as MacKnight, transferred these urban hygiene campaigns to factory reform campaigns via the suction shuttle and brought them to the attention of the state BOH so that in 1906, the Board labelled the suction shuttle a 'bad, unhygienic habit', because the weaver drew 'into his mouth more or less fine lint and dust, which gives rise to spitting'.[48] While this description points to an occupational rather than a contagious disease, both the state BOH and local physicians emphasized the unhygienic practice of sharing shuttles.[49] In other words, physicians acknowledged that certain work practices were uncomfortable, but did not recognize any specific health risks attributable to dust inhalation. Instead, they focused on the dominant urban health discourse surrounding reducing the cases of contagious diseases and improving hygiene. However, it was because physicians in Fall River, Fitchburg, New Bedford, Lawrence and Lowell had linked the spread of contagious diseases in their towns to work practices that the state government was forced to include the latter in its public health agenda.

Cotton town BOH doctors, including those in Fall River and Fitchburg, also brought the practice of humidifying the weaving and spinning rooms to the State Board's scrutiny, by arguing that it held the potential to spread TB infected sputum through the spray.[50] This contributed to the

[45] B.G. Rosenkrantz, 'Cart before horse: theory, practice and professional image in American public health, 1870–1920', *Journal of the History of Medicine and Allied Sciences*, 29 (1974), 55–73, 57; M.V. Melosi, *Garbage in the Cities: Refuse, Reform, and the Environment, 1880–1980* (College Station, TX, 1981).

[46] Massachusetts State BOH, 23rd Annual Report [1903], 387–15; Rosenkratz, *Public Health and the State*, 102–5.

[47] Feldberg, *Disease*, 87, 88; National Association for the Study and Prevention of Tuberculosis, *Tuberculosis Directory* (New York, 1911).

[48] *ARSBHM*, 1906, 466.

[49] *Ibid*., 466.

[50] *Ibid*., 466.

Massachusetts' Legislature decision to pass a series of Acts between 1907 and 1910 that regulated humidity levels and atmospheric temperatures in the mills, increased ventilation requirements, mandated that only clean water be used for humidifiers and increased the BOH physicians' authority to address specific occupational practices that affected workers' health.[51] Combined, these Acts increased the state's authority to intervene in local communities and workplaces and affirmed a view of their responsibility for public health as incorporating both the city and the workplace. Moreover, the state still did not require specifically occupational illnesses to be reported unless there was an additional public health risk. Thus, any Legislative intervention in the workplace would have to aid the general, collective, health of the working population, not simply the health of individuals.

By 1910, local and state health agendas were firmly entwined. That year, a state investigation of the inspection of factories linked the spread of tuberculosis to weavers' sharing shuttles. During their investigation, legislators held hearings in the neighbouring cotton towns of Fall River and New Bedford, considering testimony from weavers, union members, Factory Inspectors and medical professionals. Fall River weavers Joseph Parks, representing organized labour, and Charles Rafferty, who was also a shuttle inventor, Joseph Jackson, a former mill worker and secretary of the Slashers' Tenders' Union, and Matthew Hart of New Bedford, representing both weavers and the Textile Council, all testified that using the suction shuttle caused respiratory problems and spread contagious diseases. They described the health risks in the language of the dominant health discourse of TB, although some witnesses clearly described other illnesses, including byssinosis, the disease whereby operatives' lungs are slowly clogged with cotton dust over years of exposure.[52] Their arguments for banning the suction shuttle emphasized the economic and collective health benefits of such legislation. Rafferty argued that 'if the operative fails in health and fails in wealth, the State fails in wealth'.[53] Jackson sought the end of the suction shuttle, 'not for the sake of the individual, but for the sake of the general public health'.[54] Emphasizing the benefits to public health and safety and the state's economic prosperity rather than specific occupational illnesses affecting individuals was necessary to gain the attention of legislators who did not want to place restrictive legislation on the state's largest industry, but who sought to improve the populations' general health. Moreover, operatives did not possess the medical knowledge or terminology necessary to describe byssinosis; whereas the TB education campaigns meant that most workers had some knowledge about its aetiology. Cotton town physicians had succeeded,

[51] *ARSBHM*, 1907, 2; 1909, 766; 1910, 458, 462 and 512.
[52] *Hearing*, 8–10, 231–2, 244; herpes was also a concern, 294–8.
[53] *Ibid*., 231.
[54] *Ibid*., 244.

with the help of social reformers, in adding the workplace to both the local and state's public health reform agendas at both the local and state levels.

Physicians from both the state BOH and the textile towns provided 'expert' testimony about the public health risks from sharing shuttles. For example, Dr William C. Hanson, assistant secretary to the State Board of Health, believed using the suction shuttle was unhealthier than sharing a drinking cup and recommended the practice be regulated 'to a certain extent'.[55] Dr William Hall Coon from Lawrence thought it dangerous when 'a person ill with tuberculosis has left the mill and a spare hand comes in and takes that shuttle'.[56] There was also the dramatic testimony of Dr J.W. Coughlin from Fall River, which was the culminating speech for persuading the hearing that legislation banning the suction shuttle was necessary. He stated:

> I am interested, Mr. Chairman, in the protection of those who use an instrument like this [a shuttle] because I believe if there to be in this whole State an instrument of greater destruction, I do not know it. I believe that is a curse, and the greatest menace that has ever confronted the operative who is compelled to earn his bread by its use. I believe that no human lips can touch that wood that has become infected by the virus of tuberculosis without imparting it to the lips of a virgin constitution and ultimately impregnating that constitution and destroying that life . . . ;
>
> Now I won't say that families have been disrupted by death by infection from this source, I have got no proof that this is so. Inferences are not facts, Mr. Chairman; and yet I have seen conditions that have led me to believe that death has come from the shuttle . . . What must the danger be in that, where the weaver, wavering and tottering at her looms, whose life is almost on the verge of extinguishment, who goes home and dies of tuberculosis and an innocent operative comes and sucks that shuttle . . . [taking] possibly, some of that dry [tubercular] material down into her lungs containing the fine virus when it may be said to be in the most virulent state, which we know will cause death.[57]

Although Coughlin admitted a tenuous link between sharing shuttles and tuberculosis deaths, his emotional appeal stressed local health risks. The testimony of cotton town physicians about the health dangers in their cities allowed them to enter the state political arena and argue for preventive medical-industrial legislation. These physicians had made the vital connection between health and work, and broadened the public health agenda to include the workplace.[58] This, combined with education campaigns informing citizens about the dangers of the tubercle bacillus, meant that the state had acquired the authority to regulate industry for the public good. The 1911 Massachusetts' legislation banning the suction shuttle was passed from the desire to decrease the spread of

[55] *Ibid*., 133–4.
[56] *Ibid*., 637.
[57] *Ibid*., 246–7.
[58] Mass *et al*., '"Kiss of death"', 27.

TB.[59] The prevention of a potential occupational health risk, byssinosis, possibly caused by years of weaving with a suction shuttle, was purely coincidental. State Medical Officers did not relate using the suction shuttle with respiratory ill health, nor was the state interested in occupational illnesses without a connection to contagious diseases and even this interest was marginal, as the legislation was not rigidly enforced. The state was interested in the collective health of working populations, not that of individuals. The methods for achieving this goal included reducing contagious and infectious diseases, preventing accidents and injuries and providing compensation for those injured.[60] All three were similar to the British government's priorities. The difference lay in that the Massachusetts Legislature held an open view about the remits of public health that allowed local doctors to attach the workplace to the agenda, whereas the British government held a limited definition of urban public health responsibility.

The following year saw the social concerns about contagious diseases further influence reforms in the Massachusetts' cotton weaving industry with a state-commissioned clinical study to determine relationships between humidification techniques and the spread of disease. Published in 1912, this study demonstrated that in weaving rooms where spray humidifiers were used, the bacteria count was far higher than in rooms without such devices.[61] It emphasized the epidemiological theory that germs were carried in wet droplets and transmitted to others through inhalation or direct contact and incorporated concern about operatives' fatigue from long hours working in hot, humid rooms, an issue about which some manufacturers also expressed unease.[62] The results were related to the state's goal of improving the well-being of urban dwellers and they persuaded many cotton employers voluntarily to lower humidity levels and/or change technology to 'germ free' humidifiers, believing that improvements to workers' health would correlate with increased productivity. This concern was a natural by-product of the Progressive Era, where employers tried various forms of welfare to stem increasing urban

[59] *Fall River Daily Herald*, 9 Jan. 1911.

[60] A. Bale, 'America's first compensation crisis: conflict over the value and meaning of workplace injuries under the employees' liability system', in D. Rosner and G. Markowitz (eds.), *Dying for Work Health in Twentieth-Century America* (Bloomington, 1989), 34–52.

[61] Bacteria concentration was highest under the sprayers. H.W. Clark and S. DeM. Gage, 'A study of the hygienic condition of the air in textile mills with reference to the influence of artificial humidification', *44th Annual Report of the Massachusetts State Board of Health* (1912), Pub. Doc. No. 34, 661–81, 1306–9.

[62] Feldberg, *Disease*, 88; D. Rosner, *A Once Charitable Enterprise: Hospitals and Health Care in Brooklyn and New York, 1885–1915* (New York, 1982), 5; Chapin, 'State'; B. Bahr Peterson, 'Industrial architecture from the inside: textile mill design and the factory workplace, 1860–1920', in R. Weible (ed.), *The Continuing Revolution: A History of Lowell, Massachusetts* (Lowell, 1991), 203–5.

labour unrest without impeding production.[63] While cotton manufacturers never entirely committed themselves to welfare or the state's urban health agenda, their successful efforts at weaving without spray humidifiers could be viewed as a four-fold success: workers' health improved as the potential spread of contagious diseases decreased; productivity increased as workers' fatigue decreased; further legislative intervention in industry was prevented by the voluntarily reduction of a potential public health risk, and responsibility for operatives' health was returned to the workers.[64] Yet, some Massachusetts' cotton manufacturers, including in Fall River, New Bedford and Lowell, as well as their southern counterparts, ignored the scientific advice about atmospheric controls or chose not to invest in new technology. As a result, workers' complaints about high levels of heat and humidity in some weaving rooms persisted after World War II.[65] At this historical juncture, the joint social and public health agendas of the Massachusetts' public and Legislature allowed city BOH physicians to mobilize the support of other local physicians, labour, engineers and social reformers to influence state policy and to pressurize local businessmen, without their unanimous support.[66]

Thus, occupational health reform in Progressive Era Massachusetts evolved as cotton town physicians expanded the public health discourse to incorporate both the urban living environment and the workplace, and as they gradually pushed this on to the state's health agenda. It briefly united doctors, workers, legislators and occasionally business to lobby towards this common goal. Although this unity of urban living and workplace health discourses was short-lived, as was reformers' influence on state policy due to the increasing influence of business on government, these early reforms mark the beginning of factory reform for illness prevention.

Lancashire, 1910–18: continued disunity

The expansion of preventive medicine in Lancashire factory towns was limited by the MOsH successes at urban sanitary reform and the common idea that public health and hygiene reform only included structural works, such as building sewers and improving water supplies.[67] Although the MOsH remit broadened during the late nineteenth and early twentieth centuries, the factory health agenda focused on sanitary reforms, which fitted the urban, Lancashire and national health priorities. However,

[63] N. Mandell, *The Corporation as Family: The Gendering of Corporate Welfare, 1890–1930* (Chapel Hill, 2002); A. Hepler, *Women in Labor: Mothers, Medicine and Occupational Health in the United States, 1890–1980* (Columbus, OH, 2000).
[64] The latter argument is also found in Hepler, *Women in Labor*, esp. chapter 4.
[65] In 1922, the Massachusetts Legislature further regulated humidity levels. Beardsley, *History of Neglect*, 70–1, 211–17, 224–5.
[66] For a discussion of women's influence on welfare reform and the importance of the state in the development of social welfare programmes, see Koven and Michel, 'Womanly duties'.
[67] Hardy, 'Public health', 128–42, 141–2.

some Lancashire MOsH continued to lend professional support to their local weavers' health reform campaigns. For example, in 1910, the MOsH for Bacup, North Burnley and Nelson attributed the spread of tuberculosis in their towns to weavers' sharing shuttles, with contagion via the sputum left on the shuttles.[68] These health risks were defined within the urban public health discourse; however, the weavers added the specifically occupational concern of dust inhalation.[69] In 1911, the Amalgamated Weavers' Association enquired of their Lancashire members their objections to the suction shuttle. The principle complaint was the risk of spreading diseases, followed closely by injuries to teeth and inhaling dirt and dust into their lungs.[70] Several branches cited their MOH and other local physicians' support for their claims. With no single health risk attributable to the practice to unite reformers or a clear medical consensus about any relationship with TB, as well as manufacturers' strong opposition to government regulation of business, there lacked a strong case to ensure that the issue reached the Parliamentary agenda before the Massachusetts' ban.

The Massachusetts' legislation forced Parliament to consider the Lancashire weavers' health concerns. A committee was appointed to investigate the alleged health hazards associated with the use of the suction shuttle in the cotton towns. The members collected evidence from Lancashire MOsH, certifying surgeons, local doctors and dentists, whose testimony took priority over that of the weavers. The majority of Lancashire MOsH (89 per cent) continued to use the 'hygiene' discourse for describing the hazards of shuttle kissing. They believed that it should be 'rendered unnecessary', because sharing shuttles either contributed to cancer of the mouth, tuberculosis, tonsillitis, phthisis, tooth decay or diphtheria. Other doctors testified that there were no apparent health risks attached to the practice.[71] Yet, all physicians ignored the potential respiratory dangers from inhaling dust and dirt and mostly linked these issues to urban living. The condemnation of the practice by many local MOsH directly confronted town council and Parliamentary policy questions – the liberty of the individual versus the good of the state; immediate economy or long-term economic investment in technology, health and labour.[72] To resolve this dilemma, the committee collected testimony on the issue from other countries, including the United

[68] BPP 1911 [Cd 5693] XXII, *Factory Inspector's Report for 1910*, xviii and 191; *CFT*, 12 May 1911, 1, and 24 Feb. 1911, 8; and LRO DDX 1123/6/2/129 Amalgamated Weavers' Association Papers, Shuttle Kissing File, letter from town clerk J. Entwistle to mill owners, 10 Jan. 1911.

[69] For example, *CFT*, 20 Jan. 1911, 7; 27 Jan. 1911, 7; 17 Feb. 1911, 7; 24 Feb. 1911, 1.

[70] LRO DDX 1123/6/2/129 Shuttle Kissing File, 1911.

[71] BPP 1912–13, [Cd 6184] XXVI, *Report to the Home Office and to the Local Government Board upon an Inquiry into the Alleged Danger of the Transmission of Certain Diseases from Person to Person in Weaving Sheds by Means of 'Shuttle-Kissing'* (hereafter *Shuttle-Kissing Report*), 81–104; LRO HRBL 2/1/18 *Blackburn Annual Report for 1911*, 154; A. Clarke, *The Effects of the Factory System* (Littleborough, 1899; 1985), 43.

[72] Hardy, 'Public health', 131.

States. This evidence was later declared 'unreliable' without a clear explanation, but was possibly in response to the Cotton Employers' Association's arguments that manufacturers maintained the interests of all aspects of their industry, including their workers' well-being, and that government intervention would cripple the trade.[73] The committee concluded that shuttle kissing was both unpleasant and unsanitary and that it *could* allow for the transmission of disease between two people. Nevertheless, as no individual case of disease contagion had been found, and without a consensual argument from the Lancashire constituencies, or a clear link to the public health agenda, Parliament refused to ban the practice as a preventative measure for the collective well-being of labour. Instead, they recommended that disinfecting shuttles and weavers' regular cleaning of their teeth should suffice.[74] The state had absolved itself of the responsibility for health policy innovation in the workplace and deflected responsibility for disease prevention back to individuals, requiring weavers to reform their work practices and personal hygiene.[75] In 1913, in response to their Lancashire constituents' continued complaints, Parliament conceded to establish a Shuttle Kissing Committee to conduct further enquiries about whether a new threading device was economically practicable – not whether it was medically necessary. This clearly demonstrated that policy priorities emphasized economic interests before workers' health.

Cotton town physicians and weavers were now forced to revise their arguments for reforming unhealthy work practices to incorporate an economic discourse and to seek reforms from both local and state government. For example, in 1915, Mr A. Middleton Hewat, Preston's Tuberculosis Officer and Assistant MOH, attributed weavers' high rates of tuberculosis, the highest of any group of Preston cotton operatives, to the sharing of shuttles, advocating 'the substitution of a hand-threaded shuttle or a mechanical shuttle-kisser'.[76] Hewat pointedly did not mention the Northrop Loom that was developed in Massachusetts and which automatically loaded shuttles with new cops of thread, raised production speeds for many types of cloth and which was increasingly popular amongst Massachusetts' employers.[77] While Hewat probably knew of the Northrop as there were over 5,000 in use in Lancashire, including at the

[73] A.J. McIvor, *Organised Capital: Employers' Associations and Industrial Relations in Northern England, 1880–1939* (Cambridge, 1996); A. McIvor, 'Cotton employers' organisations and labour relations, 1890–1939', in J.A. Jowitt and A.J. McIvor (eds.), *Employers and Labour in the English Textile Industries, 1850–1939* (London, 1988), 1–26.

[74] BPP 1912–13 [Cd 6184] XXVI, *Shuttle-Kissing Report*, 90.

[75] In early twentieth-century Birmingham, the MOH and city officials also emphasized individual responsibility for health in order to triumph over circumstance, in this case, tuberculosis. M. Niemi, 'Public health discourse in Birmingham and Gothenburg, 1880–1920', in Sheard and Power (eds.), *Body and City*, 123–42.

[76] LRO CBP/22/38 Hewat, 'Report', 8.

[77] W. Mass, 'Mechanical and organizational innovation: the Drapers and the automatic loom', *Business History Review*, 63, 3 (1989), 876–929; I. Feller, 'The Draper loom in New England

Preston firm Horrocks, Crewdson and Co., he considered the financial implications to local manufacturers by mentioning cheaper technological alternatives.[78] Factory reform campaigns now centred on economic issues at both the local and state levels, with both public and occupational health issues being marginalized, unlike in Massachusetts where these had been linked.

World War I interrupted industrial reform efforts, but they resumed afterwards. In 1919, the Parliamentary Shuttle Kissing Committee classed the practice as a technological issue alongside accidents and injuries. They recommended abolition of the suction shuttle and the substitution of an alternative technology, but delegated the final decision to local governments and businesses. The Lancashire town councils refused to take a stance and left the decision to the industry. The Weavers' Amalgamation endorsed the Parliamentary recommendation, but sought to appease manufacturers. They conceded economic practicalities about new technologies with exemptions for classes of cloth where hand threaders were impracticable and a five-year phasing in period to deplete current stocks of shuttles.[79] The Lancashire Cotton Spinners' and Manufacturers' Association rejected the weavers' compromise, opposing a mandatory ban of suction shuttles on the principle that manufacturers needed the freedom to conduct business as they saw fit. However, they agreed to recommend the use of hand threaders where possible, provided operatives agreed to use them. Again, responsibility for workplace health had been deflected from central to local government and industry, from local government to industry, and from manufacturers to individual operatives. Both state and local government refused to place the health of workers before economics, listening to the voice of the minority, business, rather than the majority of their Lancashire constituents and experts – the cotton weavers and physicians.

The interwar economic slump enabled manufacturers to ignore their agreement, as industrial survival took priority. Thereafter, physicians faded from the debate as business practicalities took priority over workers' health. The Lancashire Weavers' Amalgamation led initiatives to find efficient, cost-effective technological alternatives to the suction shuttle through negotiations with local manufacturers. When Parliament finally banned the practice in 1952, it was because suction shuttles were no longer

textiles, 1894–1914: a study of diffusion of an innovation', *Journal of Economic History*, 26, 3 (1966), 320–47.

[78] The Amalgamated Weavers' Association reported 5,409 Northrops in use in 1911, concentrated in Hyde, Hadfield, Bury, Stockport, Ramsbottom and Blackburn. LRO DDX 1123/6/2/365 *Shuttle Kissing File*, Accrington Report. Alternative methods of threading shuttles were discussed in *Textile Manufacturer*, e.g. 15 Aug. 1913, 269; 15 Mar. 1915, 83–4; and 15 July 1920, 209.

[79] LRO DDX 1123/6/2/129 *Shuttle Kissing File*, resolution sent to the Superintending Inspector of Factories, by Jos. Cross, secretary of the Amalgamated Weavers' Association, 16 Feb. 1920.

technologically efficient or necessary. No health risks were attributed to the practice, nor did town councils or the public visibly accept any responsibility for workers' health.

The steaming story is similar, with the lack of consensus about health risks, a belief in its economic necessity for manufacturing cloth and the state deflecting responsibility for health to local authorities and individuals. In both 1911 and 1914, the Home Office collected testimony from various Lancashire towns, including Blackburn, Preston, Darwen and Great Harwood, about the effects that working in a hot, humid environment had on the industry and operatives' health. The weavers highlighted fatigue issues; the overlookers stressed the discomfort of humidity and wearing damp clothes when leaving the shed; the manufacturers highlighted the economic necessity of steaming; and the physicians attributed various health problems to the use of steam, including stunted growth, but they emphasized that abolishing the practice could not be justified purely on medical grounds, and did not connect the issue to broader public health concerns.[80] The voluntary reductions/reforms in the use of steam by Massachusetts' manufacturers and Clark and Gage's 1912 Report on the hygiene effects attributable to the use of humidify went unnoticed in Lancashire. The physicians' testimony enabled manufacturers to convince the home secretary that as steaming posed no definite health risk to workers and was essential for the weaving process it should not be banned.[81] Despite this setback, the Lancashire weavers continued their campaigns for the legislative abolition of, or at least further regulations for, humidification. After World War I, there remained a lack of a united medical condemnation of the health risks attributable to steaming. The practice was declared merely uncomfortable.[82] As a result, Lancashire town councils and Parliament saw little reason to interfere in industry. Over the next fifteen years, several Lancashire MPs submitted private members' bills to Parliament to reform and further regulate the practice – with little success. Cotton manufacturers successfully denied that steaming posed any health risks; blamed the victims for their own ill health; deemed the practice vital to industrial production and prevented its abolition by convincing Parliament and town councils this was an industrial issue, not a governmental one.[83] Weavers' campaigns to ban the practice essentially

[80] LRO DDX 1123/6/130 UTFWA Report to the Home Secretary, 26 Feb. 1914, 59; BPP 1911 [Cd 5566] XXIII, 807, *Second Report*.

[81] BPP 1911 [Cd 5566] XXIII, 807. *Second Report*, 1–10, 24–5. LRO DDX 1123/6/130 UTFWA Report to the Home Secretary, 26 Feb. 1914, 59.

[82] S. Wyatt, *Variations in Efficiency in Cotton Weaving* (London, 1923); *Atmospheric Conditions in Cotton Weaving* (London, 1923); *Report of the Departmental Committee on Artificial Humidity in Cotton Cloth Factories: With Appendices* (London, 1928).

[83] McIvor, 'Cotton employers'; McIvor, 'Health and safety', 55. LRO DDX 1123/6/130 UTFWA Report, 26 Feb. 1914, 55; LRO DDX 1123/6/2/129 Notes from a Conference between Employers, Operatives and Inspectors, concerning the Fencing of Machinery, etc., in Cotton Weaving Factories, 13th Meeting, 7 Nov. 1928.

ended after Home Office Reports in 1927 and 1928 'proved' that steaming was not detrimental to health and aided weaving.[84] Manufacturers now had national government and medical support for their claims that weaving was a healthy occupation and they could avoid changing work practices and responsibility for weavers' claims of ill health.

The minimal factory health reform in Lancashire, as compared with Massachusetts, does not demonstrate a complete inactivity in the area of reforming working conditions. In many Lancashire towns, the MOsH improved factory sanitary standards and ensured the regular use of clean water for humidifiers. Thus, they extended public health to include sanitation but not issues specific to occupations. At the state level, they had aided the anti-steaming campaigns that resulted in regulations of the practice with the 1901, 1907 and 1911 Factory Acts.[85] However, unlike their Massachusetts' counterparts the physicians did not utilize clinical knowledge to connect steaming with the public health discourse surrounding contagious diseases, especially TB. Without a broadening of the definition of public health to include both the city and the workplaces, Parliament continued to emphasize an urban living discourse. Not surprisingly, town councils and MOsH adopted this focus and successfully reduced cases of infectious disease and improved sanitation and people's nutrition – to the neglect of the workforce.[86]

The key problem hindering the reform of unhealthy work practices in the Lancashire weaving industry lay in perceptions of responsibility for workers' ill health. Unlike in Massachusetts, the region had not developed a widely inclusive definition of public health. Rather, manufacturers and city officials firmly separated the public health of the city from the private health of the individual. The visible, urban environment was the focus of the Parliamentary health agenda. While some local exceptions have been discussed, most Lancashire MOsH fitted their scientific knowledge about disease contagion to this agenda, rather than addressing related issues in the workplace, whereas their Massachusetts' counterparts considered both. The resulting lack of professional medical and clinical consensus about the ill-effects to health from steaming and shuttle kissing; the emphasis on the urban living environment; manufacturers' strong opposition to governmental intervention (local and state); and the deflection of responsibility for health by the different groups, makes it unsurprising that occupational health regulation was repeatedly delayed.

[84] A. Bradford-Hill, *Artificial Humidification in the Cotton Weaving Industry. Its Effects upon the Sickness Rates of Weaving Operatives* (London, 1927), IHRB Report No. 48, and J. Jackson (chair), *Home Office Report of the Departmental Committee on Artificial Humidity in Cotton Cloth Factories* (London, 1928), 218–22.

[85] LRO CBP/22/11 *Preston Annual Report for 1888*, 12; *TM*, 5 Jan. 1907; LRO HRBL/2/1/15 *Blackburn Annual Report for 1908*, 203–5 and 1/18 *1911*, 245.

[86] Welshman, 'Medical Officer'.

Conclusion

During this period and earlier, the British government, far more than the American, either federal or state, has been associated with government intervention and social reform, albeit frequently with a cautious tone.[87] This article has demonstrated a counter-case where early twentieth-century Massachusetts' Progressives assigned environmental rather than individual responsibility to the spread of tuberculosis in weaving sheds – much earlier than their British counterparts. It has highlighted how institutions of governance operated differently at both the local and state level in Massachusetts and Britain to influence the campaign for health reforms in the cotton weaving industry. The Massachusetts' case was unique in America, with few other state governments taking significant interest in workplace health. It was a state-wide belief in a definition of public health that incorporated both the living and working environments that was the key influence behind the State Legislature's decision to ban shuttle kissing and a broad acceptance of clinical science, including experts' explanations of the health risks attributable to steaming. Local physicians made the vital connection between health and work, tapping social concerns about tuberculosis and transferring them from the urban living to the working environment. They enlisted the help of city governments, reformers and operatives and influenced local and state political and economic action, including legislative reform. Urban town councils recognized the limitations of their authority within their community and particularly amongst businessmen and were thus willing to campaign the state for legislative intervention to achieve local benefits.

In contrast, British central and local governments emphasized the health of the masses through building physical structures, such as improved water supplies, and placed responsibility for health care on individuals rather than the environment. Businessmen's powerful influence in local and national politics made officials reluctant to impose strong or expensive regulations on industry, even when market forces suggested otherwise. Lancashire County was behind the rest of Britain in that its town councils were the slowest at establishing local public health boards and many delayed appointing a MOH. Thus, it is unsurprising that few Lancashire MOsH challenged their employers', the town councils', priority of the urban living discourse. Most MOsH did not entirely ignore the workplace and a few transferred their clinical knowledge about tuberculosis contagion from the living to the working environment, but they also believed that their official responsibilities were limited to the inspection and regulation of factory sanitation.

This sole example of the Massachusetts' Legislature's reform of working conditions for the prevention of tuberculosis is insufficient to counter the many other health reforms that Britain developed before the United

[87] Rodgers, *Atlantic Crossings.*

States, most notably national health insurance. Yet, the Massachusetts case does suggest the potential power of reforms specific to regional interests under a devolved government, even though the likelihood of reform is less than under a centralized government where specific regional or industrial concerns can be easily lost in broader economic and political agendas.

It would be wrong solely to commend or blame any one group of actors for the success or failure of legislative health reforms in the cotton weaving industry. In both countries, the various actors were influenced by the beliefs and actions of the others. Yet, in Massachusetts, the various local groups united around their common goal of improving the public's health in all environments and in working together for reforms at the city and state level. Lancashire reformers lacked a common goal or a united health discourse, resulting in few reforms in weaving towns and little effective health legislation.

The beliefs and actions of the various participants in the occupational health discourse need further examination for other regions and industries, as does the course of technological developments in work processes that affected the health of the workers.[88] Additional examinations of the ecology of the workplace will further understandings of relationships between health, labour, technology and market forces.[89] These studies may also illuminate further cases where an American state was more progressive towards health reform than its European counterparts. In both countries, the period 1870–1918 marks the collective recognition of visible relationships between work and health in terms of accidents, injuries and compensation, but not necessarily the invisible, including disease, noise and fatigue. At this particular historical juncture, laboratory science, medical practice and reform united in Massachusetts and good health was related to economic progress, urban structures, public health and good governance. In Britain, these issues remained predominately separate. By 1918 in both countries, the reform of work practices in the cotton weaving industry remained in its infancy. Weavers were still subject to fatigue from long hours in hot, humid conditions and continuous exposure to high decibels of noise from clattering machinery. They were still injured, and occasionally killed, by flying shuttles and through other industrial accidents. The weaving rooms were far from safe places to work.

[88] Recent work has elucidated the role of trade unions in the regulation of certain work practices as contributors to ill-health and in providing compensation for the victims. S. Bowden and G. Tweedale, 'Mondays without dread: the trade union response to byssinosis in the Lancashire cotton industry in the twentieth century', *Social History of Medicine*, 16, 1 (2003), 79–95; A. Fowler, *Lancashire Cotton Operatives and Work, 1900–1950* (Aldershot, 2003), chapter 6; For examples of literature on technological developments in the textile industries that affected workers' health, see Feller, 'Draper loom'; G. Cooper, *Air-Conditioning America: Engineers and the Controlled Environment, 1900–1960* (Baltimore, 1998).

[89] For a discussion of the ecology of the workplace, see McEvoy, 'Working environments'.