4

Identifying Risk and Compensating Tuberculosis: 1916–1957

By the 1830s, Scottish physicians had confirmed the everyday knowledge of hard rock miners, cutlery grinders and stone masons that men exposed to silica dust were likely to die from tuberculosis by their mid-thirties. From 1916, what was by then a medical orthodoxy was embodied in the South African legislation. Dr Andrew Watt, who appeared before the Parliamentary Select Committee in that year, was strongly opposed to silicotics returning underground as they would quickly develop tuberculosis. He pointed out that following the South African War, many former miners came back from the veldt in good health, having lived an open-air life. Those who went back underground soon fell ill.[1] To Watt it was unthinkable that a man with tuberculosis should continue to work in a mine.

South Africa was the first state to compensate for silicosis and tuberculosis as occupational diseases. Miners, stonemasons and foundry workers in the UK faced similar risks. From the final decades of the nineteenth century, there was a succession of British commissions into tuberculosis. To prevent the spread of disease, by 1910 public health authorities had

[1] Dr Watt, evidence before *Miners' Phthisis Working of Acts Parliamentary Select Committee 1916* SC 10-15 1915 Third Report AN 4923, p. 628.

J. McCulloch, P. Miller, *Mining Gold and Manufacturing Ignorance*,
https://doi.org/10.1007/978-981-19-8327-6_4

implemented three key policies: a state directed system of case identification, the compulsory isolation of infective patients and the education of patients and their families about disease prevention.[2] However, tuberculosis was not compensable in hard rock miners,[3] and it was not until 1918 that silicosis became recognised as an occupational disease for specific classes of British workers. The International Labour Office Convention No. 42 of 1948 included silicosis (with or without pulmonary tuberculosis) in its Schedule of Occupational Diseases, providing it was proven to be an essential factor in causing incapacity or death.[4] Under the National Insurance (Industrial Injuries) Act of 1951, tuberculosis became a prescribed occupational disease for British health workers or research and laboratory staff coming into contact with patients or infective material.[5]

The response by South Africa's gold mines was markedly different. In contrast to the UK, where compensation was awarded for demonstrable disability, under South African law workers were entitled to compensation even in the absence of impairment. The South African decision to make tuberculosis compensable was remarkable. The legislative recognition of an occupational disease usually involves the play of various social, political and economic factors which are far removed from actual workplaces or medical discovery.[6] To qualify as an occupational disease, an injury typically has to meet a number of tests. Is the disease specifically associated with the person's employment? Does the disease occur more frequently in a particular industry than in the general population? Are the risks peculiar to that industry, or do they occur in other industries or

[2] *Report Tuberculosis Commission, 1914*, pp. 16–17.

[3] On the UK experience see P. Weindling (ed.) *The Social History of Occupational Health.* London: Croom Helm, 1985 and N.J. Wikeley. *Compensation for Industrial Disease.* Aldershot: Dartmouth Publishing, 1993. See also Arthur McIvor. 'Germs at Work: Establishing Tuberculosis as an Occupational Disease in Britain, C.1900–1951'. *Social History of Medicine*, Vol. 24, No. 4, 2012, pp. 812–829.

[4] Note on the Status of Lung Diseases in Workmen's Compensation, p. 3. *PRO CO859/259 Lung Diseases Workmen's' Compensation 1952.*

[5] See Arthur McIvor. 'Germs at Work: Establishing Tuberculosis as an Occupational Disease in Britain, C.1900–1951'. *Social History of Medicine*, Vol. 24, No. 4, 2012, pp. 812–829.

[6] See, for example, Allard E. Dembe. *Occupation and Disease: How Social Factors Affect the Conception of Work-Related Disorders*. New Haven: Yale University Press, 1996.

in workers' daily lives? The 1906 British Committee report on the Workmen's Compensation Act, for example, excluded *tuberculosis phthisis* as an occupational disease because it also occurred outside the workplace.[7]

The South African legislation was driven by two key concerns of the white Mine Workers Union (MWU), formed in 1902 as the Transvaal Miners' Association. The first was ensuring that its members were compensated for silicosis. Many miners whose doctors diagnosed serious lung disease were denied compensation by the companies.[8] The plight of the widows of white miners was raised at a number of Commissions and Select Committee hearings, and there is a voluminous correspondence from women appealing for assistance to the Prime Minister's Office.[9] Until 1956, the South African Acts applied only to gold mines, thereby excluding the thousands of men and women who worked on coal and asbestos mines. The legislation also excluded workers exposed to silica dust in other industries.[10]

The second concern related to the high tuberculosis rate among black miners, which the MWU believed put white miners and their families at risk. There is little surviving correspondence about the 1916 Act, but we do know it was designed to protect white families from infection. We also know that once passed, the MWU fought to ensure the Act was never repealed. White supervisors were in close contact with black miners in confined spaces. We also know from the surviving records that at any time, large numbers of infected men were employed on the mines. It was in fact common for black miners to die underground from haemorrhages. There were also cultural factors at play which worked in favour of the MWU. Infectious diseases exercised a powerful influence on the origins and development of urban segregation in Southern Africa. Between 1900 and 1904, the threat of bubonic plague, cholera and smallpox saw the hasty removal of African urban populations to locations in Cape Town

[7] Dr W. Watkins-Pitchford. 'The Industrial Diseases of South Africa', *South African Medical Record*, Vol. 11, No. 3, 14th February 1914, p. 34. See also Beris Penrose. 'Medical Monitoring & Silicosis in Metal Miners: 1910–1940'. *Labour History Review*, Vol. 69, No. 3, 2004, pp. 285–303.

[8] *Report of the Miners' Phthisis Commission of Enquiry 1929–30* (Young Commission). Union of South Africa. Pretoria: The Government Printer, 1930, Part 1, p. 17; Part 2, p. 83.

[9] See Prime Minister's Office Correspondence 1/1/275 148/15/15 SANA.

[10] See McCulloch, 'Compensation', in *South Africa's Gold Mines*, pp. 33–54.

and Port Elizabeth. What Maynard Swanson has called 'the sanitation syndrome' equated black urban settlement with a threat to the health and security of white communities.[11] The powerful metaphor linking black urban settlement with a danger to the health of white families became a routine part of public health discourse; the resultant panic played a role in the passing of the 1916 Act.

Using a linguistic sleight of hand, the Miners' Phthisis Acts were woven around the binary pairing of miners (whites) and native labourers (blacks).[12] In the early twentieth-century period of reconstruction after the South African War, that device enabled legislators to racialise the labour laws without mentioning race. The technologies used in medical examinations and the methods of paying compensation were also racialised. White miners were examined by specialists at the Bureau and had access to private physicians. The screening of whites involved a clinical examination, a chest X-ray and the taking of medical and work histories. Black miners were examined by mine medical officers and only that small number referred to the Bureau for further examination were X-rayed. In practice, access to compensation for 90 per cent of the workforce fell under the authority of mine medical officers rather than the state. There is a reference to this anomaly in a 1949 report by the Northern Rhodesian Commission of Inquiry into Silicosis. It recommended that the State Medical Bureau assume the sole responsibility for certifying compensable disease and performing all entry and exit examinations. As it was, mine medical officers were part of both the examining and the compensation system.[13] That arrangement, with its inbuilt conflict of interests, remained at the heart of South African mine medicine for decades. As a result, epidemiology, as it is usually understood, played little part in producing the official disease data. The reported silicosis and

[11] See Maynard W. Swanson. 'The Sanitation Syndrome: Bubonic Plague and Urban Native Policy in the Cape Colony'. *Journal of African History*, Vol. 18, No. 3, 1977, pp. 387–410.

[12] See 'Delict and Compensation' in Martin Chanock. *The Making of the South African Legal Culture, 1902–1936: Fear, Favour and Prejudice*. Cambridge: Cambridge University Press, 2001, pp. 189–196.

[13] *Northern Rhodesia Report of the Commission on Silicosis Legislation* Lusaka: Government Printer, 1949, p. 11.

tuberculosis rates were in effect the compensation rates, and both were controlled by the mine doctors.

In the event, the mines complied with the Miners' Phthisis Acts by setting up the world's first system of case finding based on entry, periodic and exit medicals of a working population. However, the vast majority of those black miners identified with tuberculosis were then repatriated to their home communities without provision for their isolation or care. There were no notifications to local health authorities, no supplementary feeding programmes for children and no education programmes for miners or their families on how to prevent the spread of infection.[14]

A Looming Crisis of Tuberculosis Infection

From the beginning of the twentieth century, there were numerous warnings about a looming tuberculosis crisis on the mines. Those concerns were expressed by the Departments of Public Health and Native Affairs, the SAIMR, the Bureau and the MPPC. They were reiterated by the international authorities William Gorgas and Lyle Cummins, who acted as consultants for the Chamber. The common themes were the known hazard of exposure to silica dust and the spread of infection from the mines to rural areas. The constant counter-theme was the Chamber's insistence that tuberculosis was not contracted because of dust exposure and cramped, arduous and unsanitary working and living conditions, but was brought to the mines by migrant workers.

In 1905, the *Transvaal Medical Journal* published an editorial warning of an imminent public health disaster. Tuberculosis was easily transferred from individual to individual and the medical profession agreed on the urgent need for action. The South African native was 'tremendously susceptible' to infection, and many deaths recorded as enteric fever were in fact due to tuberculosis. According to the editor, the main area for concern was the mines: 'That the disease in its infective phases is developed by the boys, in the majority of cases, after their arrival on the Rand is

[14] See Chap. 13 for detailed discussion of the repatriation regime.

undoubted'. In the absence of isolation care by the state, miners should be repatriated as soon as possible. White miners must be protected and the risk of repatriations to the families of those infected was less crucial than that involved in allowing them to remain on the mines. The editorial concluded: 'That Tuberculosis occurs amongst mine boys in epidemic form is clearly proved: is it any wonder that so many cases of Miners' Phthisis contract a tuberculous secondary infection?'[15]

The decision to compensate tuberculosis as an occupational disease had its origins in a Parliamentary Select Committee enquiry of 1916. Dr George Albert Turner, the medical officer for the WNLA, appeared as an expert witness. Each year, Turner examined thousands of East Coasters (miners from Portuguese East Africa). He also conducted post-mortems of miners who died at the WNLA Compound. Turner told the Committee that the high mortality rate was due to the employment of Tropicals who were susceptible to pulmonary tuberculosis and pneumonia. He suspected that most men contracted tuberculosis on the mines.[16] Turner's evidence was supported by Dr L.G. Irvine, an experienced mine medical officer, who later became Director of the Bureau. Irvine was sure that East Coast recruits were more prone to tuberculosis than were men from the Cape, who had some acquired immunity. White miners showed silicosis in all its stages, whereas the typical black patient had early or intermediate stage silicosis with a mass of tuberculosis infection on top.[17]

The Select Committee found an urgent need to reduce the prevalence of tuberculosis. It recommended that infected miners be excluded from underground work, and for that reason receive compensation.[18] Such awards would be for the loss of earnings rather than for a workplace

[15] Editorial, 'The Tuberculosis Peril'. *The Transvaal Medical Journal*, Vol. 1, No. 2, Johannesburg, 1st September 1905, p. 26.

[16] Evidence of Dr George Albert Turner, Monday 17th January 1916 in 1916 Miners' Phthisis Working of Acts Parliamentary Select Committee 1916 SC 10-15 1915 Third Report AN 4923, pp. 580–589.

[17] Evidence of Dr L.G. Irvine, Monday 17th January 1916 in *1916 Miners' Phthisis Working of Acts Parliamentary Select Committee 1916 SC 10-15 1915 Third Report AN 4923 15th December 2015*, pp. 606–614.

[18] *Third and Final Report of the Select Committee on Working of Miners' Phthisis Acts*. Union of South Africa Select Committee 10-15. AN 492 April 1916, pp. xxiv–xxvi.

injury. In the case of white miners, that recommendation went against the evidence of number of expert witnesses. Dr Andrew Watt told the Committee that he had examined hundreds of white miners with tuberculosis but had not seen a single case in which a man's wife or children had been infected.[19] Dr Francis Aitken, the superintendent of the Springkell Sanatorium, agreed that it was rare for tuberculosis to spread from a white miner to his wife and children. Infection was influenced by living conditions: if conditions were good, the rate of infection was likely to be low.[20]

The Select Committee's Report received wide support. Three months later, the Miners Phthisis Act No. 44 of 1916 was passed. The Act made it an offence for any person to work underground knowing he had tuberculosis. His employer was also held to be guilty. During the first reading the Minister of Mines, Mr Malan, noted that the work conditions had improved to such an extent that the number of awards for miners' phthisis was falling, as was the severity of the disease. Despite those improvements, men with ordinary tuberculosis remained a danger, especially to miners suffering from silicosis. Malan explained that the aim of the Act was to prevent men with tuberculosis from entering the industry, and to identify and exclude those who had become infected. To that end, there were to be six monthly examinations of white miners, 'while blacks were also to be examined with regard to tuberculosis'. The legislation gained unanimous support. Dr Davies (Yeoville) noted that men with silicosis were very much at risk from tuberculosis. Mr Sampson (Siemert) warned the House that tuberculosis was spreading throughout South Africa and that: 'It should be made worth the while of the industry to take every possible means to eliminate dust from the mines'.[21]

[19] Evidence of Dr Andrew Watt, Monday 17th January 1916 in 1916 Miners' Phthisis Working of Acts Parliamentary Select Committee 1916 SC 10-15 1915 Third Report AN 4923, p. 617.

[20] Miners' Phthisis Working of Acts Parliamentary Select Committee 1916, SC 10-15 1915 Third Report, AN 4923, pp. 617–618; 693.

[21] See Debates of the House of Assembly of the Union of SA Vol 1, First Session, Second Parliament, 19th November 1915 to 17th June 1916. Reproduced in *The Cape Times*, Tuesday 6th June 1916, pp. 386–387.

The Chamber and Tuberculosis

The Act of 1916 represented a defeat for the Chamber. Over the following decades, each time the legislation was reviewed, the Chamber challenged the legitimacy of designating tuberculosis as an occupational disease. Chamber officials pointed out, quite correctly, that in the UK and the USA tuberculosis was not compensable in hard rock miners. In 1921, the Chamber's Legal Advisor, George Barry, noted the relative infrequency of pure tuberculosis in (white) miners and that 'contrary to preconceived ideas, employment in the gold mines at the present time does not specially increase the liability in our miners to ordinary Pulmonary Tuberculosis'. Barry concluded: 'I think a strong case can be made for the exclusion of compensation for pure pulmonary tuberculosis from the Act'.[22]

In their submissions to the 1931 Select Committee, George Barry and Frans Unger, representing the Chamber, argued that since tuberculosis was widespread in labour-sending communities, it should be removed from the Act. During the Second World War, the Gold Producers' Committee (GPC) reviewed the findings of the recently tabled Miners' Phthisis (Stratford) Commission Report. The GPC argued that Stratford had presented no evidence why tuberculosis should be classed as an industrial disease. Tuberculosis was endemic in the Native Territories, and with the change of environment and occupation latent tuberculosis was liable to become active. The illness was not due to the inhalation of dust and there was no justification for the gold mines compensating tuberculosis. The medical treatment of infected blacks should be the responsibility of the state.[23]

In his review of the proposed Silicosis Act of 1946, the Chamber's legal advisor, George Barry, again noted that 'grossly exaggerated' statements had been made in the press about the mines spreading tuberculosis. 'It is

[22] Report by George Barry, Legal Advisor to The Chamber on Miners' Phthisis Commissions (of 1919) and the Draft Act, December 1921 Miners Phthisis' Act 1919 WNLA 144 B July 1919 to January 1922, p. 5.

[23] Gold Producers' Committee Comments upon Report of Miners' Phthisis Commission, February 1944, p. 15. SANA, K105 Miners' Phthisis 1941–48, Vol. 1 Correspondence, The Stratford Commission.

common knowledge that tuberculosis is endemic in native territories and that latent tuberculosis which is liable to flare up at any time is difficult of detection at a medical examination.' According to Barry, the incidence of tuberculosis on the mines compared more than favourably with other industries, and the mines did far more than any other industry to combat the spread of disease.[24]

In response to a sudden increase in the number of awards in 1954, an enquiry chaired by Professor Sarel Oosthuizen was asked to review the compensation system.[25] In its submissions, the Chamber again challenged the status of tuberculosis as a compensable disease. 'It is the view of the Chamber that there is nothing specific in the nature of employment underground or elsewhere on a mine which is particularly conducive to the spread of tuberculosis.'[26] Oosthuizen agreed that tuberculosis was not in a strict sense an occupational disease. However, his report was highly critical of mine medicals and the industry's repatriation policies.[27] Oosthuizen noted that at recruitment, miners were a physical elite far less vulnerable to infection than the populations from which they were drawn. Therefore, the tuberculosis which did occur among miners must be related to their employment. Oosthuizen remarked that the mining industry had never recognised tuberculosis as an occupational disease peculiar to mining. At various times the industry admitted that men with silicosis were more susceptible to tuberculosis, but it objected to any suggestion that mining be regarded as causative factor in the contraction or spread of tuberculosis.[28]

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[24] George Barry, Legal Advisor, Chamber of Mines, Notes on Silicosis Bill-Natives, Cape Town, 14th May 1945. SANA, K105, Miners' Phthisis 1941–48 [Stratford] Correspondence, Volume 4.

[25] See Report of the Departmental Committee of Enquiry into the Relationship Between Silicosis and Pulmonary Disability and the Relationship Between Pneumoconiosis and Tuberculosis August 1954. SANA F 33/671 Treasury. See also Jock McCulloch. 'Hiding a Pandemic: Dr G.W.H. Schepers and the Politics of Silicosis in South Africa'. *The Journal of Southern African Studies*, Vol. 35, No. 4, 2009, pp. 835–848.

[26] Memorandum from the Legal Adviser, B.T. Tindall, dated 2nd May 1955, p. 8. TEBA Archive, WNLA 14/3, Mass Miniature Radiography, General File, March 1954 to January 1956.

[27] Minutes of a Meeting of the Sub-Committee of Group Medical Officers held on 21st June 1955, in the Chamber of Mines Building, p. 2. *TEBA Archive, WNLA 14/3, Mass Miniature Radiography, General File, March 1954 to January 1956*.

[28] For a review of the Chamber's view of tuberculosis as an occupational disease see Report of the Departmental Committee of Enquiry into the Relationship Between Silicosis and Pulmonary Disability and the Relationship Between Pneumoconiosis and Tuberculosis. Part 2 The Relationship Between Pneumoconiosis and Tuberculosis, 1954 pp. 57–67. SANA, F33/671 Treasury: 29.

Oosthuizen found the medical examination of black miners inadequate, and he recommended that they be examined radiologically every three months and at the end of their contracts. He also strongly disapproved of the repatriation of tubercular miners and recommended that suspected cases be placed under observation in a mine hospital until they were no longer infectious. Oosthuizen recommended that miners not be discharged unless authorised by the Bureau and endorsed by the Native Affairs Department. The local authority of the area to which a miner was returning should be notified so that his case could be followed up. Indeed, Oosthuizen proposed that it should be an offence for a mine owner to discharge an employee suffering from active tuberculosis.[29]

The Group Medical Officers Committee (GMO) met to review the Oosthuizen Report. As was so often the case, Dr A.J. Orenstein served as chair. The Committee opposed periodic X-rays as both unjustified and expensive. It also opposed Oosthuizen's recommendation that it be an offence for a mine owner to discharge an employee suffering from active tuberculosis.[30] Two weeks later, the Committee met again. Those present included Orenstein, again in the Chair, and the Chamber's Assistant Legal Adviser, who was usually present when tuberculosis was discussed. In principle, the Committee agreed that miners certified by the Bureau with tuberculosis should be admitted to hospital for observation or treatment.[31] There were, however, several practical difficulties with such a policy. In some cases, treatment was ineffective, and it would be unfair to detain a man indefinitely who wanted to return home. Given these problems, the Committee rejected Oosthuizen's recommendation that miners be treated until they were no longer infectious.

The industry adopted the same position when negotiating labour contracts. During talks with the government of Nyasaland, for example, William Gemmill emphasised a distinction between miners' phthisis

[29] Memorandum from the Legal Adviser, B.T. Tindall, 2nd May 1955, pp. 12–13; 16. TEBA Archive, WNLA 14/3, Mass Miniature Radiography, General File, March 1954 to January 1956.

[30] Minutes of a Meeting of the Sub-Committee of Group Medical Officers 21st June 1955, in the Chamber of Mines Building, pp. 2–3. TEBA Archive, WNLA 14/3, Mass Miniature Radiography, General File, March 1954 to January 1956.

[31] Minutes of a Meeting of the Sub-Committee of Group Medical Officers 4th July 1955, in the Chamber of Mines Building, p1. TEBA Archive, WNLA 14/3, Mass Miniature Radiography, General File, March 1954 to January 1956.

(which in this instance he used as a synonym for silicosis) and tuberculosis.[32] Tuberculosis, he argued, had existed in the rural areas long before blacks went into the mines. While the mines did all they could to ensure that miners' phthisis was compensated, they took a very different view towards tuberculosis, which black miners contracted while in their villages. According to Gemmill, it had always been the industry's contention that pure tuberculosis was not an occupational disease.[33]

Negotiating Diagnoses

The Chamber's opposition to tuberculosis compensation was one element in a wider conflict over the Miners' Phthisis Acts. That conflict was due in part to legitimate problems with diagnosis, and in part due to flaws in the conduct of mine medicals. Silicosis was not easy to diagnose then, and remains difficult to diagnose today, with vastly improved medical technology.[34] It was also difficult for mine doctors relying upon a stethoscope to diagnose tuberculosis in a fibroid lung. Many cases initially showed little, if any, evidence of infection. As one mine medical officer commented, making two hundred daily stethoscopic examinations with the object of discovering early tuberculosis was a wasted effort.[35]

Weighing was the other tool for diagnosis. In 1916, the Miners Phthisis Medical Bureau made weighing compulsory and the mines were required to weigh men every thirty days. Miners who had lost five pounds or more between two weighings or six pounds over three consecutive weighings

[32] Mr. Frans Unger and Mr. George Ernest Barry representing the Transvaal Chamber of Mines, transcript of evidence before Select Committee of Inquiry into the Miners' Phthisis Commission Report, AN 756-1931 SC12-31, Parliamentary Library, Cape Town, pp. 85–87.

[33] William Gemmill, General Manager Tropical Areas, Note for Mr. K. Lambert Hall, Secretary, Nyasaland, Northern and Southern Rhodesia Inter-Territorial Conference, Salisbury, 20th December 1940, Emigrant Labour Governors Survey M2/3/19, Malawi National Archives.

[34] Rodney Ehrlich, Jill Murray and David Rees. 'Subradiological Silicosis'. *American Journal of Industrial Medicine*, Vol. 61, 2018, pp. 877–885.

[35] Dr L.F. Dangerfield. 'Pulmonary Tuberculosis in South Africa and the Problem of the Native Mine Labourer'. In *Proceedings of the Transvaal Mine Medical Officers' Association*, March 1943, Vol. 22, No. 249, p. 173.

were to receive a more detailed examination.[36] Although weight loss was usually present in active tuberculosis, it was unreliable as an indicator of early disease. Weight loss was caused by a number of factors, and even in advanced tuberculosis it was not always present.[37] Dr W. Watkins-Pitchford thought that weighing was a clumsy tool. 'Experience has shown … that, for one reason or another, this system [of weighing] does not lead to the detection of more than about 50 per cent of the cases of simple tuberculosis and of tuberculosis with silicosis which are finally discovered.' Watkins-Pitchford concluded, 'In order to mitigate the mischief of which the overlooked native "carrier" of tuberculous infection is the source, I have lately proposed utilising large-scale X-ray examinations'.[38] In addition, medical records were not kept, so that when a man returned to the mines, as most did, there was no file on his previous service.[39]

There were major differences between white and black communities regarding tuberculosis. During minority rule, the mortality rates in whites were among the lowest in the world, while those among blacks were among the highest.[40] The Bureau data suggested that the differences between white and black miners were just as great. Silicosis was fourteen times more common in whites while tuberculosis was twice as common in blacks. During 1939, a total of 1164 black miners received compensation under the Miners' Phthisis Act 1925. Of those, 377 were for ante-primary silicosis, 78 for primary silicosis, 150 for silicosis and tuberculosis and 559 for tuberculosis.[41] The Chamber claimed that the low rate of silicosis in blacks proved that migrant labour protected black miners from lung disease. It also proved that dust exposure played no role in tuberculosis.

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[36] 'Miners' Phthisis Act No. 35 (1925) Condensed précis of regulations and procedure (Natives and Non-Europeans) for mine medical officers', *Proceedings of the Transvaal Mine Medical Officers' Association*, Vol. 6 No. 4, October 1924, p. 4.

[37] Dr N.R.A. MacColl. 'The Early Diagnosis of Tuberculosis'. In *Proceedings of the Transvaal Mine Medical Officers' Association, May 1940*, Vol. 20, No. 218, pp. 1–2.

[38] Watkins-Pitchford, 'The Silicosis of the South African Gold Mines', pp. 128–129.

[39] E.H. Cluver. 'The Progress and Present Status of Industrial Hygiene in the Union of South Africa'. *Journal of Industrial Hygiene*, Vol. 11, No. 6, June 1929, p. 204.

[40] See B.A. Dormer and F.J. Wiles. 'Tuberculosis in the Bantu'. *The South African Medical Journal*, Vol. 20, No. 10, 25th May 1946, p. 264.

[41] Annual Report, 1939. Witwatersrand Native Labour Association, p. 3. BNA S305/9 Witwatersrand Native Labour Association.

Because blacks were excluded from supervisory roles and whites did not do the actual drilling and blasting, white miners had relatively lower dust exposures. When diagnosed, they were given free specialised treatment at the Springkell Sanatorium, established in 1911 by the Chamber and the government for their care, or they could enter one of the provincial hospitals. Suitable sheltered employment was found on the mines or elsewhere for men able to work. Others were assisted with loans, allotments and other benefits so they could start small businesses.[42] Black miners had higher rates of exposure to silica dust, lived in crowded and unhygienic compounds and received a fraction of the pay of whites. Once they left the mines, their nutrition was poor and their access to biomedical care minimal.

Changing Patterns of Disease

In the first decade of mining on the Rand, the dust levels were very high. The life expectancy of drillers, most of them white immigrants from Europe, was as little as six years. After 1910, the introduction of mechanical ventilation, blasting regulations and watering down reduced the palpable dust and with it the severity of silicosis. As a consequence, the form of miners' phthisis in which the lungs were a solid mass of fibrosis became rare, and a typical X-ray showed only patches of scarring.[43] In 1912, Dr Andrew Watt invented the term *tuberculo-silicosis* in acknowledgment of the shift in disease forms.[44] As the threat of acute silicosis receded, tuberculosis became more prominent. From that point, the divide in the health profiles of white and black miners became more pronounced. Few white silicotics contracted tuberculosis, and those with simple silicosis were given surface jobs, pensions and retraining. By 1920 the life expectancy of a white miner with silicosis was as much as fifteen years from diagnosis. The small number who developed tuberculosis went to the Springkell

[42] Jack Simons. Migratory Labour, Migratory Microbes. Occupational Health in the South African Mining Industry: The Formative Years 1870–1956. Unpublished manuscript, 1960, p. 18.

[43] Dr Watkins-Pitchford *Evidence before Miners' Phthisis Working of Acts Parliamentary Select Committee 1916 SC 10-15 1915 Third Report AN 4923*, p. 685–686.

[44] *The Prevention of Silicosis on the Mines of the Witwatersrand.* Pretoria: Government Printer, 1937, p. 224.

Sanatorium. In contrast, few black miners were diagnosed with simple silicosis, and the far larger number who developed tuberculosis or silicosis with tuberculosis were repatriated.[45] Here too there was a dramatic change in disease form, with tuberculosis replacing silicosis as a major cause of death.[46]

In a letter to the Minister of Mines in July 1914, the Chair of the Miners' Phthisis Prevention Committee, R.N. Kotze, noted that tuberculosis was a very serious threat on the mines and that it was important to prevent the employment of infected men. Kotze also warned that tuberculosis was a complicating factor in pneumonia. 'A large number of natives die of tuberculosis following a pneumonic attack and amongst tropical natives especially tuberculosis runs a very acute course.'[47] Kotze identified two types of cases: there were the men who brought infection with them from rural areas and those who contracted tuberculosis while on the mines. Kotze believed that more thorough medicals were necessary to exclude infected recruits. The shift in the disease forms was accompanied by the emergence of contradictory elements in the medical discourse. South African physicians continued to use the term miners' phthisis to describe occupational lung disease, a term which recognised the role of dust in active tuberculosis. And yet that same body of specialists rarely made reference to dust as a causal factor in black miners' tuberculosis.

Kotze's concerns were taken up by the Miners' Phthisis Prevention Committee. In its annual report of 1916, the Committee noted that although the term 'silicosis' accurately defined the occupational factor in miners' disease, the more general term 'miners' phthisis' better described its composite character.[48] When tuberculosis invaded a silicotic lung, destructive and obliterative changes soon followed. The disease altered type, and

[45] McCulloch 'Hiding a Pandemic', pp. 835–848.

[46] Dr A. Watt 'Personal Experiences of Miners' Phthisis on the Rand 1903 to 1916'. In *Silicosis, Records of the International Conference held at Johannesburg 13th–27th August 1930.* London: ILO, 1930, p. 595.

[47] Appendix 10 Letter from R.N. Kotze, Chair of the Miners Phthisis Prevention Committee to the Minister of Mines, Johannesburg, 4th July 1914, *in General Report of the Miners Phthisis Prevention Committee Johannesburg 15th March 1916.* Pretoria, The Government Printing & Stationery Office 1916, p. 142.

[48] *General Report of the Miners Phthisis Prevention Committee Johannesburg 15th March 1916.* Pretoria: The Government Printing & Stationery Office, 1916, p. 10.

the symptoms of a simple silicosis were aggravated and to a large extent merged in an acute or chronic pulmonary tuberculosis. Tuberculosis was not merely a terminal phenomenon in miners' phthisis: it may intervene at any point. 'Fibrosis caused by silica dust is life threatening, in that when it has progressed to a certain stage tuberculous infection is almost inevitable.' In white miners it usually did so late in the disease process; with black miners it was frequently associated with a slight degree of fibrosis.[49]

Researchers in the US and the UK favoured a more discrete terminology to distinguish between silicosis and tuberculosis. In August 1925, Professor Kettle from the UK told a meeting of the Mine Medical Officers Association in Johannesburg that he was reluctant to use what he considered to be a 'somewhat obscure nomenclature'. Professor Kettle went on: 'To me, Miners' Phthisis would mean phthisis developed in a miner. In a good deal of the literature one finds no clear distinction between silicosis and tuberculosis; and Miners' Phthisis seems to be the general term employed to express either silicosis or tuberculosis combined with silicosis. So that there is a difficulty, as far as I'm concerned, as to what the condition is actually that we are investigating.'[50] Despite objections such as these, the term miners' phthisis continued to be used in the South African legislation until 1956 when it was replaced by pneumoconiosis, thereby bringing South African usage into line with international practice. The fact that miners continue to use the term phthisis attests to the ongoing significance of tuberculosis in the South African setting.[51] Given the fact that 'subclinical silicosis', or silica exposure which cannot be diagnosed in living subjects, still doubles their likelihood of contracting tuberculosis, the less precise term is, paradoxically, in some ways more scientifically appropriate.[52]

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[49] *General Report 1916*, pp. 12; 15. Under the National Insurance (Industrial Injuries) Act of 1951 tuberculosis became a prescribed occupational disease for British health workers or research and laboratory staff coming into contact with patients or infective material.

[50] Professor Kettle presentation to the Mine Medical Officers' Association, Johannesburg in Proceedings of the Transvaal Mine Medical Officers' Association, August 1925, Vol. V, No.4, p. 4.

[51] Jaine Roberts. *The Hidden Epidemic Amongst Former Miners: Silicosis, Tuberculosis and the Occupational Diseases in Mines and Works Act in the Eastern Cape, South Africa*. Westville: Health Systems Trust, June 2009, p. 18.

[52] Eva Hnizdo and Jill Murray. 'Risk of pulmonary tuberculosis relative to silicosis and exposure to silica dust in South African gold miners'. *Occupational and Environmental Medicine*, vol. 55, no. 7, 1998, pp. 496–502; Ehrlich et al., 'Subradiological silicosis', 2018.

Critics of the Compensation System

The South African Miners' Phthisis Acts saw the country lead the world in monitoring and compensating hard rock miners. And yet, within six months of the passing of the first piece of legislation in 1912, its effectiveness was being questioned. The South African Secretary for Native Affairs was sure that only a small proportion of black miners with silicosis were receiving the compensation to which they were entitled. According to the official returns for the year ending 21 July 1912, only 287 cases were notified from a total workforce of over 200,000. The Secretary noted that the disproportion between the number of awards made to white and black miners was striking, especially since by now black miners did the actual drilling and therefore had the highest dust exposures. To address that problem, he wanted a government medical officer to oversee compensation cases. In addition to examining miners, the officer could advise on sanitation and be responsible for compiling statistics.[53]

In October 1913, the Director of the Native Labour Bureau wrote a brief review of the 1912 Miners' Phthisis legislation.[54] Under the Act medical officers were required to report all cases of miners' phthisis to the mine managers who in turn were to notify the Secretary for Native Affairs. The data showed that on some mines with a small workforce there was a comparatively large number of cases, while on some large mines, such as Crown Mines and East Rand Proprietary, there were practically none. The Minister of Native Affairs concluded that the system of referrals was not working and suggested that periodical examination of black miners be introduced.

The mining companies' insurers too had reservations about the medical procedures in place. Much to the annoyance of the Rand Mutual Assurance Company, which held policies for the major mining houses, every year a sizeable number of recruits would break down after brief

[53] Letter from Secretary for Native Affairs, Pretoria, upon Appointment of Medical Officer to the Secretary to the Interior, Pretoria, 20th October 1912, p. 3. SANA NTS 324, Dept. of Native Affairs, TB Commission & MP Act 1912.

[54] Letter from Director of Native Labour Bureau, Johannesburg, upon Position of Native Labourers under the Miners' Phthisis Act (No.19 of 1912), to the Secretary for Native Affairs, Pretoria, 16th October 1913. SANA NTS 324, Dept. of Native Affairs, TB Commission & MP Act 1912.

periods underground. For example, a migrant worker named Sikambele, who had been repatriated following an accident at the Modderfontein Deep in June 1911, was subsequently recruited by the WNLA and returned to Johannesburg in December 1912. He worked only one shift before being diagnosed with 'marked phthisis'. When he died on 16 March 1913, a claim for £30 was lodged by the Department of Native Affairs on behalf of his estate. Sikambele's was one of several cases in which claims were made by men who had worked for a month or less.[55] The secretary of Rand Mutual wrote in protest to the WNLA, pointing out that Sikambele had been under medical treatment at the WNLA's compound after his accident in 1911, and his illness should have been diagnosed at that time. The company wanted stricter pre-employment examinations. The Chamber's legal adviser noted that the cost of compensating black miners was rising fast, and he agreed there was need for more stringent entry medicals.[56]

For the mining houses, more thorough entry medicals presented a dilemma. Clearly, there were savings to be made in keeping men with pre-existing lung disease out of the mines, and in identifying early disease in serving miners who could then be quarantined and repatriated. On the other hand, enhanced case findings promised to increase the numbers referred for compensation, and therefore the cost of caring for miners at the WNLA hospital while their claims were being assessed. Mounting numbers of awards might not only cost money, but also raise serious problems with the HCTs about the mines' safety. To compound the problem, many mines faced periodic shortages of labour, and preferred to employ as many recruits as possible, whatever their health status, in order to avoid costly production cuts.[57]

On their part, mine medical officers tended to approach the issue of medical examinations as a technical problem compounded by lack of

[55] Letter from Managing Secretary, Rand Mutual Assurance Company, Johannesburg, to The Secretary, WNLA, 20th March 1913. WNLA 138 Phthisis: Allotment of Natives January 1913 to May 1915, TEBA Archives, University of Johannesburg.

[56] Memo from Mr G.E. Barry, Legal Advisor to the Chamber of Mines Compensation for Miners' Phthisis in Native Labourers under Act 19 of 1912, 18 December 1912. WNLA 138/2 Miners' Phthisis Amendment Act June 1912 to February 1916, TEBA Archives, University of Johannesburg.

[57] Packard, R. M. *White Plague, Black Labour: Tuberculosis and the Political Economy of Health and Disease in South Africa*. Berkeley: University of California Press, 1989, Chs 3 & 6.

staff and resources. Discussions at the MMOA highlighted concerns that cases of tuberculosis were not being picked up, the lack of a diagnostic standard and the intense pressure on mine doctors to keep a full complement of men underground. At a meeting in October 1921, for example, Dr Girdwood noted that most of the deaths at the WNLA compound were from tuberculosis. He asked his colleagues: if monthly weighing was reliable, why were there so many 'bad cases'?[58] The MMOA eventually sent a questionnaire to its members to gauge the scheme's usefulness. In 47 per cent of cases, the results showed, tuberculosis was discovered through weight loss, and in 15 per cent 'incidentally', usually when miners were admitted to hospital following an accident. In 38 per cent of cases tuberculosis was discovered following 'acute diseases', meaning that by the time of diagnosis those miners were dying.[59]

Even when a case had been picked up at weighing, the problem of diagnosis persisted. Under the Act of 1925, compensation for tuberculosis was based on the presence of tubercle bacillus in the sputum or marked physical incapacity. Because positive sputum was the exception rather than the rule in early stage infection, those prescriptions added to the problems of diagnosis. It was common for a miner to have tubercle bacilli in his sputum and physical signs suggestive of tuberculosis but return a negative X-ray plate. Conversely, a miner might display radiological evidence of disease without appreciable physical symptoms. Dr F. Retief spoke at length on the challenges of diagnosis at a MMOA meeting in February 1940. He noted that a single sputum sample in a suspected tuberculosis case was often inconclusive, and that repeated examinations should be made. Where physical and radiological tests were suggestive of infection, it might be necessary to do as many as six or seven examinations before the bacilli were found.[60] Medical officers who carried out hundreds of examinations each week were incapable of following such thorough procedures. In effect, given the available medical resources, the legislative definition of TB dramatically decreased its statistical visibility.

[58] Dr Girdwood in discussion *Proceedings of the Transvaal Mine Medical Officers' Association*, Vol. 1 No. 7 October 1921, p. 3.

[59] Dr Butt, in discussion *in Proceedings of the Transvaal Mine Medical Officers' Association*, Vol. V, No. 5 September-October 1925, p. 7.

[60] F. Retief. 'The Clinical Side of Tuberculosis'. *Proceedings of the Transvaal Mine Medical Officers' Association*, 19, no. 215 1940, p. 237.

Miners' Phthisis Commissions and Medical Examinations

Many of the individual criticisms of the compensation system were taken up during the numerous Miners' Phthisis Commissions. Although researchers such as Drs Watkins-Pitchford, Andrew Watt, A.J. Orenstein and L.G. Irvine, who appeared as expert witnesses, seldom referred at length to disease among black miners, the Commissions were often critical of the conduct of mine medicals.[61] The 1919 Commission into Miners' Phthisis, for example, concluded that the medicals of black miners were inadequate. It also found that black miners with tuberculosis, including men who in some cases had spent months in hospital, were being discharged without a medical certificate. 'We are informed' the Commission wrote, 'that in practice numerous cases have occurred where compensation could not be legally claimed'. Where a miner died at the hospital, it was common for the death certificate to state 'general tuberculosis' when in fact the miner had died from pulmonary tuberculosis. Such a diagnosis prevented surviving dependents from claiming compensation. The situation with living miners was no better, and the Commission found that often there was no exit medical as required by law.[62]

The final twenty pages of the Commission into Miners' Phthisis of 1929 are devoted to black miners.[63] The Commission heard applications from the Department of Native Affairs and the Director of Native Labour for improved benefits. Since there was no information on the circumstances of beneficiaries, the Commission refused to recommend any change to the legislation.[64] Two of the Commissioners, Mr W. Becker and Mr W. Boshoff, dissented. Mr W. Boshoff was particularly critical of the WNLA medicals, and he questioned whether periodic examinations

[61] See Appendix F in *Report of the Miners' Phthisis Commission 1902–1903.* Pretoria: Government Printer, 1903.

[62] *Report of the Commissions of Inquiry into the Working of the Miners' Phthisis Acts.* Cape Town: Government Printer, 1919, pp. 11–12.

[63] *Report of the Miners' Phthisis Commission of Enquiry 1929–30*. Union of South Africa. Pretoria: The Government Printer, 1930, p. 15.

[64] *Report of the Miners' Phthisis Commission of Enquiry 1929–30, Part Two*. Union of South Africa. Pretoria: The Government Printer, 1930, p. 83.

were in fact being carried out. 'Some of these natives died in the mines [from tuberculosis] without their [sic] having ever been examined during their working period.' Boshoff went on: 'I am convinced that the figures giving the deaths from tuberculosis among natives on the mines do not reflect the true position. Black miners were repatriated as soon as they were discovered to have tuberculosis and so the majority of deaths do not take place on the mines.' Boshoff recommended, in vain, that initial, periodic and final medicals be conducted by government medical officers.[65] The same criticisms were repeated by the Stratford (1943), Allan (1950) and Beyers Commissions (1952). Dr G.W.H. Schepers, who worked as an intern at the Silicosis Medical Bureau from 1944 to 1952, made similar comments about mine medicals.[66] Jaine Roberts, in her 2009 study of living miners from the Eastern Cape, found that almost 90 per cent of former miners had not been given an exit medical. The mines' failure to conduct those examinations over such a long period of time, she speculated, was suggestive of a coherent policy.[67]

In response to criticisms, the WNLA took every opportunity to publicise its success in detecting and removing infected men from the mines. In December 1941 correspondence with Mr K. Lambert Hall, the Chief Secretary in Zomba, for example, William Gemmill described in some detail the WNLA's management of health and compensation.[68] All recruits were medically examined before entering the mines and at regular intervals during their contracts. At discharge, black miners were weighed and those with significant weight loss were admitted to hospital for examination, which included an X-ray. Any suspicious cases were then referred to the Bureau for compensation. At the WNLA hospital, any repatriates suspected of tuberculosis were X-rayed. The system was such that it was all but impossible for a miner with tuberculosis or silicosis to be repatriated without receiving an award.

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[65] 'Reservations by Mr W. Boshoff' *in Report of the Miners' Phthisis Commission of Enquiry, Part Two*, p. 101.

[66] McCulloch, 'Hiding a Pandemic'.

[67] Roberts, *The Hidden Epidemic Amongst Former Miners*, pp. 151; 154.

[68] Note *Native Labourers and Miners' Phthisis* from William Gemmill, WNLA General Manager (Tropical Areas) Salisbury to Mr K. Lambert Hall, Chief Secretary, Zumba, Nyasaland 20th December 1941 Emigrant Labour Governors Permits. M 2/3/19. Malawi National Archives.

Gemmill explained that within South Africa, a number of X-ray clinics had been established in the Native Territories at which former miners could be examined and their films sent to the Bureau in Johannesburg. It was the duty of District Surgeons, Magistrates and Native Commissioners to publicise the rights of former miners to compensation. Men who had worked on the mines and became ill were instructed to report to their District Surgeons. By implication, if such a system was not available in Nyasaland, it was up to the government to create one. The only problem was that the health services Gemmill described never existed.

The X-ray Puzzle

Although South Africa's gold mines led the world in using radiography to monitor a working population, the technology was not routinely used with black miners until the mid-1950s. That is puzzling, given the acknowledged failure of mine medicals to pick up tuberculosis in serving miners. The 1912 Commission into Miners' Phthisis and Pulmonary Tuberculosis, which featured an X-ray survey of miners, was probably the first study of its kind, and formed the centre-piece of a report which was a landmark in the science.[69] The Miners' Phthisis Prevention Committee found that while an X-ray provided the most reliable single piece of evidence, an accurate diagnosis required a radiograph, a work history and a clinical examination.[70] From 1916, state physicians laid the foundation of modern practice when the Bureau introduced routine X-rays for the entry, periodic and exit medicals of *white* miners. Soon after the establishment of the Tuberculosis Research Committee in 1926, an X-ray plant was installed at the WNLA compound in Johannesburg, but its use

[69] *See Report of a Commission into Miners' Phthisis and Pulmonary Tuberculosis.* Cape Town: Government Printer, 1912. For a history of the use of X-ray technology in Britain see Joseph Melling. 'Beyond a Shadow of a Doubt? Experts, Lay Knowledge, and the Role of Radiography in the Diagnosis of Silicosis in Britain, c.1919–1945'. *Bulletin of the History of Medicine*, Vol. 84, 2010, pp. 424–466.

[70] *General Report of the Miners Phthisis Prevention Committee Johannesburg 15th March 1916.* Pretoria: The Government Printing & Stationery Office, 1916, p. 13.

was limited to that very small number of *black* miners referred to the Bureau for compensation.[71]

At the beginning of 1930, WNLA trialled the routine use of X-rays at entry examinations, but the scheme soon ran into problems. The workload of mine doctors was already overwhelming, and there were simply too many plates to review. Following protests from the MMOA, the trial was ended prematurely.[72] In 1938, a departmental committee recommended that where there was a suspicion of disease, the final examination should include an X-ray. The technology was introduced on most mines and according to the Bureau: 'There can be no doubt that the installation X-ray plants on practically all the mines in recent years has been and will be in the future of the greatest value in the early detection of tuberculosis … among "native labourers"'.[73] However, because of cost, the procedure was reserved for those cases under review for compensation, a decision which rested with the mine medical officers. The GPC estimated that to conduct radiological examinations at every major point of recruitment would require twenty plants at a cost of £100,000, and an additional £40,000 per annum to operate them.[74] At a number of different forums, A.J. Orenstein not only reiterated the issue of cost and capacity but argued against the use of X-rays on medical grounds. According to him, to X-ray every black miner at regular intervals would require increasing the number of medical officers four- or five-fold. Moreover, he was sure that if X-rays were introduced for black miners, other methods of detection would be neglected, thereby leading to more early cases being overlooked.[75]

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[71] A.P. Cartwright. *Doctors of the Mines: A History of the Work of Mine Medical Officers*. Cape Town: Purnell and Sons, 1971, p. 128.

[72] Letter from A. Percival Watkins, Transvaal Mine Medical Officers Association to General Manager, Transvaal Chamber of Mines, Johannesburg, 28th November 1930. WNLA 20L Diseases and Epidemics Tuberculosis February 1923 to December 1930. TEBA Archives.

[73] *Report Miner's Phthisis Medical Bureau for the Three Years Ending 31st July 1941.* Pretoria: Government Printer, 1944. UG No. 18, 1944, p. 28.

[74] Memo A.T. Milne, General Manager to G.P.C. Members, 27th September 1957, Memorandum to the Round Table Conference on Vulnerable Mines: Recruiting and Medical Examination of Mine Native Labourers, p. 5. TEBA Archives, WNLA 14/3, Mass Miniature Radiography General, Dec. 1956 to Jan. 1958.

[75] Report of the Medical Committee appointed to Enquire into the Deaths of Certain Mine Natives 8th February 1926 to 26th May 1926, pp. 5–6, 13. GES 1005 9 17 A TB in Mines Natives SANA.

In response to criticism from the Tuberculosis Research Committee about the conduct of entry examinations, in June 1926 William Gemmill instructed mine medical officers on the screening for tuberculosis.[76] Officers were to perform their own initial examinations and not rely on the medicals already conducted at the WNLA compound. They were also to screen long-service men every three months. Within two weeks of Gemmill's directive, Dr J.F. Young of the WNLA Hospital made a presentation to the Mine Medical Officers Association's monthly meeting. He announced that the WNLA was conducting an experiment involving 2000 black miners to determine whether X-rays should be used routinely at entry medicals.[77] The experiment was authorised by the GPC, of which A.J. Orenstein was a permanent member and which he often chaired. Dr Young told his audience: 'I do not want you to take too much notice of the X-ray findings … as we are by no means experts [at reading X-rays]. For example, if a recruit had a shadow on his lung he should not be rejected. A *special test* had already been carried out by an expert and the results were "extraordinary".' Orenstein explained that the *special test* with 100 recruits had shown that X-rays could not supplant a stethoscopic examination because, even in the hands of an expert, the results were totally unreliable as an indicator of lung disease.[78] It was a most curious discussion. According to the Proceedings, none of those present questioned Orenstein's characterisations of the technology as worthless, even though under the various Miners' Phthisis Acts from 1916 the Bureau used X-rays as its principal diagnostic tool with white and black miners in assessing compensation claims.[79]

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[76] W. Gemmill, General Manager Gold Producers' Committee Circular No. 59/26, cited in *Proceedings of the Transvaal Mine Medical Officers' Association*, June 1926, Vol. VI, No. 2, p. 1.

[77] See Dr J.F. Young. 'Explanation of Methods Adopted at WNA. Hospital to Carry Out New X-ray Tests, With a Practical Demonstration of Radioscopy of Cases'. In *Proceedings of the Transvaal Mine Medical Officers' Association,* June 1926, Vol. VI No. 2, p. 3. See also Circular from L.S. Raymond, Secretary, Medical Committee on Tuberculosis, Gold Producers' Committee, Transvaal Chamber of Mines, to Members of the Medical Committee on Tuberculosis, 1st March 1927. SANA, 1928, GES2596 5/54A, League of Nations, TB Research.

[78] Dr Orenstein, discussion in Proceedings of the Transvaal Mine Medical Officers' Association June 1926, Vol. VI, No. 2, p. 4.

[79] For an overview of radiography on the mines see Isidore Donsky. A History of Silicosis on the Witwatersrand Gold Mines, 1910–1946. PhD, Rand Afrikaans University, 1993, pp. 27–30.

Despite the GPCs' opposition to X-rays on the grounds of costs, some mines turned the technology to their advantage. Dr Peall, the Senior Medical Officer of Randfontein Estates Mines, noted that from its installation in May 1930 to December 1936, the plant at Randfontein examined 15,237 recruits, or just over 10 per cent of all miners on entry. Amongst the rejects were 59 cases of tuberculosis and a further 142 of silicosis, who were then repatriated without compensation. If employed and then subsequently compensated, those men would have cost Randfontein £10,050. But perhaps the major economic benefit came from the additional 252 cases suggestive of tuberculosis and 138 cases of possible silicosis who were also rejected. Dr Peall was pleased that the X-ray plant, which had cost £2000, had paid for itself handsomely.[80] In effect, at Randfontein Estates Mines the technology was used to prevent the employment of men with early stage lung disease rather than to identify miners for compensation. The Chamber's Legal Adviser, G. Barry, later acknowledged that the exclusion, with or without the use of medical technology, of experienced miners likely to suffer from occupational lung disease was in effect an industry-wide policy: 'There is a tendency on the part of mine medical officers to reject black recruits with considerable underground history as such natives may soon be certified to be silicotics, and the responsibility for compensation rests with the employer who has last signed him for underground work'.[81]

In 1938 a Miners' Phthisis Bureau committee recommended that where there was evidence of tuberculosis, the final examination should include an X-ray. That suggestion was introduced with some success: 'There can be no doubt', the MPMB wrote, 'that the installation X-ray plants on practically all the mines in recent years has been and will be in

[80] Dr P.A. Peall. 'Physical Examination and Scientific Management of Mine 'Native Labourers'. In *Proceedings of the Transvaal Mine Medical Officers' Association*, November 1937, Vol. XVII, No. 191, p. 52.

[81] Memo from G. Barry, Legal Adviser to H. Wellbeloved, The Chamber, 26th March 1942. Appended to Memo to Member of the Gold Producers Committee 8th April 1942 subject: Miners' Phthisis Commission: Pooling of Native Compensation NRC 390 1&2 Miners Phthisis Compensation for Natives 1942–1949 TEBA Archives.

the future of the greatest value in the early detection of tuberculosis'.[82] The decision to take an X-ray was in the hands of mine medical officers rather than the Bureau. Curiously, despite the use of the technology, there was no rise in compensation rates. In that same year, the WNLA conducted a small X-ray study of 435 long-service miners. Of that group 11 were identified as having tuberculosis, 6 tuberculosis with silicosis and 6 silicosis, giving a rate of over 5 per cent for previously undetected cases.[83] In 1938 the mines employed more than 300,000 migrant workers, the majority of whom served multiple contracts, suggesting there may have been thousands of infected men working underground.

Conclusion

Compensating tuberculosis as an occupational disease cost the mines little in terms of payments to white miners. However, that concession by the Chamber to the MWU created a number of ongoing problems for the WNLA. In particular, the legislation redefined the status of tuberculosis for the HCTs, the Colonial Office and later for the ILO, all agencies on which the WNLA depended in recruiting from the north.

The first perceived health crisis in gold mines led to a swathe of legislation designed to reduce dust levels, improve mine medicine and provide compensation. It saw the creation of the SAIMR and the Bureau, but also the state handover the conduct of mine medicals to employers. Finally, the crisis led to the appointment of A.J. Orenstein as head of sanitation in the largest of the mining houses, Rand Mines Ltd, a position from which he came to dominate mine medicine for half a century.

In theory, the South African legislation was the most progressive in the world. The legislation was a product of the racialised labour system which enabled the powerful white MWU to gain concessions regarding medical

[82] *Report Miner's Phthisis Medical Bureau for the Three Years Ending 31st July 1941.* Pretoria: Government Printer, 1944. UG No. 18, 1944, p. 28.

[83] Annual Report, 1937 Witwatersrand Native Labour Association p. 9. BNA S305/9 Annual Reports, Payment of Accident Compensation to Mine Natives.

care and compensation for occupational disease that trade unions elsewhere were unable to achieve.[84] The Miners' Phthisis Acts were also unique in terms of the other labour sectors. Outside of South Africa's gold mines, there was little state regulation of factories, and virtually none of farms or the domestic sector, where large numbers of black women worked.[85]

The challenges and flaws in diagnosing occupational lung disease in a huge workforce were understandable. But those challenges were quite distinct from the mines' management of tuberculosis. The WNLA's refusal to use X-rays at exit examinations or to issue notifications to local health authorities were incongruous in terms of the legislation. They were also incongruous in terms of the existing medical knowledge. Having reluctantly agreed to compensate tuberculosis, the Chamber was relentless in opposing any suggestion that the mines were a source of infection.

The lack of reliable data makes it impossible to quantify the mines' impact in spreading infection. The picture is made more complex by the variety of factors at play, such as land hunger, droughts and the expropriation and relocation policies of the apartheid state about which Randall Packard has written with such precision.[86] We can be sure, however, that the mines influenced the spread of tuberculosis in three particular ways. Dust exposure greatly expanded the pool of men suffering from tuberculosis who, when diagnosed, were repatriated to rural areas where little or no biomedical care was available. The below-subsistence wages offered by the mines impoverished labour-sending communities, and this in turn created the ideal social setting for infection to take hold and to spread. Finally, because most infected miners did not receive compensation, the resources of their home communities were further depleted by having to care for men who could no longer work.

[84] Penrose, 'Medical Monitoring & Silicosis in Metal Miners'.

[85] *Report of the Commission of Enquiry on Occupational Health.* Pretoria: Government Printer, 1976, pp. 95–96.

[86] See Packard, *White Plague, Black Labour*.

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