Commentary: Medicine, population, and tuberculosis

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Thomas McKeown’s 1971 paper appeared in connection with a series of three other papers, two published before 1971 and one after, all dealing with the population increase in England and Wales since 1700. In 1976, McKeown incorporated the themes of the papers in his book *The Modern Rise of Population*.

The 1971 paper reprinted here was an interim summary of opinions that McKeown developed and reiterated over more than 20 years and continued to express through the remainder of his life. These themes were that the population of England and Wales had begun to grow in the 18th century because of a decline in the death rate, a decline that had occurred independently of medical measures. McKeown considered medical measures almost totally ineffective until the mid-20th century. The only exceptions he would allow were that vaccination had reduced mortality from smallpox in the 19th century, and in the 20th century diphtheria immunization had reduced deaths from diphtheria. For the 18th century, McKeown dismissed any influence on the death rate of smallpox inoculation or the founding of hospitals. In the 19th century, public health measures, such as supplies of pure water and sewer systems, he thought had reduced deaths from typhoid fever and cholera.

In his 1962 paper with RG Record, McKeown wrote that the primary question was ‘whether a rise of the birth rate or a decline of mortality was a more important influence on the growth of population’. Actually, neither rate needed to change to permit a population to grow. If a birth rate exceeds a death rate by even a narrow margin, a population will grow. Its arithmetic growth rate will also increase with the passage of time, because at constant rates the excess of births over deaths will be proportionate to the size of the population.

Great Britain has conducted decennial censuses since 1801, but McKeown showed little interest in the census figures. As for British population data before 1801, McKeown considered the sources too inadequate to be useful. In contrast, in 1916 John Brownlee estimated the population of England and Wales during the 18th century. While Brownlee’s estimates may not be as precise as those provided by the census after 1801, they are congruent with them. From 1750 to 1911, the population of Britain grew very steadily—variations in birth and death rates, and immigration and emigration, seeming to cancel each other out over time (Fig. 1). It was probably growing also before 1700, perhaps at a slower rate.

McKeown placed faith exclusively in data from the registration of births and deaths after 1838. The records showed that tuberculosis, then the leading cause of death, had undergone a decline that persisted into the mid-20th century. The central pillar of McKeown’s 1971 paper remains his 1962 paper with RG Record in which they discussed the 19th century decline of tuberculosis mortality in England and Wales. Oddly, in view of the central importance of the decline in tuberculosis, McKeown and Record did not review extensive earlier work on the question. In several articles summarized in his 1908 book, *The Prevention of Tuberculosis*, Arthur Newsholme showed that tuberculosis had declined in England as an indirect consequence of the 1834 Poor Law. This law required that relief be given to the poor only within the walls of workhouses. Many of the poor were destitute because of tuberculosis. They entered the workhouse sick and were cared for during their final illness in workhouse infirmaries. The result was, Newsholme showed, to isolate poor tuberculous patients during the time when they were most liable to spread their disease. In 1906, Newsholme analysed the possible influence of various factors on tuberculosis mortality during the previous 40 years in 9 countries: Belgium, Denmark, France, Ireland, Great Britain, Norway, Prussia, Sweden, and the United States of America. He compared trends in housing, wages, the cost of food, the total cost of living, and the level of poverty with the trend of tuberculosis mortality. During the 19th century, all the countries studied had experienced a general rising standard of living with improved housing, higher wages, and a lower cost of food. In Great Britain, tuberculosis mortality had declined, but in Ireland and Norway, countries that had undergone improvements in social and economic conditions similar to those in Great Britain, tuberculosis mortality had risen. In France, tuberculosis mortality had remained extremely high throughout the century. In Prussia, with the most crowded living conditions of any European country, tuberculosis mortality had fallen sharply after Robert Koch’s discovery of the tubercle bacillus in 1882, when Prussian physicians introduced the strict isolation of infected patients. Similarly in New York City, where tuberculosis mortality had been high throughout the 19th century, it began to fall after 1882 with the recognition of the contagiousness of the disease. In England and Wales, Newsholme found that the decline in tuberculosis mortality was correlated closely with the degree of segregation in workhouse infirmaries. The detailed thoroughness of Newsholme’s analysis, his statistical correlations, and his caution stand in striking contrast to McKeown’s later sweeping conclusions.

In 1962 McKeown and Record cited Newsholme’s 1923 book, *The Elements of Vital Statistics*, but misrepresented his views and ignored his evidence. They said that Newsholme ‘attached considerable significance to segregation of patients in sanatoria’, and argued that only a few sanatoria existed in England before
Actually, Newsholme provided statistics to show that from 1870 to 1920 the proportion of total deaths occurring in public institutions (poor law infirmaries and public hospitals) had risen from 8.3% to 24.3%. He had demonstrated earlier that a large proportion of patients who died in hospitals died of pulmonary tuberculosis, after prolonged periods of hospital care. Thus, the proportion of patients with pulmonary tuberculosis who died in workhouse infirmaries and public hospitals was much higher than 24%. Newsholme concluded that 'historically, before its rationale was understood, and when hospital treatment was being given solely for humanitarian reasons, this hospital treatment played an important part in reducing the death rate from tuberculosis'. In contrast, McKeown repeatedly denied that medical measures, including hospital care, influenced the decline in tuberculosis. He ascribed the decline to improved nutrition, without specifying what he meant by nutrition. He did not mention Arthur Newsholme's disproof in 1923 of any link between the price of food and the decline in tuberculosis, although he should have been aware of it.\footnote{Thomas McKeown's 1971 article—indeed the whole body of his work—is a period piece. In the years he was writing, a half-century of organized medical effort had reduced the incidence of tuberculosis to a very low level. In 1974, for instance, Minnesota recorded no deaths due to tuberculosis. Tuberculosis in Great Britain was at a similar low level. In such circumstances, Thomas McKeown was able to promulgate his preposterous opinions with little criticism and few awkward questions. Physicians' ignorance of history combined with}

Figure 1 Population growth: 1701–1931
historians’ ignorance of medicine to create an enraptured audience of almost perfect gullibility. In the past quarter century the situation has changed. Tuberculosis has returned with a vengeance. The AIDS epidemic combined with drug addiction has been accompanied in American cities by a sharply increased frequency of the disease. The indiscriminate use of anti-tuberculosis drugs has led to the emergence of drug-resistant strains of tubercle bacilli. In hospitals, physicians are obliged to resort to strict isolation of patients with drug-resistant tuberculosis. In Minnesota, tuberculosis appears frequently among immigrants, especially those from Southeast Asia and Africa. Tuberculosis is one of the most serious diseases confronting physicians in the large city hospitals of Minneapolis and Saint Paul. Small epidemics have occurred. In a Saint Paul high school, a teacher with unrecognized active tuberculosis infected a large number of students. Another epidemic occurred among the regular patrons of a bar in Minneapolis. Such epidemics demonstrate that, if not checked; tuberculosis can spread rapidly and easily. Fortunately, physicians and public health officials are prepared to take prompt and vigorous measures to treat the victims of tuberculosis and prevent its spread. Today tuberculosis remains a highly contagious and extremely dangerous disease. Its continued serious threat to public health makes the pronouncements of Thomas McKeown a quarter century ago seem faintly absurd. Like P–G Wodehouse, who wrote so amusingly about the life of the British aristocracy, McKeown did not let facts, or even improbabilities, interfere with the telling of a story. However, Wodehouse knew that what he was writing was fiction, even fantasy. The haunting question about McKeown is whether he knew that what he was writing was nonsense. McKeown ignored evidence that bore directly upon the questions he posed. He distinguished what he called the modern rise of population since 1750 from earlier growth in population without demonstrating any change in rate of growth in the 18th century from earlier centuries. He misconstrued the causes of population growth as requiring changes in birth rates or death rates, when neither is necessary. Nevertheless, he gave preference to decline in the death rate and emphasized the significance of the decline in tuberculosis mortality after 1838. He did not raise the question of whether tuberculosis was rising or falling before 1838. For McKeown, the chief question was to explain ‘the early, rapid and continuous decline of mortality from tuberculosis’, and he cited his and Record’s 1962 paper that the decline ‘was due mainly to a rising standard of living, particularly of nutrition’. McKeown did not mention that the standard of living was rising also in France, Ireland, Norway, and the United States of America, but in these countries tuberculosis mortality was not declining. It did not begin to decline until physicians began to urge medical measures against the disease after Robert Koch’s discovery of the tubercle bacillus in 1882. In Minnesota, a prosperous agricultural state with a high standard of living and an abundance of food, the incidence of tuberculosis rose during the 19th century. Between 1900 and 1912, the tuberculosis mortality rate in Minnesota rose almost 20%. In 1908, when the Sixth International Congress on Tuberculosis met in Washington, DC, tuberculosis represented a growing epidemic. At the congress, Minnesota physicians heard Arthur Newsholme from England tell how the segregation of tuberculosis patients in workhouse infirmaries and hospitals had resulted accidentally in the steady decline of tuberculosis in England and Wales. Similarly, Newsholme noted that the
deliberate isolation of tuberculosis patients in Prussia and in New York City, since the discovery of the tubercle bacillus, had resulted in a rapid decrease in tuberculosis mortality. Before they heard Newsholme, Minnesota physicians had sought to create tuberculosis sanatoria to provide for patients in the early stages of the disease, who with supportive care might recover. After hearing Newsholme at Washington, they returned home with a new purpose, to provide sanatorium care for as many tuberculosis patients as possible to prevent them from spreading their disease. By 1912, Minnesota physicians had succeeded in opening two county sanatoria. In 1913, the Minnesota legislature provided funds to establish 12 more. By 1918, 14 county sanatoria were open, in addition to a state sanatorium and one or two private institutions. From this year tuberculosis mortality in Minnesota began a long, steady decline, in parallel with similar declines because of similar policies, applied throughout the United States and Canada.

McKeown cited Arthur Newsholme’s 1923 book on the role of vital statistics in public health but misrepresented Newsholme’s views and ignored his evidence for them. Indeed, McKeown ignored completely the vast literature on tuberculosis and its history. He dismissed all the medical treatments used before the introduction of anti-tuberculosis drugs as not effective, but he offered no evidence in support of that opinion. Nevertheless, his opinion has since become an article of faith among social historians of tuberculosis. They have relied upon McKeown but offer no more evidence than he did.

A physician caring for patients with tuberculosis follows the course of the disease in several ways: the record of the patient’s temperature, the presence or absence of night sweats, the presence or absence of tubercle bacilli in the patient’s sputum, and changes in tubercular lesions in the chest revealed by X-ray examination. When a patient in the early stages of tuberculosis entered a sanatorium, their treatment usually began with bed rest. Soon the patient’s temperature came down, the lesions in the chest began to heal, and their general condition improved. In patients with more advanced disease and tubercle bacilli in the sputum, artificial pneumothorax (collapse of the affected lung) hastened the disappearance of tubercle bacilli from the sputum and promoted recovery. Determination of the presence or absence of tubercle bacilli may be laborious, requiring the culture of sputum samples on agar plates or in guinea pigs. The medical care of a tuberculosis patient often continued over months or years and accumulated a record from which the physician in charge could determine the degree of effectiveness of the course of treatment. In 1946 in their first report on the clinical use of streptomycin to treat tuberculosis, Hinshaw and colleagues noted that they had spent 7 years in developing procedures to determine the effect of any given drug on the course of experimental tuberculosis in animals. After finding in 1944 that streptomycin showed unusual promise against tuberculosis in animals, they had used it on patients with severe progressive tuberculosis for whom ‘long-term roentgenographic and clinical records’ existed. Most of the patients improved rapidly with streptomycin treatment; among those that showed no improvement, the disease stopped progressing. The criteria for judgement of improvement’, wrote Hinshaw et al. ‘were strictly objective with emphasis on the roentgenographic picture, the temperature curve and the bacteriological examinations for tubercle bacilli. Although Hinshaw and colleagues might have been forgiven some excitement at the promising results from the clinical use of streptomycin, they concluded by saying that it was too early to recommend it ‘as a substitute for accepted therapeutic procedures, the efficacy of which have been proved by long experience’. If cautious medical scientists, like Hinshaw and colleagues, considered the effectiveness of the pre-antibiotic treatment of tuberculosis as proven by long experience, how did McKeown conclude that such procedures were ineffective? True, sanatorium treatments could not save patients with severe advanced tuberculosis, but then neither could streptomycin. Nor could any other anti-tuberculosis drug or combination of drugs today. Early diagnosis is critical to effective treatment.

Thomas McKeown had no more evidence for the ineffectiveness of the earlier treatments than he had for the view that improved nutrition brought about the historical decline of tuberculosis in England. He evidently possessed a great capacity for self-deception, if not an intention to deceive others. Many of his readers were equally eager to be deceived.

References

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