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Mortality rates or sociomedical indicators? The work of the League of Nations on standardizing the effects of the Great Depression on health

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This article explores the first international effort by the League of Nations Health Organization (LNHO) to standardize the study of the effects of the economic crisis of the 1930s on health. Instead of analysing this effort with the benefit of hindsight, this article takes into account the actors' perspectives and, therefore, it relies on the documents produced by the LNHO and public health experts of the 1930s, as well as on the historical scholarship on this subject. This article shows that, despite the declining death rates in Europe and in the US during the crisis, the LNHO considered that death rates concealed a more subtle effect of the crisis on health; hence, they launched a project aimed at making the effect visible. It describes the LNHO programme and the guidelines and methods set out by the organization in 1932 to observe this subtle effect through sociomedical investigations. The results of these surveys are summarized and the article discusses how the eugenic arguments used to explain them were not accepted by the LNHO. The article also shows how some members of the LNHO considered the results of the sociomedical surveys inconclusive and questioned the usefulness of socioeconomic indicators; in so doing, they raised concerns about the intervention of the LNHO in national matters and about the risks of crossing the established limits between science and politics. This article shows that an historical analysis, which takes into account the points of view of the actors involved, illuminates the factors that led the LNHO to conclude that mortality rates were the best method for measuring the effects of the economic crisis on health and that, as they were declining, the Great Depression was not having any deleterious effect on public health.

Keywords History, international health, economic crisis, public health

KEY MESSAGES

- The international efforts within the League of Nations Health Organization (LNHO) to standardize the statistical methods for studying the effects of crises on health during the crisis of the 1930s centred around two contending indicators: official national statistics based on mortality rates and sociomedical indicators (malnutrition and illness).
- The clash between those within the LNHO who supported sociomedical research and those defending official national statistics shaped not only the debates but also the arrival at the conclusion that the crisis of the 1930s, as measured by mortality rates, had no deleterious effects on public health.
- This historical analysis of the LNHO's work on crises and health, based not on ex-post evaluations but on the actors' own perspectives, shows that standardizing the statistical methods for detecting the effects of crises on health involved divergent research traditions, conflicting views of the role of the organization and opposing beliefs about the crises and health problem.

Introduction

During the 20th-century economic crises, public health professionals, health economists and demographers studied how economic crises affected health and the best ways to preserve public health in times of crisis. The current consensus indicates that mortality-based statistics such as life expectancy are the best indicators of the health of a population. In addition, health, as measured by mortality, correlates inversely with business cycles, i.e. during periods of prosperity health tends to deteriorate.[1] Although this is a well-established consensus today, at the time of the Great Depression there was no such consensus. Not only did health experts face an economic crisis on an unprecedented scale, but they also sought to standardize the study of the effects of economic crises on health for the first time ever. This article analyses the first international efforts, led by the League of Nations Health Organization (LNHO), to standardize the statistical methods for studying the effect of economic crises on health during the early 1930s.

To explore the guidelines set by the LNHO, the methods and results of the investigations carried out, and the way in which the organization evaluated those results, the historical approach has been used. Unlike the bulk of the literature on crises and health, which deals with the problem with the benefit of hindsight, this article analyses the debates during the Great Depression from the actors' own perspectives. By changing the timeframe and taking an historical approach, the article aims at indicating how the scientific consensus about the statistical methods used to detect the effects of the depression on health was the product of several historical factors. The literature on the history of statistics has explored the forces by which numbers and statistics have come part of modern science and medicine and the conflicts caused by their inception on pre-existing traditions. According to historians, the expansion of capitalism and the emergence of nation states were the most important source of impetus to unify and simplify measures that overlooked the past regime of discretion and negotiation that clearly favoured local interests over central powers (Kula 1986; Porter 1995; Desrosières 1998). Precise, uniform measures helped to move the economy away from an order based on privilege, into the domain of law and enhanced administrative control over matters of taxation and economic development. The culture of quantification that resulted from this process, which we tend to think began with the sciences, involved scientists and bureaucrats alike (Porter 1995). Examples of this phenomenon are the collaboration of science with the state in the definition of the metric system in France (Alder 1995) or the standardization of vital statistics by the UK General Register Office (Desrosières 1998). The work of the LNHO in standardizing biological practices and statistical methods can be seen as a part of this process of unifying measures in the depression context.

On the other hand, historians who have explored the nature of quantification in medicine have found, e.g. how political and economic practices informed medical quantification in 18th century England (Rusnock 1995); how quantification in medicine has been embedded in a wide range of instruments and technologies (microscopes, thermometers and time charts) and the tension it created among 19th century physicians who were hostile towards statistics on the grounds that they homogenize individual differences (Hess 1995; La Berge 1995). Historians have also explored how statistical tools such as standard deviation and the chi-square test, introduced by Karl Pearson (1857–1936), were developed within the frame of eugenics, the controversial science for the improvement of the human race that informed much of the medicine of the first half of the 20th century (Kevles 1985; Porter 1988; Proctor 1988). Like these instances of the historical application of quantitative methods in medicine, the work of the LNHO in standardizing the statistical analysis of population health escaped neither the constraints of the knowledge and technologies of its era nor the tensions between divergent views on how to measure disease as we will see.

Finally, historians interested in the history of scientific objectivity have also explored how numbers became one of the foundations of objectivity in modern medicine and the significance of this transformation. The aforementioned bureaucratic imposition of uniform standards and measures has been indispensable for the transformation of local know-how into generally accepted scientific knowledge, for producing a kind of objectivity to which scientists have also contributed (Porter 1995). However, precisely because quantification represents the core of the most important value of modern science, objectivity (i.e. exclusion of judgment and the rejection of subjectivity), a decision based on numbers appears to be fair and impersonal. The power of deciding on the basis of numbers is not only evident in the authority which scientists and the public confer to numbers but also in the growing role of quantitative expertise in the making of public decisions.

As Ian Hacking (2006) indicates, quantification is not only an 'engine of discovery' but also a powerful 'engine for making up people', i.e. it produces effects on the kinds of people to whom they are applied—e.g. classifications of people or diseases—and upon which policy measures are justified. Thus, relying on the insights of the history of statistics, medical quantification and objectivity, this article analyses the LNHO's efforts to standardize the statistical studies of the effect of crises on health during the Great Depression on the basis not of ex-post evaluations, but of the scientific and cultural movements of the time and the actors involved. This effort may contribute to our understanding of the process of producing statistical standards for population health at any given time.

The first section presents the LNHO programme on the crisis and health and its intellectual basis. The second and third sections summarize the results of the sociomedical surveys carried out in the US and Vienna, respectively. The eugenics arguments raised by these surveys and the position of the LNHO in the context of the social medicine and the eugenic movements of the interwar years are presented in the fourth section. The fifth section details the controversy within the LNHO surrounding the crisis and health programme and the sociomedical investigations that led to the closure of the programme. Some concluding remarks are included.

The LNHO programme on crisis and health

The LNHO was the international health agency created within the League of Nations (LN) in 1921. Along with the International Red Cross and the Health Section of the Rockefeller Foundation, the LNHO was the most influential international health agency of the first half of the 20th century. Its agenda was decided by a committee of health experts from the member nations, including a German expert and a US representative (Dubin 1995), which met twice a year. The Health Section of the LNHO was one of the technical bodies of the organization, which put the Health Committee's decisions into practice. Historians have already analysed the LNHO's early work on epidemiological investigations, public health statistics and standardization of biological practices (Borowy 2009). They have pointed out that by the end of the 1920s, the LNHO agenda had moved towards socioeconomic concerns, owing to the socialist preferences of the Health Section's medical director, Ludwik Rajchman, to the interest in the 1920s in community health and ultimately to the depression, which proved to be crucial to this new interest (Weindling 1995a, 2005).

In 1932, the LNHO considered the problem of economic crises and health at the October Health Committee meeting. Unemployment, the most dramatic consequence of the crisis, was used as justification for the investigation into what the LNHO considered would be the negative effects of the crisis on health. Unemployment rates were alarming. According to LN experts, quoted by the historian Hobsbawm (1996), the dramatic recession of the North American industrial economy, which began with the New York Stock Exchange crash of October 29, 1929, soon spread to world's other industrial powerhouse, Germany. US industrial production fell by about a third from 1929 to 1931 and the decline was mirrored in Germany. Austria, Czechoslovakia, Greece, Japan, Poland and Great Britain were similarly shaken. For farmers dependent on the market, especially the export market, this meant ruin, unless they could retreat to subsistence production. For the agricultural workforce, the primary consequence of the depression was unemployment on a previously unimagined and unprecedented scale. During the worst period of the depression, and by the time the LNHO decided to tackle the possible consequences of the slump, 22–23% of the British and Belgian workforce, 24% of the Swedish, 27% of the US, 29% of the Austrian, 31% of the Norwegian, 32% of the Danish and no less than 44% of the German workers were out of jobs (Hobsbawm 1996). This situation was more dramatic considering that public provision for social security, including unemployment relief, was either non-existent, as in the US, or meagre. In the absence of any solutions within the framework of the old liberal economy, at a time when world trade fell by 60% in 4 years (1929–32), states resorted to erecting increasingly higher trade barriers to protect their national markets and currencies against the global economic situation. The world was being divided into competing monetary trading blocks and this, coupled with nationalism in Germany and Italy, affected international peace (Hobsbawm 1996; Clavin 2000). Thus, the crisis pushed countries to protect their national interest above all else and also forced Western governments to give social considerations priority over economic ones in their national politics. It was in this context that the LNHO assumed responsibility for contributing to the understanding and prevention of what it assumed would be the negative consequences of mass unemployment, taking advantage of its privileged scientific, humanitarian and international character.

According to historian Iris Borowy (2008), the discussions of the consequences of the crisis for health at the Health Committee meeting of October 1932 revealed great disagreement among members: official statistics from every country showed declining mortality rates and revealed a healthier state than ever, yet the feeling among the participants that the crisis must have been having a deleterious effect on health was general. The Health Section stated that mortality was not a reliable way to determine the effect of the crisis 'since general mortality is an imperfect and somewhat insensitive criterion of the state of the health of the population (LN 1932)'. This idea was not new. Indeed, according to Historian Paul Weindling (2005), since the 1920s innovative statisticians had claimed that mortality indicators obscured much of the frequency of sickness when age, gender and class were taken into account. Official statistics on disease were known to be limited and suffer from severe under-reporting. Besides, national aggregate mortality statistics were increasingly being criticized for masking regional, class and gender inequalities.

Thus, the Health Section prepared a memorandum of the economic crisis 'from the point of view of the health expert', in which it explained why the LNHO must make the effect 'statistically' visible (LN 1932). First, it argued that despite the fact that the mortality rates had actually declined in major cities in the US and in both Eastern and Western Europe, this did not mean that there was no correlation between economic

crises and health. For the Health Section, laboratory and clinical research had made it clear that 'the health of a nation was closely bound up with the state of its nutrition'. By the 1930s, the LNHO had established a programme on nutrition with the help of the British scientist W.R. Aykroyd. Thus, the Health Section assumed that certain unfavourable conditions, exercising only a slight influence, may diminish the degree of physical well-being, reduce weight and delay growth, without immediately provoking well-defined diseases. To a more pronounced degree, it argued, such conditions might engender diseases not causing death (rickets) or only causing it after a long interval (tuberculosis). Thus, it proposed to turn to nutrition: restrictions on the quantity and quality of food available owing to a reduction in the family incomes of the unemployed could lead to a state of malnutrition (LN 1932).

Second, the Health Section argued that there was mounting evidence from German doctors showing that underfeeding was increasing to such an extent that it had become a danger to public health. During the 1930s, the German doctors reported abnormal weight loss, disturbed metabolisms and mental unbalance among the unemployed (Balinska 1998). German medical literature, according to the Health Section, had pointed to an increase in the cases of tuberculosis and rickets, and an increase in the number of complaints from school doctors about the debility of schoolchildren. In an effort to justify how this could be the case, the Health Section, in its memorandum, analysed the state of nutrition of the unemployed from the point of view of calorie intake. It stated that, although during unemployment there was a reduction of 25% in the calorie needs of the workers, the needs of their families remained the same; therefore, the reduction in the calorie needs would be 8%. Using this rationale, it compared the calorie intake of German working families before and during periods of unemployment, concluding that there was malnutrition during periods of unemployment among the families at the lower income level.

Finally, the Health Section also pointed out the fact that the diet of the unemployed families tended to be of cheap vegetable foods (cereals, potatoes and margarine) instead of protective foods (eggs, butter, milk, greens and vegetables), with the former defined as incompatible with optimum health. Although medical reports from Germany showed diminution of weight and growth in schoolchildren, and increase in tuberculosis morbidity, skin diseases and nervous problems as 'symptoms of the economic depression', the Health Section also presented reports that showed no evidence of any deterioration in the physical development of schoolchildren (LN 1932).

Based on the Health Section's memorandum, the Health Committee of October 1932 introduced a six-point strategy for addressing the health effects of the crisis. First, it decided to bring together sanitary administrations to 'work out methods of statistical study to elucidate the effects which the economic crisis may have upon the public health'; second, it wanted to bring together authors of special investigations to secure 'understanding on the way in which individual nutrition should be studied'; third, it sought to foster an exchange of information about the best that could be done with reduced income with respect to nutrition; fourth, it wanted to work out 'the most suitable methods by which, in a period of economic crises, the public health can be safeguarded'; fifth, it sought to study the effects of the exodus and agglomeration of the unemployed on public health in cities; and finally, it wanted to explore the effects of the economic depression on mental health (LN 1932; Borowy 2009).

Following the Health Committee's mandate with regard to the first two points on this agenda, the Health Section convened a conference in Berlin between 5th and 7th December, 1932 (LN 1933a). This conference established clinical and statistical methods for studying the effects of unemployment on nutrition in large populations. Although studies on the state of nutrition of the unemployed were already in progress or in preparation in several countries, such as the US, the Berlin conference aimed to enhance the value of these inquiries by suggesting that the research be conducted in a systematic way, so that they would be comparable. This not only meant selecting the best clinical methods for detecting malnutrition but also standardizing the questions and methods for detecting the effects of economic crises on public health.

According to Paul Weindling (2005), the US surveys already in progress would become a key input for the work of the LNHO. They were guided by the interests of two financial sponsors of the LNHO, the Rockefeller Foundation and the Milbank Memorial Fund. Their priorities derived from public health reformers who supported pioneering health demonstrations, which set out to prove that investment in medical facilities could bring down the incidence of disease on one hand, and the idea that, to assess the impact of any reduction in sickness, one had to reconstruct the complete demography and family structure of the community, on the other. The US Health Service statistician Edgar Sydenstricker (1881–1936), who was trained as an economist, took a key role in bringing about this analysis. He set standards for research and policy agendas and reshaped the statistical priorities of the LNHO in 1925 when he was seconded to assist with the organization's statistical services. Sydenstricker had already used insurance records to study pellagra, which demonstrated that diseases could be prevalent without affecting overall mortality rates. He had also led the first longitudinal study of ill health among an urban population carried out in Hagerstown, Maryland, between 1921 and 1924. Sydenstricker and his staff collected baseline data on the health status and economic conditions of more than 7200 members of white families and continued to visit each family every 6–8 weeks for 28 months to record all new cases of illness. Sydenstricker decried the use of mortality data as an index of health and advocated collecting data on morbidity as he was convinced that regions with low death rates might nonetheless have high rates of debilitating illness (Krieger and Fee 1996; Weindling 2005).

When, in 1925, Sydenstricker was called to advise the statistical service of the LNHO, he suggested that this service should more accurately reflect health conditions beyond the already established warning system for epidemic infectious diseases in its weekly, monthly and quarterly epidemiological reports. Furthermore, when he later worked for the committee on the costs of medical care, in co-operation with the US Public Health Service, he studied morbidity among 12 000 families in Syracuse with the aim of linking illness with sex, age, economic status, housing and sanitary conditions. He finished in 1931

and reported gratifying interest in this project among the grouping of the Health Section at the LN in Geneva. The idea was to co-ordinate the Milbank Fund's study of the impact of the depression with studies sponsored by the Health Organization established at the 1932 Berlin conference. Sydenstricker was aware that morbidity was vague as a statistical measure since an attack of illness could vary in severity and duration, but believed that morbidity statistics could still be more revealing of social conditions than mortality (Weindling 2005).

Following Sydenstircker's research agenda, members of the Berlin conference considered it necessary to mix social inquiries and medical investigations. They proposed determining the state of nutrition, income, food intake and social conditions of members of the same class of the population, whose incomes and conditions of life had been affected by the depression (the unemployed), and comparing them with those unaffected by the crisis (the control group). They stated that urban, rural and industrial districts suffering from the effect of 'the industrial depression' should be studied, and that no less than 1000 people should be interviewed, so that the results of 'medico-social' inquiries would be robust enough for valid conclusions to be drawn from them. In addition, investigations on a much larger scale (10 000 families) were also recommended by the attendees of the Berlin conference. They suggested that social inquiries should include family resources before the depression (wages and other sources of income) and social conditions, such as housing, garden (if any) and diet. As for the medical data, they suggested simple clinical methods for examining nutrition, such as determination of weight and height, observation of physical condition and constitution, the Piquert Pedilisi Index and the Sacratama method used in the US relief work in Vienna, which assess height and weight, as well as the condition of the skin and muscles.[2] The conference recommended performing these examinations periodically and, in particular, measuring weight every 2 or 3 months.

This plan was immediately put into effect by the public health departments of several countries, and the Health Organization was 'asked to co-ordinate the inquiries now proceeding or to be instituted hereafter' (LNHO 1933a). According to the LNHO, by September 1933, this programme was being implemented in Austria, Belgium, Germany, Hungary, the Netherlands, Poland, Yugoslavia, and with some changes, in the US; however, the results of only two of these investigations were published in the *Bulletin of the Health Organization*.

Unemployment and nutrition in Vienna

The survey performed in Vienna was thus designed to establish whether it was possible to prove that unemployment in Vienna had affected the state of nutrition and physical development of the families concerned (Götzl and Nobel 1934). Apart from examining housing conditions and income, investigations of the state of nutrition followed the methods recommended at the Berlin conference (the Pedilisi Index and the Sacratama method). Surveys were conducted among 558 unemployed and 152 employed families between June and July 1933. Nurses performed at least two examinations within 5–6 months, but only 151 families of the unemployed and 48 families of the employed, who were first interviewed, attended the second call. According to the researchers, this seriously limited the possibility of making any comparative analyses of the changes over time. Thus, the results were based on cross-sectional observations comparing the medical variables among the unemployed and the employed with the normal average.

The authors of the Vienna report found no differences in the provision of housing between the employed and the unemployed, except in the number of beds per family, which was higher among the former when compared with the latter. The Pedilisi Index did not show significant differences between the employed and the unemployed, but the results of the test of the blood content of the skin and visible mucous membranes of the Sacratama method showed better results among the employed when compared with the unemployed. In terms of the average height and weight of adults, the results showed that they were greater in families whose breadwinner was working than in families of the unemployed. They also showed that the differences in height and weight in relation to the normal average revealed 'very strikingly the considerable preponderance of minus differences in the height of adults, adolescents and children in the families of unemployed persons as compared with families which are employed'.

According to the authors, the differences in weight in relation to employment status were more significant than those in height: weight followed fluctuations in 'external conditions', such as employment, much more rapidly than height. However, the authors also affirmed that the differences in height could not actually be a consequence of unemployment. They recognized that at least some portion of the divergences in the average height of the adults observed must be regarded as a result of unemployment, and even that coming from less favourable social surroundings might account for this result. But they also suggested that these results were due to unemployed families already being psychophysically impaired; in other words, that unemployment may not be the cause of, but one of the consequences of this psychophysical condition.

The US 'depression poor'

Although the US was not a part of the LN, US representatives had participated in the LNHO since 1923. Not only did the philanthropic organization, the Rockefeller Foundation, financially support the Health Section (Weindling 1995b) but also the Surgeon General of the Public Health Service of the US, Hugh Smith Cumming, had participated in the LNHO as a chairman of the Commission on the fumigation of ships during the 1920s and was put forward to become member of the Health Committee in 1930 (LNHO 1930a,b). Although Cumming did not attend the Berlin conference, where the guidelines for research on nutrition were drawn up, he sent doctors John R. Murlin and Kenneth D. Blackfan (Sydenstricker 1933; Perrott, Collins and Sydenstricker, 1933).

The US survey, which was supported by the Milbank Memorial Fund, was thus performed following the line of enquiry set by the US Health Service statistician, Sydenstricker. It was wider in scope than the Vienna survey. It focused on eight large cities and two industrial towns where unemployment was the greatest: New York, Brooklyn, Syracuse,

Pittsburgh, Detroit, Cleveland, Baltimore, Birmingham, a coal-mining camp near Morgantown, West Virginia, and the cotton-mill villages near Greenville, South Carolina. Nearly 1200 families were visited in each place, amounting to a total of 12 000 families. Researchers wanted to ascertain whether there was any association between income changes during the depression and ill health, as measured by morbidity and mortality (Perrott and Collins 1933; 1935). Although studies comparing the height and the weight of children of the new poor or 'depression poor' were also carried out in the US (Palmer 1933, 1934), there is no evidence that these investigations were taken into account by the LNHO.

The authors of this survey argued 'the ordinary barometers of health—death rates and reports of communicable diseases—do not indicate that harmful effects of the depression upon the health of the population as a whole have taken place'. In their view, 'the comfortable conclusion is drawn by many that the physical well-being of the American people not only has not suffered but, in view of the continued low death rate, may have been benefited by the economic catastrophe'. They strongly criticized conclusions based upon mortality statistics alone and even affirmed that 'the assumption that mortality in the general population is an accurate index of sickness in the families of the unemployed is still less tenable' (Perrott and Collins 1935).

The individuals selected for the US survey were unemployed and people on restricted incomes because of the depression, and the most comfortable families living adjacent to the unemployed served as the control group. Researchers compared the incidence of illness during the period surveyed, both in families classified according to the number of employed workers in a family in 1932, and in wage-earning families according to the change in the per-capita income between 1929 and 1932. What was designated as illness was, to a considerable extent, a matter of what the informant (usually the housewife) remembered and designated as such. The survey used the disabling-illness category for cases in which the illness caused inability to carry out the usual activities on their own for one or more days during the 3 months before the interviews (the surveyed period), and whether the reported illness started within or before that period (Perrott and Collins 1933; 1935).

In relation to employment status, the researchers reported a lower incidence of disabling illness, starting before or during the surveyed period, among families having full-time workers than among those with only part-time or no-wage earners. The unemployed group showed a 48% higher rate of disabling illness than the families with full-time workers, while non-disabling illness showed no correlation with employment status. This was true for all cities, except Greenville and Morgantown. Inasmuch as most of the families having no employed workers in 1932 had one or more employed workers in 1929, the researchers stated 'these data are striking evidence of the association between a relatively high rate of disabling illness and loss of employment during the depression' (Perrott and Collins 1935).

More interestingly, the US survey analysed the change in the incidence of illness against the change in the income 'per capita' between 1929 and 1932. They classified people according to their economic status as 'poor' for those who earned US$ 149 or less per capita per year; 'moderate' for those who earned US$ 150–424 per capita per year; and 'comfortable' for those who earned US$ 425 and over per capita per year.[3] The researchers compared the incidence of illness with the economic experience of each of these groups between 1929 and 1932. Thus, they compared the disabling illness among those who remained comfortable, moderate and poor throughout the 4 years with the illness among families that had suffered loss of income and hence, a lower standard of living during the depression. The highest illness rate was exhibited by the group worst hit by the depression, namely, those classed as comfortable in 1929 and poor in 1932. They were called 'the depression poor'. The incidence of illness among the depression poor was 45% higher than the rate for their more fortunate neighbours who had remained equal in status, i.e. comfortable in 1929 and 1932, and 9% higher than the incidence of illness of the 'chronic poor', i.e. those who were poor in 1929 and remained so in 1932. However, the rate of illness among those who were comfortable in 1929 and dropped to moderate in 1932 was 10% higher than among those who remained comfortable all the time. Moreover, the rate of illness among those who dropped from the moderate to the poor group was 17% higher than that among those who remained in the moderate group throughout the period in question (Perrott and Collins 1933; 1935). The drop in income seemed to be associated with illness.

'Nature or nurture?'

Both the Vienna and the US surveys suggested that the unemployment caused by the depression seemed to be related to impaired health. However, according to the surveys' conclusions, whether the depression had actually worsened the nutrition of the unemployed families or caused an increase in the incidence of reported illness was not clear. As mentioned earlier, the authors of the Vienna report showed that the smaller average height of the adults in the families of the unemployed, when compared with the employed, could be regarded not just as a result of unemployment, but quite the opposite (Götzl and Noble 1934). A similar argument was put forward by the authors of the US survey: was 'nurture' or 'nature', they wondered, responsible for bringing about the observed results? More precisely, they continued, 'have we observed the *effect* of the depression on health or merely the results of a great sifting process?' (Perrott and Collins 1935). Indeed, they stated that 'the depression may have been a sifting process, separating the fit from the unfit'. According to the US researchers, men who kept their jobs were, on average, the more vigorous, capable and intelligent ones, and those who lost their jobs were less efficient than those who remained employed. This inefficiency, they suggested, may have been exhibited in many different ways, from the inability to compete in the economic struggle, to diathesis or a tendency towards sickliness that existed among these families as a concomitant of the economic inefficiency of the wage earner. They realized that this explanation of the higher sickness rates among the new poor postulated an 'inherent inferiority of which unemployment was one manifestation and ill health another'. In other words, they admitted the possibility that selection played a part in bringing about the situation observed in 1933. However, they recognized that it was highly improbable that a theory of

selection contained the sole explanation for the results of the survey. As a matter of fact, they affirmed that when the illness rates were made specific for age, sex, race, education, occupation and relief status, the association between the drop in income and the high illness rate became evident.

The results of the Vienna an the US surveys show how social medicine, i.e. the study of the medical problems from the social viewpoint, and eugenics, the science for the improvement of human race, dominated the medical scene at that time and both converged to provide an explanation for economic crises and health (Porter 1999; Borowy and Gruner 2005). As pointed out by the historians, social medicine was often tainted by eugenics with biologically based concepts of the poor and the sick as hereditarily degenerated (Weindling 1995b). In the US, many eugenicists insisted that due to biological destiny, the unemployed were mentally incompetent, improvident and irresponsible. In the UK, ideas that the poor constituted a biological class of their own were not uncommon (Kevles 1985). However, despite the eugenic arguments displayed in the explanations of the results of the Vienna and US surveys, the LNHO did not take the eugenic path. Alison Bashford has recently pointed out that during the 1920s and 1930s many advocates of eugenics approached the secretariat of the League and its various agencies, seeking to place eugenics officially on the agenda, but they failed (Bashford 2010). According to her, it was problematic for the LN personnel to divorce eugenics from nationalism and to see it as a viably international issue. One could argue that since the depression was strengthening the radical right who were increasingly finding support for their political agenda in racialist ideas and eugenics, as in the case of the Nazis, the LN's attitude to eugenics might not be surprising during the 1930s; however, one still has to explain why eugenics had not fully entered the medical discourse of the LNHO even sooner. By the time Cumming presented the results of the US surveys before the Health Commitee in October 1933, the eugenic arguments used to explain them had probably not been fully disclosed yet; surely, we can no discard the possibility that they were ignored. In any case, according to Weindling (1995b), the fact that the LN had a pronatalist ethos and that its work on nutrition was an environmental refutation of eugenics would partially explain why the LNHO did not take the eugenic path. Issues of social medicine such as the study of health insurance and public health administration as well as the definition of which diseases should be considered social diseases—'those which attacked society, those which involved social factors, or those which required social measures?'—had been widely discussed in the Health Committee (LNHO 1930a); however, no trace of eugenic arguments can be found in the Health Committee's reports between 1930 and 1935. The eugenic explanations hinted at by the researchers of the Vienna and the US surveys could have been used to contradict the LNHO presumption that the crisis had produced negative effects on health, but instead the customary indicator of health status, mortality rates, became the strongest argument against those results as we will see.

The end of the LNHO programme

One year after the LNHO set the agenda for studying the effects of the economic crisis on health, criticism of this initiative emerged during the assessment of the technical bodies by the LN Assembly. Indeed, the British representative to the LN Assembly, Mr Douglas Hacking MP, Parliamentary Under-Secretary for the Home Office, pointed out that in his country and in many others, unemployment had not been found to have had any prejudicial effect on people's health (LN 1933b). He considered the work undertaken on the effects of the economic crisis on public health 'to be one of the less essential activities', and therefore, called for an examination of the Health Committee's programme. Hacking argued that the Committee's work was based on the assumption that unemployment had affected public health, which was not the case in the UK since no limitations had been imposed on public health and social protection; he thought the same must have been true in other countries (BMJ 1933a). Whether the depression was affecting health was a highly controversial matter in Britain. Hacking followed the 1932 official annual report by the chief medical officer of Britain who stated: 'it is not correct as a medical practitioner in the provinces recently stated, that malnutrition is widespread (in spite of statistics to the contrary) among both children and adults'. The officer said that, in spite of local rises and falls in the incidence, 'there is at present no medical evidence of any general increase in sickness or mortality which can be traced to the effects of economic depression' (BMJ 1933b). Hacking not only criticized the LNHO programme on economic crisis and health based on the official assessment of the situation in Britain but was also convinced that crises had not negatively affected public health in other countries. Indeed, he was supported by at least two other members of the LN: Prof. Gallavresi, representing Italy in the LN Assembly and Mr Seán O'Kelly, representative of the Irish Free state. Both stated that the crisis had not lowered the level of public health in their countries (BMJ 1933a).

The British, Italian and Irish representatives were not alone in casting doubts on the LNHO's crisis and health programme. During the 20th session of the Health Committee held in Geneva in October 1933, representatives of Denmark, France, the UK, Italy and the Netherlands also ascertained that the depression had not been accompanied by any 'definite or measurable' effect on public health (LNHO 1933b,c). In the same meeting, the US representative, General Hugh Cumming, presented the first results of the work conducted in the US. According to the proceedings of the Committee, the US survey shows that 'the sickness rate would seem to have increased in families which were comparatively well off in 1929 but have fallen into comparative poverty in 1932. The sickness rate would also appear to be higher in unemployed families than in those which are not affected by unemployment'. The organization concluded from this statement that 'it would, however, be premature to attempt to draw any definite conclusions from these first results'. Furthermore, the British representative to the Committee, George Buchanan, recalled that it had originally been decided that the methods of enquiry into the effects of the economic crisis should be experimental and that 'relatively little profit to health administrations had been obtained by the methods adopted in this instance' (LNHO 1933b).

Buchanan added that the depression had not necessarily entailed great reductions in the expenditure on public health

services, echoing the view of Hacking and the British government. He questioned the recommendations that the LNHO had made with regard to the best ways of safeguarding public health at times of crisis, arguing that international standards might interfere with national autonomy (LNHO 1930a; Weindling 1995b). Indeed, as mentioned at the beginning of this article, one of the points on the health and crisis agenda set by the LNHO in 1932 was the study of 'the most suitable methods by which, in a period of economic crises, the public health can be safeguarded'. The LNHO, in co-operation with the International Labour Office worked together in a conference in 1933 with participants from France, Germany, the UK and Belgium for that purpose (LNHO 1933b). The practical conclusions of this meeting with regard to social assistance, expenditure on medical care and public health, insurance benefits, etc. (LN 1933c) were interpreted by Buchanan as a transgression from the purpose of the LNHO: 'it would not be the business of an international conference of experts who did not represent their Governments, to say how health administrations in different countries should be organized, reformed or rationalized'. Although Buchanan did not oppose the work of the organization on international standards related to what he considered strictly scientific issues, such as diagnostic methods for syphilis or the experimental studies of the health effects of the crisis, for him, the crisis and health programme seemed to be dangerously blurring the line he sought to maintain between the scientific and the political. The head of the Health Section, Rajchman, had another view. He believed that the LNHO was in a privileged place since, under the cover of humanitarian matters and medical progress, it could more easily work towards improving conditions that were in fact closely linked with political and economic issues (Balinska 1998). This was how the organization had obtained the co-operation of Germany and Soviet Russia in 1922. In any case, Buchanan's criticisms of the crisis and health programme, including both the results of the sociomedical investigations and the methods proposed to safeguard public health in times of crises, led the French representative, Leon Bernard, to state 'neither the Health Committee nor the Health Section ever intended to prejudge the result of studies undertaken with regard to the possible effects of the depression' (LNHO 1933b).

Concerns about the boundaries between science and politics, national autonomy and international intervention, in which the discussion about the crisis and health programme developed, were not new within the organization. For example, by 1930, Buchanan had strongly opposed the proposal that the LNHO should carry out comparative studies of preventive medicine. This could lead, in his view, to the formulation of international doctrines and dogmas. He called for a moderation of the international obligations of the organization to avoid a kind of 'scientific monopoly' or 'wishing to impose obligations on the circles concerned'. In his view, 'each country should work out its own methods, taking into account its national genius and the local conditions'. The head of the Health Section, Rajchman, and León Bernard, the French representative, said in reply to these criticisms that the Committee had never desired to interfere in the internal sanitary policy of the various countries and insisted that the aim of the organization has not been to create an 'international doctrine' (LNHO 1930a).

Tensions about the limits of the work of the organization prompted by the crisis and health programme added to the inconclusive results of the sociomedical investigations, according to some members, and to the mounting criticism of the programme from above and within. So it is not surprising that by 1933 the Health Committee substantially scaled back its programme concerning economic crises. No further attempts were made to set standards for national governments to safeguard public health. However, the Committee decided to continue to work on the statistical methods for investigating the effects of the depression on public health. It was said that better methods to reveal the early stages of malnutrition were needed and that the inclusion in the surveys of control groups whose living and working conditions had not changed would be desirable. In any case, taking into account Buchanan's criticism, the Committee's recommendation was to continue surveys of the state of the nutrition of the unemployed 'whether they followed strictly the suggestions of the Berlin conference, or were conducted in other ways along national lines (George Buchanan)' (LNHO 1933b).

Despite these intentions, by mid-1934, the LNHO had turned away from the problems of economic crises and health. Although studies inspired by the 1932 Berlin Conference were still being planned in other countries, such as Hungary, where the Home Office proposed to carry out an inquiry into the state of nutrition of 1000 families living in rural areas (BMJ 1934), the 21st Health Committee meeting of May 1934 reported that 'no further progress has been made with the enquiry into statistical methods of investigating the effects of the economic depression on health' (LNHO 1934). Furthermore, the Committee affirmed that economic depression apparently had no deleterious effects on public health that might have been expected 'at least as far as death-rates are reliable indices of the people's health' (LNHO 1934).

This last argument clearly contradicted the arguments that had been made by the Health Section in 1932 to justify its programme on crisis and health. As mentioned earlier, the Health Section had assumed that death rates were not a reliable measure of the effects of the crisis on health since mortality rates were considered an imperfect criterion of the state of public health; this is why it decided that it was necessary to explore the state of nutrition, considered to be a better indicator of the health of a nation. Clearly, the social concerns of the members of the Health Section declined in the Health Committee, and criticisms from the British representation were finally heard. According to historians there were tensions between the medical director of the Health Section, Ludwik Rajchman, and the British and the US representatives, Buchanan and Cummings. The latter did not appreciate Rajchman's 'social radicalism' and his involvement with China and Russia (Weindling 1995b; Balinska 1998). During the 1934 administrative reform of the Health Committee, when it was reduced from 26 to 12 members, two of Rajchman's allies, the Danish bacteriologist and president of the Health Committee, Thorvald Madsen, and the Polish health expert, Witold Chodzko, were dismissed (Balinska 1998). Given these circumstances, it is not surprising that by June 1934 the Health Section was preparing a general report on nutrition 'that would not be limited to the possible repercussions on health of the

economic depression and unemployment', thus marking the end of the LNHO crisis and health programme (LNHO 1934). It should be noted that despite the closing down of this programme, sociomedical surveys in the same vein continued for the rest of the decade in the US. However, these efforts were cut short by World War II and their legacy nearly erased by the Cold War (Krieger and Fee 1996).

Conclusions

In 1932, one of the most important international health organizations of the first half of the past century, the LNHO, set up a programme for investigating and standardizing the study of the effects of the Great Depression on health. Assuming that unemployment has subtle effects before disease or death, the LNHO interpreted the declining mortality rates in Europe and the US as a phenomenon concealing the negative effects of the crisis. After 2 years on the programme supporting sociomedical surveys which suggested that malnutrition and sickness were associated with unemployment caused by the economic crisis, the organization reached the conclusion that, as the death rates were declining, the crisis might not have had a negative effect on public health. In the process, supporters of mortality rates, on the one hand, and of malnutrition and morbidity indicators, on the other, claimed that the indicators they defended were the most reliable, yet they represented two contending measures of the problem that implied clear-cut opposing conclusions. Those who supported the use of mortality rates raised two arguments against sociomedical surveys: their results were inconclusive and they lacked any practical use for administrative purposes. For them, the fact that public health expenditure was not reduced because of the depression in some countries might have supported the idea that declining mortality rates were more accurate than sociomedical indicators. Eugenic explanations, which implied that malnutrition and even unemployment were not caused by the depression, but were instead a precondition brought to light by the crisis, could have also been used against the sociomedical conclusions, but the LNHO decided not to pursue that line of explanation. Thus, who was to decide between the conflicting conclusions and measures represented by mortality rates and sociomedical indicators? On what grounds? The analysis of the shift of opinion of the LNHO programme on the basis not of ex-post evaluations, but instead from the actors' perspectives, brings to light several historical factors involved in the process of standardizing statistical surveys.

First, one has to consider the traditions that supported standards (official national statistics and social medicine), the views of the actors involved in the discussions and their weight in setting the research agenda. Clearly, bringing together two different statistical traditions in a supposedly neutral arena such as the LN and the LNHO itself proved to be conflict-producing. The proponents of the crisis and health programme, who supported nutritional and morbidity indicators were strongly criticized for their leftist views by those who supported the standard and official measure of the health of the nations, mortality rates. While the former dominated much of the work of the organization in the late 1920s and early 1930s, the latter would end up leading the organization by the mid-1930s, thus shutting down the crisis and health programme, and redirecting the LNHO work on nutrition.

Second, one has to consider the nature of the organizations in which the debates develop. The LNHO had been crucial in centralizing and generating epidemiological information worldwide and promoting the standardization of biologicals. It presented itself as an organization whose function was to be a technical advisor to the LN council. However, the debates regarding the crisis and health programme showed that members advocating the use of the opposing health indicators also held different views of the role of the organization. Those who considered mortality rates as the true indicators of a nation's health believed that the LNHO should limit its work to offering technical advice and therefore should not become a supranational agency, which would regulate or intervene in areas considered matters of national concern. On the contrary, the supporters of nutritional indicators, faithful to their 'social radicalism', envisioned the organization as a means to force improvement of conditions that were linked to political and economic issues. For the former, crossing the between politics and science represented some of the greatest risks of the crisis and health programme.

This historical analysis, which takes into account not ex-post evaluations, but the actors' perspectives shows how, despite being endowed with the authority of science and numbers, the LNHO's efforts to standardize, for the first time ever, the statistical methods for studying the effects of crises on health proved to be controversial: it involved divergent research and statistical traditions, conflicting views of the role of the organization itself and opposing perspectives of the crisis and health problem.

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Endnotes

[1] For investigations of business cycles variations of death rate, unemployment and disease, see e.g. Ogburn and Thomas (1922), Eyer (1977), Brenner (1979), Gravelle *et al.* (1981), Wagstaff (1985), Mesa-Lago (1985), Abel-Smith (1986), Sen (1998), Ruhm (2000, 2005), Cutler *et al.* (2002), Tapia Granados (2005), Tapia Granados and Diez Roux (2009) and Stuckler *et al.* (2009).

[2] The Piquert nutrition index, Pedilisi, is the cubic root of 10 times the body weight divided by sitting height taken as a basal unit, represented by 100. Schoolchildren whose index exceeds 100 are overnourished; those whose index ranges from 95 to 100 are

normal, and those below 95 are undernourished. The Sacratama method was used to measure the state of nutrition by the blood content of the skin, the condition of the subcutaneous fat layer, the skin tension, determined by the water content of the subcutaneous tissue and the condition of the muscles (LN 1932).

[3] The Unskilled Wage Rate calculator, which is used to compare different wages in different years, shows that in 2008, US$ 150 from 1929 is worth US$ 5954.76, and US$ 424 is worth US$ 16 871.81. See http://www.measuringworth.com/uswage/ accessed in June 2010.

References

Abel-Smith B. 1986. The world economic crisis. Part 1: repercussions on health. *Health Policy and Planning* **1**: 202–13. Part 2: Health manpower out of balance. *Health Policy and Planning* **1**: 309–16.

Alder K. 1995. A revolution to measure: the political economy of the metric system in France. In: Wise N (ed). *The Values of Precision*. Princeton: Princeton University Press, pp. 39–71.

Balinska A. 1998. *For the Good of Humanity. Ludwik Rajchman Medical Statesman*. Budapest: Central European University Press.

Bashford A. 2010. Internationalism, cosmopolitanism, and eugenics. In: Bashford A, Levine P (eds). *The Oxford Handbook of the History of Eugenics*. Oxford: Oxford University Press, pp. 154–72.

Borowy I. 2008. Crisis as opportunity: international health work during the economic depression. *Dynamis* **28**: 29–51.

Borowy I. 2009. *Coming to Terms with World Health. The League of Nations Health Organization, 1921–1946*. Frankfurt am Main: Peter Lang.

Borowy I, Gruner W. 2005. *Facing Illness in Troubled Times*. Frankfurt am Main: Peter Lang.

Brenner MH. 1979. Unemployment, economic growth, and mortality. *The Lancet* **24**: 672.

British Medical Journal (BMJ). 1933a. International Health and the Economic Crises. *BMJ* **2**: 690–1.

BMJ. 1933b. The Nation's Health: Sir George Newman's Report for 1932. *BMJ* **2**: 580–1.

BMJ. 1934. International health work. *BMJ* **2**: 642.

Clavin P. 2000. *The Great Depression in Europe, 1929–1939*. London: McMillan Press.

Cutler D, Felicia K, Lozano R, Méndez O, Zurita B. 2002. Financial crisis, health outcomes and ageing: Mexico in the 1980s and 1990s. *Journal of Public Economics* **84**: 279–303.

Desrosières A. 1998. *The Politics of Large Numbers, A History of Statistical Reasoning*. Cambridge, MA: Harvard University Press.

Dubin M. 1995. The League of Nations Health Organization. In: Weindling P (ed). *International Health Organizations and Movements, 1918–1939*. Cambridge: Cambridge University Press, pp. 56–80.

Eyer J. 1977. Prosperity as a cause of death. *International Journal of Health Services* **7**: 125–50.

Götzl A, Kornfeld W, Nobel E. 1934. The effects of the economic depression on the population of Vienna. *Quarterly Bulletin of the Health Organization* **III**: 461–522.

Gravelle HSE, Stern J, Hutchinson G. 1981. Mortality and unemployment: a critique of Brenner's time-series analysis. *The Lancet* **2**: 675–9.

Hacking I. 2006. Making up people. *London Review of Books* **28**: 23–6.

Hess K. 1995. Standardising body temperature: quantification in hospitals and daily life, 1859–1900. In: Jorland G, Opinel A, Weisz G (eds). *Body Counts. Medical Quantification in Historical and Sociological Perspectives*. Montreal & Kingston: McGill-Queen's University Press, pp. 109–26.

Hobsbawm E. 1996. *The Age of Extremes: A History of the World, 1914–1991*. New York: Vintage.

Kevles D. 1985. *In the Name of Eugenics*. Cambridge: Harvard University Press.

Krieger N, Fee E. 1996. Measuring social inequalities in health in the United States of America: a historical review, 1900–1950. *International Journal of Health Service* **26**: 391–418.

Kula W. 1986. *Measures and Men*. Princeton, NJ: Princeton University Press.

La Berge A. 1995. Medical Statistics at the Paris School. What was at stake? In: Jorland G, Opinel A, Weisz G (eds). *Body Counts. Medical Quantification in Historical and Sociological Perspectives*. Montreal & Kingston: McGill-Queen's University Press, pp. 89–108.

League of Nations (LN). 1932. The economic depression and public health. *Quarterly Bulletin of the Health Organization* **1**: 425–76.

LN. 1933a. The most suitable methods of detecting malnutrition due to the economic depression. *Quarterly Bulletin of the Health Organization* **II**: 116–29.

LN. 1933b. *Work of the Health Organization*. Report of the Second Committee to the Assembly, Geneva, October 3, 1933. Document Number A.38.1933.III.

LN. 1933c. Report on the best methods of safeguarding the public health during the depression. *Quarterly Bulletin of the Health Organization* **2**: 266–332.

League of Nations Health Organization (LNHO). 1930a. *Minutes of the Sixteenth Session held at Geneva from September 29th to October 7th, 1930.* Geneva, December 1930. Series of League of Nations Publications. III. Health 1930.III.13. Document Number C.627.M.248.1930.III.

LNHO. 1930b. *Nomination of Members of the Health Committee*. Note by the Secretary General, Geneva, May 12, 1930. Document number C.296.1930.III.

LNHO. 1932. Report to the Council on the Work of the Nineteenth Session of the Committee. Held in Geneva from October 10th to 15th, 1932, Geneva, October 15, 1932. Document number C.725.M.344.1932 [III] C.H.1109(I).

LNHO. 1933a. Report of the Health Organization for the Period October 1932 to September 1933, Geneva, September 1, 1933. Document number A.13.1033.III.

LNHO. 1933b. Report of the Council on the Work of the Twentieth Session of the Health Committee held at Geneva from October 27th to November 1st, 1933, Geneva, December 1, 1933. Document Number C.652.M.312.1933.III/[CH.1129(1)].

LNHO. 1933c. Work of the Twentieth Session of the Health Committee, held at Geneva from October 27th to November 1st, Geneva, December 30, 1933. Document Number C.704.1933.III.

LNHO. 1934. Report to the Council on the Work of the Twenty-First Session of the Health Committee, Geneva, May 11th to 16th, 1934, Geneva, June 7, 1934. Document Number 1934 C.233.M.97.1934.III.

Mesa-Lago C. 1985. Health Care in Costa Rica: boom and crises. *Social Science and Medicine* **21**: 13–21.

Ogburn WF, Thomas DS. 1922. The influence of the business cycle on certain social conditions. *Journal of the American Statistical Association* **18**: 324–34.

Palmer C. 1933. Growth and the economic depression: a study of the weight of elementary school children in 1921–1927 and 1933. *Public Health Reports* **48**: 1277–92.

Palmer C. 1934. Further studies on growth and the economic depression. A comparison of weight and weight increments of elementary-school children in 1921–1927 and 1933–1934. *Public Health Reports* **49**: 1453–69.

Perrot G, Collins S. 1933. Sickness and the depression. A preliminary report upon a survey of wage-earning families in Birmingham, Detroit, and Pittsburgh. *The Milbank Memorial Fund Quarterly Bulletin* **11**: 281–9.

Perrot G, Collins S. 1935. Relation of sickness to income and income change in 10 surveyed communities. *Public Health Reports* **50**: 595–622.

Perrott G, Collins S, Sydenstricker E. 1933. Sickness and the economic depression. Preliminary report on illness in families of Wage Earners in Birmingham, Detroit, and Pittsburgh. *Public Health Reports* **48**: 1251–64.

Porter D. 1999. *Health, Civilisation and the State. A History of Public Health from Ancient to Modern Times*. London: Routledge.

Porter T. 1988. *The Rise of Statistical Thinking*. Princeton, NJ: Princeton University Press.

Porter T. 1995. *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*. Princeton, NJ: Princeton University Press.

Proctor R. 1988. *Racial Hygiene. Medicine under the Nazi*. Cambridge: Harvard University Press.

Ruhm CJ. 2000. Are recessions good for your health? *Quarterly Journal of Economics* **115**: 617–50.

Ruhm CJ. 2005. Healthy living in hard times. *Journal of Health Economics* **24**: 341–63.

Rusnock A. 1995. *Quantifying Infant Mortality in England and France, 1750-1800. Body Counts. Medical Quantification in Historical and Sociological Perspectives*. Montreal & Kingston: McGill-Queen's University Press, 65–86.

Sen A. 1998. Mortality as an indicator of economic success and failure. *The Economic Journal* **108**: 1–25.

Stuckler D, Basu S, Suhrcke M, Coutts M, McKee M. 2009. The public health effect of economic crises and alternative policy responses in Europe: an empirical analysis. *Lancet* **374**: 315–23.

Sydenstricker E. 1933. Health and the depression. *The Milk Memorial Fund Quarterly Bulletin* **11**: 273–80.

Tapia Granados JA. 2005. Recessions and mortality in Spain, 1980-1997. *European Journal of Population* **21**: 393–422.

Tapia Granados JA, Diez Roux AV. 2009. Life and death during the great depression. *Proceedings of the National Academy of Sciences of the United States of America* **106**: 17290–5.

Wagstaff A. 1985. Time series analysis of the relationship between unemployment and mortality. A survey of econometric critiques and replications of Brenner's studies. *Social Science & Medicine* **21**: 985–96.

Weindling P. 1995a. The role of international organizations in setting nutritional standards. In: Harmke K, Andrew C (eds). *The Science and Culture of nutrition, 1840-1940*. Amsterdam: Clio Medica Editions Rodopi B.V, pp. 319–32.

Weindling P. 1995b. Social medicine at the League of Nations Health Organization and the International Labour Office compared. In: Weindling P (ed). *International Health Organizations and Movements, 1918-1939*. Cambridge: Cambridge University Press, pp. 134–53.

Weindling P. 2005. Interwar morbidity surveys: communities as health experiments. In: Borowy I, Gruner W (eds). *Facing Illness in Troubled Times*. Frankfurt and Main: Peter Lang, pp. 75–84.