Classifying Cause of Retirement in Historical Pension Records

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The Post Office Pension Application Forms contain a cause of retirement for all employees that were granted a pension, gratuity or other form of retirement award.[1] Many workers retired because they reached the retirement age (the age at which they became eligible for a pension) which was 60 years old until 1890 when the it was raised to 65.[2] However, a substantial proportion retired because a medical condition meant that they could no longer perform their duties. In those cases, a medically certified cause of retirement was provided by a Post Office Medical Officer. These causes of retirement provide valuable information on the kinds of medical condition which prevented work, how such causes varied by location, time, gender, age and occupation.

Figure 1 shows the number of postal workers retiring sick each year between 1860 and 1908, and that figure as a percentage of all retirees. The number of medical retirements, unsurprisingly, increased substantially as the total number of retirees increased from the 1890s onwards. The percentage of medical retirements slowly increased across the period, albeit with considerable year-on-year variation, until a peak in the first half of the 1890s before falling.
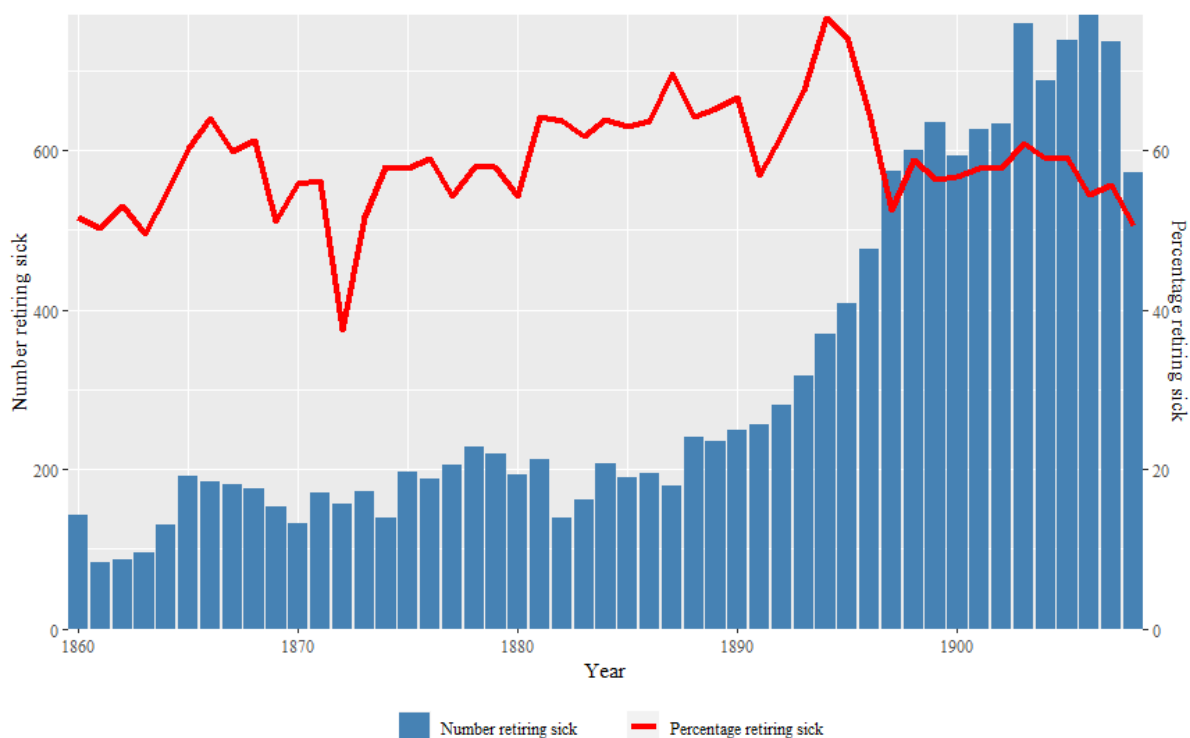
Figure 1. Number and percentage of pensioners retiring for medical reasons, 1860-1908. Source: Addressing Health Pensions Database.

There is a considerable range of medical causes identified in the records. Between 1860 and 1908, 15,479 postal workers, out of a total of 26,500, retired for medical reasons and 4,213

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[1] These forms, their transcription and processing are described in detail in Harry Smith, 'Building the Addressing Health Pensions Database', Addressing Health Working Paper 1 (2023), http://dx.doi.org/10.13140/RG.2.2.27152.17920

[2] Kathleen McIlvenna, Douglas Brown and David R. Green, '"The Natural Foundation of Perfect Efficiency": Medical Services and the Victorian Post Office', *Social History of Medicine*, 33/2 (2020), 545. Note that some people who reached retirement age nevertheless retired for medical reasons, of the 2,223 people who retired aged 65 or above between 1860 and 1908 233 retired for medical reasons (10 per cent).

unique causes of retirement were given for these retirees.[3] Many of these causes applied to a small number of workers: 3,557 of the causes were given to just one worker; conversely only 18 causes applied to more than fifty workers.[4] The considerable number of unique medically certified causes of retirement means that these causes must be classified into categories before they can be feasibly used in analysis. This paper describes the method by which such classification was carried out, and the reasoning behind the classification used.

Certifying a cause of retirement
The information in these pension records relates to a specific issue, namely whether or not a worker was able to perform their duties. For a medical officer to mention a disease or injury in the cause of retirement, therefore, it must have been preventing the individual from working and be likely or inevitable that this would continue for an extended period. Workers who were sick were entitled to receive sick pay for up to a year but if there was no chance of the condition improving within that period, they could be retired on grounds of ill health. For these reasons, the medical cause for retirement will have affected different occupations to varying degrees. For example, while a leg injury may have prevented a postman from delivering the mail, leading to his retirement, it may not have prevented a clerk from performing their duties. Thus, when analysing the causes of retirement, it is important to remember that not only were different individuals exposed to different kinds and levels of risk, but their susceptibility to those risks also varied according to their occupation.

The centrality of work to the question of sickness in the Post Office means that determining whether or not a worker could perform their duties was a key concern for the Post Office management in this period. As the nineteenth century progressed, the Treasury and the Post Office introduced regulations to ensure that workers who could no longer perform their duties retired, rather than continue to be paid sick leave. For most workers, sick leave could extend to a year, but in some instances it could continue for longer. In 1889 the Treasury, which was responsible for the financial arrangements of the Post Office, set a rule that if a postal worker took sick leave which amounted to three years and the medical certificate that justified their sick leave suggested they would remain incapable of working, then that would be sufficient evidence under the Superannuation Act for them to receive a medical pension.[5] However, it was not clear that this applied to all postal workers.[6] The Postmaster General, in 1897, issued a circular aimed at identifying individuals whose sick leave suggested they were unable to perform their duties. This circular asked surveyors and heads of departments to investigate the health of any worker who met one of three conditions: first, those who in two consecutive years took more sick leave than the mean for that location; second, workers who were absent ill on twelve or more occasions in two years; and third, those who took more than 100 days sick leave in a single year. In each case, the surveyor or head of department would submit a report, which included comment from the local medical officer on whether the worker in question would be 'likely in future to render permanent and regular useful service to the Department.'[7]

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[3] Of the rest, 6,945 retired because they reached retirement age, 747 retired for administrative reasons (often their post was abolished), 2,969 resigned (mostly women in occupations where the marriage bar operated) and 47 had no given cause of retirement.

[4] Midway through 1900 the forms stop providing specific causes of retirement, noting only 'ill health' or age as a cause. There are 5,800 individuals who retired after this point for medical reasons for whom we only have a generic cause of retirement.

[5] The Postal Museum (hereafter TPM), Post 64/4, 'Memorandum comprising a brief history of sick leave regulations and staff pay entitlement' (1902), 5.

[6] Ibid., 11-12.

[7] TPM, Post 64/3, 'Regulations for Abnormal Sick Leave' (1901), 324-5. These conditions changed over time, see Post 30/1729A, 'Regulations governing abnormal sick leave', folder VIII.

Medical officers themselves were required to pay attention to excessive sick leave, as indicated in the manual of practice: 'As Post Office servants are subject to medical examination before appointment, good *health records* may be expected … and special attention should be given to *excessive sick absence* on the part of young officers. … It is important that such unfitness for Post Office work should be observed, and the question of retirement raised as early as possible.'[8] It was repeatedly stressed that 'sick-leave should not be recommended unless there is *reasonable prospect of such recovery* as will enable the Officer to resume duty with a probability of remaining permanently at work. If there is not such a prospect the Medical Officer must report the circumstances in order that the *question of retirement* may be considered.' This provision had been in place since at least 1867 when a Treasury minute stated 'no sick pay was to be granted unless there was a reasonable hope of recovery sustained by Medical Certificates.'[9]

In many cases, then, it is likely that retirement was suggested to the worker by officials keen to maintain the efficiency of the Post Office workforce. However, that cannot have been true in all cases. For some, accidents lead to incapacitating injuries which made retirement the only option. For example, in January 1898 Henry James Walkerdine, a postman in Derby, slipped and fell while trying to board a tram car, which subsequently ran over his leg. Walkerdine's leg had to be amputated and the surgeon at the Derbyshire Royal Infirmary stated that Walkerdine would take a long time to recover and would 'never again be capable of discharging the duties of a Postman.'[10] Others must have come to their own conclusion that a medical condition was preventing them from working. In 1899, 25 of the 587 workers who retired for medical reasons took no sick leave at all in the three years prior to their retirement and so cannot have met any of the criteria outlined above in the Postmaster General's circular or the Treasury minutes. The precise trigger for these workers' retirements is not known but must have involved some form of negotiation between the workers themselves, their managers and the medical officers.

These causes of retirement, therefore, even when very specific medical conditions are mentioned, are not diagnoses but rather a requirement in a bureaucratic process designed to maintain a healthy and efficient workforce, and to protect the Post Office finances by avoiding paying pensions to workers who could have continued with their duties. These factors mean that the medical information contained within the causes of retirement provided on the pension application forms is markedly different in character and purpose from other sources of information on morbidity in this period, such as hospital registers, although they are similar to the information on sickness found in Friendly Society registers.[11] These causes are fundamentally about the inability to work rather than the other reasons which might lead someone to seek medical care.

The causes of retirement are also substantially different in nature to causes of death, the classification of which has received much historical commentary. In the 1990s, scholarship on the classification of causes of death tended to focus on whether or not historical causes of death, usually derived from civil registration documents, were sufficiently intelligible and reliable to explain trends in mortality rates.[12] Since then, much careful work

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[8] TPM, Post 64/10, 'Manual for the use of Post Office medical officers' (1913), 8, original emphasis.
[9] Ibid., 10, original emphasis; Post 64/4, 4.
[10] TPM, Post 1/275, 445, pension form of Henry James Wilkerdine, 1898.
[11] James C. Riley, *Sick, Not Dead: The Health of British Workingmen during the Mortality Decline* (Baltimore, MD: 1997), 189-7; Claudia Edwards, Martin Gorsky, Bernard Harris and Andrew Hinde, 'Sickness, Insurance and Health: Assessing Trends in Morbidity Through Friendly Society Records', *Annales de démographie historique*, 105 (2003), 149-55.
[12] These debates can be followed in special issues of *Historical Methods* (29/2 and 29/3, 1996), *Continuity and Change* (12/2, 1997) and *The Journal of the History of Medicine* (54/2, 1999).

has demonstrated the utility of historical causes of death, albeit with considerable emphasis on the care required in processing, analysing and interpreting such data.[13]

While the causes of retirement in the pension application forms share many of the same pitfalls as civil registration causes of death (inconsistent use of vague terminology, reporting symptoms rather than diseases, and changing definitions of diseases and multiple causes) they differ in several ways. First, the subject of the cause was alive rather than dead. This has a number of consequences: the cause given was likely the result of a negotiation between the physician and the subject rather than in the case of causes of death where the subject can necessarily make no contribution to the diagnosis. In contrast the postal worker could describe symptoms, request treatment and provide a personal history all of which affected the cause of retirement given. Relatives or acquaintances of the deceased could provide this information, but such information is necessarily different in character to that provided by the subject themselves.

Similarly, because the Post Office had a substantial medical service, in the case of causes of retirement the physician providing the information likely had a deeper knowledge of the retiring postal worker than doctors often had when providing causes of death. The Post Office medical service was closely involved in monitoring the health of the postal workforce, they examined all candidates for permanent employment to ensure they had good health and were likely to stay healthy, they provided free medical attendance for all postal workers earning less than £150 per annum, and, as noted above, were required to provide medical certificates when individuals took sick leave and to investigate the ability to work of any employees with unusually poor health records.[14] While not every postal worker was employed in a location with a medical officer, many were, and, given that medical attendance from a Post Office Medical Officer was free for many, it is likely that the certifying medical officers had knowledge of a given worker's medical history. In many cases the interaction leading to retirement will not have been the first meeting between that worker and that doctor. In contrast, when certifying causes of death, many doctors had either never interacted with the deceased individual, or had last seen them several weeks or months before their death.[15]

The advantage of this long-standing familiarity between worker and medical officer can often be seen in the pension forms where comments about medical history are provided. For example, Henry John Boxall applied to retire in January 1900 and his application form included the following comment

> On the 31st August last while on duty at the Finsbury Park Station transferring parcel Receptacles from one line to another, Boxall ruptured himself badly. The injury at the time rendered necessary absence from duty for 10 days, and now in the opinion of the Medical Officer, whose certificate is enclosed, not only render

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[13] For example, Alice Reid, Eilidh Garrett, Chris Dibben and Lee Williamson '"A confession of ignorance": deaths from old age and deciphering cause of death statistics in Scotland, 1855-1949', *History of the Family*, 20/3 (2015), 320-44; Rebecca Kippen, '"Incorrect, loose and coarse terms": classifying nineteenth-century English-language causes of death for modern use. An example using Tasmanian data', *Journal of Population Research*, 28 (2011), 267-91; Barbara Revuelta-Eugercios, Helene Castenbrandt, Anne Løkke, 'Older rationales and other challenges in handling causes of death in historical-level databases: the case of Copenhagen, 1880-1881', *Social History of Medicine*, (advance access, 2021).

[14] McIlvenna et al., 'Medical Services and the Victorian Post Office'; H.H. Bashford, *Post Office Medical Service* (Post Office Green Papers, number 31, 1936).

[15] Naomi Williams, 'The Reporting and Classification of Causes of Death in Mid-Nineteenth-Century England: The Example of Sheffield', *Historical Methods*, 29/2 (1996), 61-2; 'Select Committee on Death Certification, First and Second Reports, Proceedings, Evidence, Appendix, Index', *Parliamentary Papers*, 11 (1893-4), xiii.

retirement necessary, but has materially impaired Boxall's capacity to contribute his own support.[16]

The cause of retirement given on Boxall's pension application form was 'double rupture'. In contrast, George Kirman, a postman in Sheffield, retired in 1899 because he suffered from 'Chronic bronchitis and sequelae of ulcerated legs'. His form noted that in November 1898 he had slipped in the street following snowfall and sprained his calf muscles resulting in 16 days off work. However, in this case the medical officer felt that this injury did not contribute to his ultimate cause of retirement.[17] In other cases, the availability of medical care brought cases to light earlier than might otherwise have been the case. For example, in 1895 Adam Haining, a postman in Newton Stewart, retired. His pension application reported 'In July last Adam Haining was reported for delaying letters; and, the enquiry shewing that the immediate cause of this was the failure of his eyesight, he was medically examined with the result of bringing to light the unhappy story embodied in the medical officer's report.'[18] That 'unhappy story' was that Haining was suffering from syphilis which resulted in damage to his eyesight that forced him to retire. These records also often contain information that is rarely seen in other health records, such as the influence of family or other context on an individual's health. For example, Henry Thomas Poulton, an overseer and senior telegraphist in London, retired in 1899, with 'nervous exhaustion' given as his cause of retirement. He had taken 396 days of sick leave in the previous 8 years, which the pension form commented 'attributable it is believed to a great extent to family troubles.'[19] In all these cases, access to the medical service, interaction between the worker and the medical officer, and the officer's knowledge of the worker's history all played a role in determining both the timing of retirement and the precise cause given on the pension application form.

The second difference, as noted above, was the focus on the ability to work and this, combined with the fact that the subjects were alive rather than dead, means that a substantially different set of medical conditions are encountered in the records compared to those that dominate cause of death data. Chronic conditions are more common, and infectious diseases less so; similarly, mental health looms far larger in the pension records than in civil registration. This means that, while the state of contemporary medical knowledge is of similar importance to understanding these data, the areas of medical knowledge that affect interpretation are substantially different. For example, little consideration is given in the cause of death literature to how mental health was understood in nineteenth-century Britain whereas when examining the causes of retirement in the Post Office, the history of how conditions such as neurasthenia were understood and diagnosed is vital.[20]

Third, the inability to work is an entirely more subjective and malleable concept than death. While there is some variation in how death is defined across time and space, it is a wholly more concrete event than medical retirement.[21] Different workers doing different jobs were affected variously by the same medical condition, there were also variations in how doctors in different locations defined conditions and how they understood and defined the inability to work. This means that different rates of certain conditions may simply be driven

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[16] TPM, Post 1/296, 507, pension form of Henry John Boxall, 1900.

[17] TPM, Post 1/284, 237, pension form of George Kirman, 1899.

[18] TPM, Post 1/255, 647, pension form of Adam Haining, 1895.

[19] Post 1/281, 360, pension form of Henry Thomas Poulton, 1899.

[20] Suicide is an exception to this, where the debate over modernity and suicide has included some discussion of the nature of psychiatry and mental health in nineteenth century, for example, Olive Anderson, 'Did Suicide Increase with Industrialization in Victorian England?', *Past and Present*, 86 (1980), 169-70; Georgina Laragy, '"A Peculiar Species of Felony": Suicide, Medicine, and the Law in Victorian Britain and Ireland', *Journal of Social History*, 46/3 (2013), 732-43.

[21] Robert M. Veatch and Lainie Friedman Ross, *Defining Death: The Case for Choice* (Washington DC, 2016).

by the composition of the workforce, rather than any change in the prevalence or incidence of a given medical issue. Similar issues affect cause of death data, notably the age structure of a population in a given area will greatly affect the causes of death seen in that location.[22] However, the outcome of a given condition will always be counted the same, two people who die from heart disease caused by rheumatism will count as two deaths regardless of their age, gender or occupation; whereas two postal workers suffering from rheumatism may not necessarily appear in our morbidity data if they worked in a job they could continue performing despite such a condition.

Fourth, the causes of retirement are recorded in bureaucratic documents which the worker in question did not see. This affected the causes provided in a number of ways: it meant that the issue with doctors avoiding mention of controversial conditions on death certificates to not embarrass the family of the deceased was avoided.[23] However, the aim in filling in these pension forms was to provide sufficient information to allow the Treasury to judge whether a pension should be awarded. As a consequence, the forms often contain comments on the worker's conduct, especially with regards to alcohol, and judgments about whether the cause of retirement was related to the worker's behaviour. For example, Alfred William Davis, a sorter in London, retired in July 1896 with 'Chronic Phthisis, Chronic Gout, Disease of Liver and Kidneys' given as his cause of retirement. The form also reported 'During the last few years Alfred William Davis has been frequently absent through illness and, when in attendance, has not displayed proper energy owing to ailments which the Medical Officer attributes in some degree to causes within Davies' own control.'[24] Whether causes of retirement such as syphilis appear with appropriate regularity in these records is hard to judge; however, it is clear that the forms are less reticent about reporting the effects of alcoholism, sexually transmitted infections and similar 'controversial' conditions than death certificates were in this period.

All of these issues mean that comparing causes of retirement across time and space is even more difficult than comparing causes of death. They are not concerned with identifying the cause of a relatively easy to define biological event, death, but instead the inability to work, something that varied by place, time, gender, age and occupation. Nevertheless, despite these difficulties, the causes of retirement can provide an insight into conditions experienced by the workforce, and therefore can be used to compare patterns over time and between places. To do so requires us to classify the various causes into distinct categories that can provide sufficient clarity while at the same time accommodating the diverse reasons for retirement.

ICD10h and the classification of medical causes of retirement

The causes of retirement found in the Post Office pension records have been coded to ICD10h, a version of the widely used International Classification of Diseases and Health-Related Problems that has been developed by the SHiP network for coding individual-level historical causes of death in a ports and cities throughout Europe.[25] ICD10 is a version of the long-standing international classification of diseases that was in use in over 100 countries until the start of 2022 when it was replaced by ICD11. The history of the ICD stretches back to 1893 when Jacques Bertillon presented a classification of the causes of death that he

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[22] Reid et al., 'Cause of death statistics in Scotland'; Andrew Hinde, 'Sex differentials in phthisis mortality in England and Wales, 1861-1870', *The History of the Family*, 20/3 (2015), 366-90.
[23] Williams, 'Causes of Death', 62.
[24] TPM, Post 1/260, 544, pension form of Alfred William Davies, 1896.
[25] Angélique Janssens, 'Constructing SHiP and an International Historical Coding System for Causes of Death', *Historical Life Course Studies*, 10, 64-70.

proposed be adopted for international use. It was revised every ten years at meetings held in Paris until its stewardship was taken over by the World Health Organisation in 1948.[26] ICD10, and now ICD11, aimed to allow countries to record mortality and morbidity data in a consistent way to enable comparisons across time and space. ICD10h aims to do much the same for historical causes of death. This scheme codes individual words and phrases rather than diseases. It attempts to group different terms for the same phenomenon under a single broad code, while also not over-interpreting a given term. This is done by expanding the existing ICD10 coding system to allow historical terms to be related to contemporary ones while remaining distinct. Thus, for example, the various conditions 'enteric fever', 'bilious fever' and so on, which are thought to be historical synonyms for typhoid fever, in ICD10h these are all coded to the same block of codes as 'typhoid fever' in ICD10 with additional 2 digits added to the standard code to distinguish all these potential synonyms. This method allows all potential cases of typhoid to be grouped together, but also allows the evolution of different terms for typhoid to be tracked.[27] Once coded the causes of death can then be classified into categories depending on the purpose of the study. The use of ICD10h allows ready comparison between our data and other historical or contemporary studies that have used ICD10 or ICD10h.

The SHiP network is primarily interested in causes of death; however, given that ICD10 is a scheme for coding all diseases, not merely causes of death, it is feasible to adopt the same approach for medical causes of retirement. The method used was as follows. First, the causes of retirement were checked and cleaned. Each unique cause of retirement was then split into component parts. For example, 'chronic rheumatism and general debility' contains two individual causes which need two codes. This was done by splitting all causes based on the presence of a number of conjunctions and symbols.[28] This process produced a set of unique 'bits' of the initial causes of retirement which could then be coded: 4,054 unique causes of retirement produced 3,307 unique bits. These were coded by hand, following the same principles as the SHiP network in producing ICD10h: individual terms rather than 'diseases' were coded; causation was not inferred; and historical terms were placed in additional codes associated with the modern terminology.

The coding process itself was, in many cases, straightforward. Two main sets of causes of retirement were easy to code. First, those that contain specific medical terminology whose meaning was stable in the period under investigation and has remained similar since then. For example, hernias have been identified for thousands of years and, while treatment methods have changed, the definition of a hernia in our period was much the same as it is today.[29] In such cases, the cause 'bit' can be readily coded to an existing ICD10h category. The second group of easily coded cause 'bits' are those which are vague. The cause of retirement data include many causes such as 'disease of the knee' or 'heart disease'. These generic, vague phrases are easy to code because they have to be given the ICD10h codes which cover 'unspecified' conditions, such as I51.900 which is the code for 'heart disease, unspecified'. The interpretation of these vague causes is difficult, but the coding is simple, the individual in question had an unspecified disease which affected a specified part of the body.

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[26] Alastair H.T. Robb-Smith, 'A History of the College's Nomenclature of Diseases: its reception', *Journal of the Royal College of Physicians*, 4/1 (1969), 16; Iwao M. Moriyama, Ruth M. Loy and Alastair H.T. Robb-Smith, *History of the Statistical Classification of Disease and Causes of Death*, eds. Harry M. Rosenburg and Donna L. Hoyert (Hyattsville, MD: 2011), 10-22.
[27] Janssens, 'Constructing SHiP', 10, 68-9.
[28] The following were used 'and', 'also', 'plus', as well as the symbols '&', ';' and ','. Further splitting was required during the hand coding process.
[29] See, for example, W. McAdam Eccles, *Hernia: Its Etiology, Symptoms and Treatment* (New York, 1900).

Beyond these two groups of causes, a third is also fairly readily coded, namely terms which have already been coded by the SHiP network in their work on historical causes of death. Of particular note here are the various forms of tuberculosis present in the cause of retirement data. Tuberculosis, variously defined, was a common cause of death throughout Europe in the period under study and therefore has already been thoroughly coded by the SHiP network; thus, 'bits' such as 'phthisis', 'pulmonary consumption', or 'scrofula' can be readily coded. However, as noted above, causes of death and causes of retirement are frequently different and, as such, the overlap between the medical terminology found in our pension data and that already coded by the SHiP network was relatively small. Consequently, once these three groups of causes were coded, many 'bits' remained to code. These remaining 'bits' take the most time to code and produce a substantial number of queries as to the meaning of particular phrases and the best ICD10h code for them.

When coding the rest of these 'bits' the method used by the SHiP network was followed, with particular reference made to contemporary medical texts in order to understand the meaning of ambiguous historical terms. To demonstrate the process used, let us consider the case of the 'rheumatic disorders' encountered in the cause of retirement data.

Coding rheumatic disorders

One of the most common causes of retirement, 'rheumatism' has a complex history in this period. Today, 'rheumatism' is a term that covers a large number of different disorders affecting joints and connective tissue, most notably rheumatoid arthritis.[30] Rheumatic disorders were well known and much studied in the nineteenth century, and they appear frequently in the cause of retirement data: 'chronic rheumatism' was the third most common medical cause of retirement, after 'phthisis' and 'worn out', being given in 252 cases between 1860 and 1899. Rheumatic conditions more generally were reported on 890 pension forms, 9.7 per cent of all medical causes of retirement between 1860 and 1899. Six main phrases are found in these 'rheumatic' causes of retirement: 'rheumatism', 'chronic rheumatism', 'acute rheumatism', 'rheumatic fever', 'rheumatic gout', 'rheumatoid arthritis'. The question, therefore, is to what extent did these different phrases represent distinct conditions?

Historians have not studied rheumatism in great detail, in large part because it was not a common cause of death, something which contemporaries also commented on. Peter Hook noted that rheumatic disorders 'form an order which causes a prodigious amount of sickness and suffering, especially among the industrial classes; and it has been well observed by Dr. Dickson that they make no appearance in the registers of mortality that is at all adequate to their actual influence upon the community.'[31] In the nineteenth century 'rheumatism' was, as it is today, a broad category of conditions, which prompted a considerable number of publications on the topic and debate about definition.[32] This was in no small part because of the aforementioned impact on society, as Percy Wilde put it, rheumatism was 'responsible for a greater amount of pain and physical disablement to the inhabitants of the British Isles than any other disorder.'[33] However, while there was much disagreement about the causes of

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[30] J.S. Lawrence, *Rheumatism in Populations* (London, 1977), 32-3; Alan J. Silman and Marc C. Hochberg (eds), *Epidemiology of the Rheumatic Diseases* (2nd edn., Oxford, 2001).

[31] Peter Hood, *A Treatise on Gout, Rheumatism and the Allied Affections* (London, 1871), 330. One scholar who has looked in detail at rheumatism is Peter English, see 'Emergence of Rheumatism Fever in the Nineteenth Century', *The Milbank Quarterly*, 67, supplement 1 (1989), 33-49.

[32] C.O. Hawthorne, *Rheumatism, Rheumatoid Arthritis and Subcutaneous Nodules* (London, 1900), 11-13.

[33] Percy Wilde, *Rheumatism: Some Investigations Respecting its Cause, Prevention and Cure* (London, 1893), 10.

rheumatism in its various forms, there was general agreement about the symptoms it presented with, as Cheadle put it, 'it has very striking and obvious symptoms'.[34]

While there were many rheumatic terms used in this period, almost all authorities in this period agreed that rheumatism of any kind involved joint pain.[35] Indeed, the ubiquity of reference to joint pain led one author to doubt the accuracy of many diagnoses of 'chronic rheumatism': 'while it is undoubtedly true that some cases of so-called chronic rheumatism are really rheumatic in nature, it is equally certain that others are not so. It seems to me too much the custom to call a case one of chronic rheumatism simply because the seat of the disease is in one or more joints.'[36] Beyond this, however, the individual terms noted above seem to have referred to distinct conditions, albeit 'acute rheumatism' and 'rheumatic fever' were synonyms.[37]

In 1883, Morris Longstreth provided a definition of 'acute rheumatism' which most other authors agreed with either entirely or in large part:

> Acute rheumatism is a constitutional disease, attended with fever, pain in various parts of the body, and almost invariably in several joints, in and around which evidences of inflammation and exudation are commonly present. The joint symptoms are often peculiar, fugitive, and erratic, but never result in suppuration or the deposit of sodium urate. The internal organs are affected often by inflammatory changes, especially the endocardium and the serous membrane.[38]

Time and again, nineteenth-century doctors stated that while the cause and precise definition of 'acute rheumatism' was uncertain, the three most common symptoms were joint pain, fever and heart involvement, often specifying pericarditis or endocarditis.[39] Heart involvement was noted to be common but not necessary, and its ubiquity in definitions likely reflects the fact that most authors were writing based on experience of cases which were severe enough to warrant hospital treatment or from post mortem examinations.[40] As Henry William Fuller noted 'pericarditis is not invariably an accompaniment of severe articular rheumatism, and occurs not unfrequently when the articular symptoms are slight, or altogether absent'.[41] However, such is the frequency with which medical texts and textbooks associate heart involvement with 'acute rheumatism' or 'rheumatic fever' we can be confident in arguing that Post Office Medical Officers were likely assuming a degree of pericarditis, endocarditis or other forms of heart damage when providing this condition as a

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[34] W.B. Cheadle, *Occasional Lectures on the Practice of Medicine* (London, 1900), 206; see also Wilde, *Rheumatism*, 15; Donald W.C. Hood, *On the Treatment of Acute Rheumatism, with Special Reference to the Use of the Salicylates* (London, 1888), 4.

[35] One exception is Thomas Barlow who notes that 'acute rheumatism' in children need not involve joint pain, but he suggests that rheumatism in adults did usually include joint pain, see *Notes on Rheumatism and its Allies in Childhood* (London, 1883), 3, 6-7.

[36] William Pepper, 'Some Practical Remarks on Chronic Rheumatism', *Archives of Medicine*, 4/2 (1880), 120.

[37] Julius Pollock, *Notes on Rheumatism* (London, 1878), 12.

[38] Morris Longstreth, *Rheumatism, Gout, and Some Allied Disorders* (London, 1883), 13.

[39] Similar definitions can be found, for example, in B. Willis Richardson, *Clinical Lecture on the Treatment of Acute Rheumatism, Pericarditis, and Pneumonia by the Eliminative Method* (Dublin, 1861); Francis T. Bond, *On the Pathology of Rheumatism* (n.k., 1858); John H. Clarke, *Rheumatism and Sciatica* (London, 1892); Rutherford Russell, *The Treatment of Rheumatism, Epilepsy, Asthma, and Fever* (London, 1865); John Beadnell Gill, *A New and Successful Method of Treating All Forms of Rheumatism and Gout* (London, 1880).

[40] English, 'Emergence of Rheumatism', 43.

[41] Henry William Fuller, *On Rheumatism, Rheumatic Gout, and Sciatica, their Pathology, Symptoms, and Treatment* (2nd edn, London, 1865), 143. See also, Thomas Bevill Peacock, *Statistical Analysis of Cases of Acute and Subacute Rheumatism* (London, 1869); Hood, *Treatise on Gout*; C.S. Taylor, *The Alkaline and Non-Alkaline Treatment of Acute Rheumatism, its Therapeutic Action, and its Pathology* (London, 1885).

cause of retirement. As a consequence, all mentions of 'acute rheumatism' or 'rheumatic fever' have been assigned to I00.000, the ICD10h code for 'rheumatic fever' which fits within the ICD10 second level description 'Rheumatic fever without mention of heart involvement', this code can then be classified into a circulation category. This assumes that in most cases the individual in question had suffered some heart damage, even when it was not explicitly mentioned.

In some cases, heart involvement was explicitly mentioned in 'rheumatic' causes of retirement; in those cases, the ambiguity is removed and the 'rheumatic' part of the cause of retirement has been coded to I09.900, the ICD10h code for 'rheumatic heart disease, unspecified'. This code is then classified into the category containing all conditions affecting the circulatory system.

'Chronic rheumatism' was less frequently discussed in nineteenth- and early twentieth-century medical texts, but the associated symptoms are still fairly clear. John H. Clarke described it as follows:

> Chronic rheumatism may supervene on an acute attack, or it may be chronic from the beginning. When an acute attack passes off, it may leave behind pain and swelling of some of the joints, stiffness of the limbs, and at times permanent enlargement of the joints. This is a state of chronic rheumatism. But rheumatism may appear in its chronic form from the first. That is to say, joints or muscles may be affected with rheumatism without fever, and patients may be very decidedly 'rheumatic'' without ever having had an acute attack of the disease.[42]

Other authors note that this characteristic joint pain or stiffness was often not migratory, and that the pain tended to be aggravated by movement and relieved by pressure or rest.[43] 'Chronic rheumatism' was not associated with either fever or heart conditions, as Rutherford Russell put it 'acute rheumatism is always attended with a febrile condition of the system, while in chronic rheumatism there is comparatively rarely any disturbance of the circulation.'[44] All mentions of 'chronic rheumatism' were, therefore, coded to M79.000, the ICID10h code for 'rheumatism, unspecified'. Some of these individuals, especially where the chronic rheumatism was a sequela of an attack of 'acute rheumatism' probably suffered heart damage; however, the immediate cause of retirement has been given specifically as 'chronic rheumatism' and so the importance of any theoretical heart damage or disorder to that worker's inability to perform their job can be doubted. This code was placed in a category that covered musculoskeletal conditions, on the assumption that it was the joint pain associated with 'chronic rheumatism' which caused the inability to work. The only exceptions are those cases where heart disease or damage was explicitly mentioned in combination with 'chronic rheumatism', in those cases the 'rheumatic' part of the cause was coded to I09.900 as noted above.

'Rheumatic gout' is a more contentious term and seems to have been used in two different ways: first, in reference to people who suffered from both rheumatism *and* gout; second, to refer to a specific, distinct condition that was also known by a range of other names: 'rheumatoid arthritis, 'rheumatic arthritis', 'nodosity of the joints' and others.[45] The

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[42] Clarke, *Rheumatism*, 16-17.

[43] Fuller, *On Rheumatism*; Wilde, *Rheumatism*; Pollock, *Notes on Rheumatism*; Hood, *Treatise on Gout*; Ralph Stockman, 'The Causes, Pathology and Treatment of Chronic Rheumatism', *Edinburgh Medical Journal*, 15/1 (1904), 107-16.

[44] Russell, *Treatment of Rheumatism*, 165.

[45] Clarke, *Rheumatism*, 44; Austin Meldon, *A Treatise on Gout and Rheumatic Gout* (11th edn., London, 1890), 189.

precise nature of this condition was subject to substantial debate. In 1900, Charles Hawthorne noted that most textbooks described it as a distinct condition from gout and rheumatism, but that this question was not settled.[46]

Some of the causes under this umbrella can be easily coded, namely those including the term 'rheumatoid arthritis', because ICD10h has a code for that condition, M06.900. All others are more difficult to deal with, however, than 'chronic' or 'acute rheumatism' as Medical Officers may have been using the same term to describe at least two different conditions. Contemporary medical texts describe the symptoms that would have prompted a Medical Officer to give 'rheumatic gout' as a cause of retirement and these offer a way forward. Such discussions show that it is unlikely that Medical Officers mistook 'acute rheumatism' or 'acute gout' for 'rheumatic gout' because, as Garrod pointed out, the symptoms of acute forms of either condition were notably different.[47] But the chronic forms of both conditions were harder to distinguish and it may be that some postal workers retiring owing to 'rheumatic gout', were in fact suffering from chronic rheumatism or chronic gout. Yet throughout this period 'rheumatic gout' was also recognised as a distinct condition, Fuller defined it as a condition which differed from rheumatism because it affected multiple smaller joints, notably hands, often causing permanent changes to the joints, with little heart involvement, and which differed from gout in that it affected women as well as men, and that it affected young and middle-aged people, rather than just older people.[48] Garrod, Meldon and Clarke all provided similar definitions, albeit Garrod suggested that it should be called 'rheumatoid arthritis' rather than 'rheumatic gout'.[49] This condition, therefore, had a distinctive set of symptoms, which, with its focus on small joints and swelling and disarticulation, is not dissimilar to the symptoms associated with rheumatoid arthritis today.[50] Consequently, it was decided to code all cause of retirement 'bits' that mention 'rheumatic gout' or its synonyms, to the ICD10h code for 'rheumatoid arthritis'. It is likely that this means some cases of chronic gout or chronic rheumatism have been allocated an incorrect code; however, the numbers involved are small (63 postal workers between 1860 and 1899 have 'rheumatic gout' in their cause of retirement) and the code for 'rheumatic arthritis' is allocated to the musculoskeletal category, as are 'chronic rheumatism' and gout in its various forms, meaning that at the aggregate level of analysis, all cases are in the correct overarching category.

This leaves, therefore, just cases where the only 'rheumatic' phrase used in the cause of retirement, is 'rheumatism' without any qualification. Such cases have been coded to the generic unspecified rheumatism ICD10h code (M79.000). It is likely that some of these were actually cases of 'acute rheumatism' and thus some heart involvement has been missed. However, it was judged that on balance most cases were not 'acute rheumatism' for two reasons. First, nearly every text that Medical Officers might have read on the topic highlighted the commonality of heart involvement in 'acute rheumatism', so it is reasonable to assume that most doctors would have specified that condition in cases where they detected heart problems along with the characteristic rheumatic joint pain.[51] Secondly, as Peter

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[46] C.O. Hawthorne, *Rheumatism, Rheumatoid Arthritis and Subcutaneous Nodules* (London, 1900), 7-8.

[47] Alfred Baring Garrod, *A Treatise on Gout and Rheumatic Gout (Rheumatoid Arthritis)* (3rd edn., London, 1876), 490.

[48] Fuller, *On Rheumatism*, 331.

[49] Garrod, *Treatise on Gout*, 499-501; Meldon, *Treatise on Gout*, 189; Clarke, *Rheumatism*, 44-5.

[50] Daniel Aletaha et al., '2010 Rheumatoid Arthritis Classification Criteria', *Rheumatism and Arthritis*, 62/9 (2010), 2569-81. Of course, the nineteenth-century texts make no mention of the autoimmune aspect of rheumatoid arthritis.

[51] Medical Officers would have been able to detect pericarditis or endocarditis using a stethoscope, English, 'Emergence of Rheumatic Fever', 38-9; Henry William Fuller, *On Diseases of the Chest* (London, 1862), 554; Austin Flint, *Clinical Medicine* (London, 1879), 199-200, 208-9.

English has argued, the incidence of heart involvement with rheumatism was probably exaggerated in nineteenth-century texts by their focus on evidence from hospitals.[52] Consequently, we should not assume that any mention of 'rheumatism' necessarily meant an individual had suffered heart damage. This also aligns with the general coding principle set out above of not reading too much into any given term. Thus, while coding 'rheumatism' to the unspecified rheumatism code likely means missing some cases of 'acute rheumatism', if we were to do the opposite and assume that all 'rheumatism' without qualifying terms were cases of 'acute rheumatism' we would greatly inflate the presence of heart disease in our data, without positive evidence of actual heart damage or disease.

The example of coding the 'rheumatic disorders' found in the cause of retirement data demonstrates the method used when dealing with the difficult causes encountered in this process. The meaning and usage of the terms in the nineteenth century was used to decide where they best fit in the ICD10h coding scheme. It must be borne in mind that the coding is an approximation aimed at rendering the substantial range of unique causes of retirement usable in historical analysis. This process inevitably involved some decisions which simplify complex medical terms. But every effort has been made to ensure that the coding reflects contemporary knowledge and practice as closely as possible.

Combining multiple codes

Once all the 'bits' were coded, they were then recombined to provide codes for complete causes. Causes which contained more than one 'bit' have more than one ICD10h code and the order of those codes reflects the order of the 'bits'. Thus, 'chronic rheumatism and general debility' has two codes: the first (the variable ICD10h_1) is M79.000, the code for 'chronic rheumatism' and the second (ICD10h_2) is R53.003, the code for 'general debility'. In doing this we assume that the causes of retirement list the primary or most significant cause of retirement first. Much of the classification of these codes rests on the first ICD10h code, reflecting this assumed ordered. The order was only changed if a causal mechanism was implied by the full cause of retirement. For example, 'Ulcerated feet caused by chronic eczema' has two codes, but the order is reversed from the usual coding method, thus the code for 'chronic eczema' (L97.000) is recorded as the first ICD10h code, and then 'ulcerated feet' (L30.901) is given as the second code. These are the few cases where some sense of causation is explicitly stated and it was decided that this information was sufficiently valuable to be reflected in the coding process.

Classifying the causes of retirement

Having coded each cause of retirement to an ICD10h code, it is then necessary to classify those codes into a set of categories to allow aggregate analysis.[53] One advantage of using ICD10h is that, once coded, causes can be immediately aggregated to the ICD10 chapters. These chapters derive, ultimately, from Jacques Bertillon's 1893 classification which mainly categorised conditions by the part of the body affected, with separate categories for injuries and notable infectious diseases.[54] The categories have changed somewhat over time, as more general disease categories have been added: cancers, autoimmune diseases and psychiatric conditions for example, all of which was part of the gradual inclusion of aetiology into the classification.[55] This scheme currently has 22 categories covering infectious diseases, cancers, diseases associated with different anatomy parts (the nervous, respiratory and

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[52] English, 'Emergence of Rheumatic Fever', 43.
[53] Janssens, 'Constructing SHiP', 69.
[54] Moriyama et al., *Statistical Classification*, 11-12.
[55] Ibid., 15-22.

circulatory systems for example), conditions related to pregnancy and childbirth, mental and behavioural disorders, blood diseases, metabolic diseases, injuries and a range of categories for other and ill-defined conditions.[56] Figure 2 shows the 1860-1899 causes of retirement classified to the ICD10 structure with one change: chapters 19, 20 and 21 have been combined, which all relate to external causes of ill health – injuries, accidents, encounters with health services. In this figure the classification is undertaken using just the first mentioned cause.

This figure suggests that a couple of changes are needed to make the ICD10 classification scheme readily usable for these data. First, the infectious disease category mainly consists of postal workers retiring because they have tuberculosis of one kind or another. This is such an important cause of retirement and cause of death in the nineteenth century that it is useful to have a separate tuberculosis category. Secondly, the ill-defined group ('18. Symptoms not elsewhere classified') is the largest category. Many of the causes included in this category cannot be put anywhere else; for example, 'ill health', 'worn out' and 'general debility' are all too vague to be allocated to other categories. However, some of the causes coded to this category under ICD10 can be placed in other categories. For example, there are a number of postal workers who retired for reasons such as 'chronic cough' or 'pleurisy'. While these are undoubtedly vague, they clearly affected and were related to the respiratory system and can be reallocated to that category. Doing so reduces the ill-defined category somewhat. It can also be further reduced by recoding individuals who have multiple causes of retirement. Where an individual had one ill-defined and one well-defined cause of retirement, the second was taken as the primary cause of retirement to allow as much specificity to be preserved as possible. For example, 'General Delicacy and recurrent attacks of Bronchitis', was changed so that 'bronchitis' was the primary cause and 'general delicacy' a secondary cause. Figure 3 shows the same data after the classification was changed to incorporate these adjustments.

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[56] The full list can be found here https://icd.who.int/browse10/2019/en (accessed 13/7/2022).
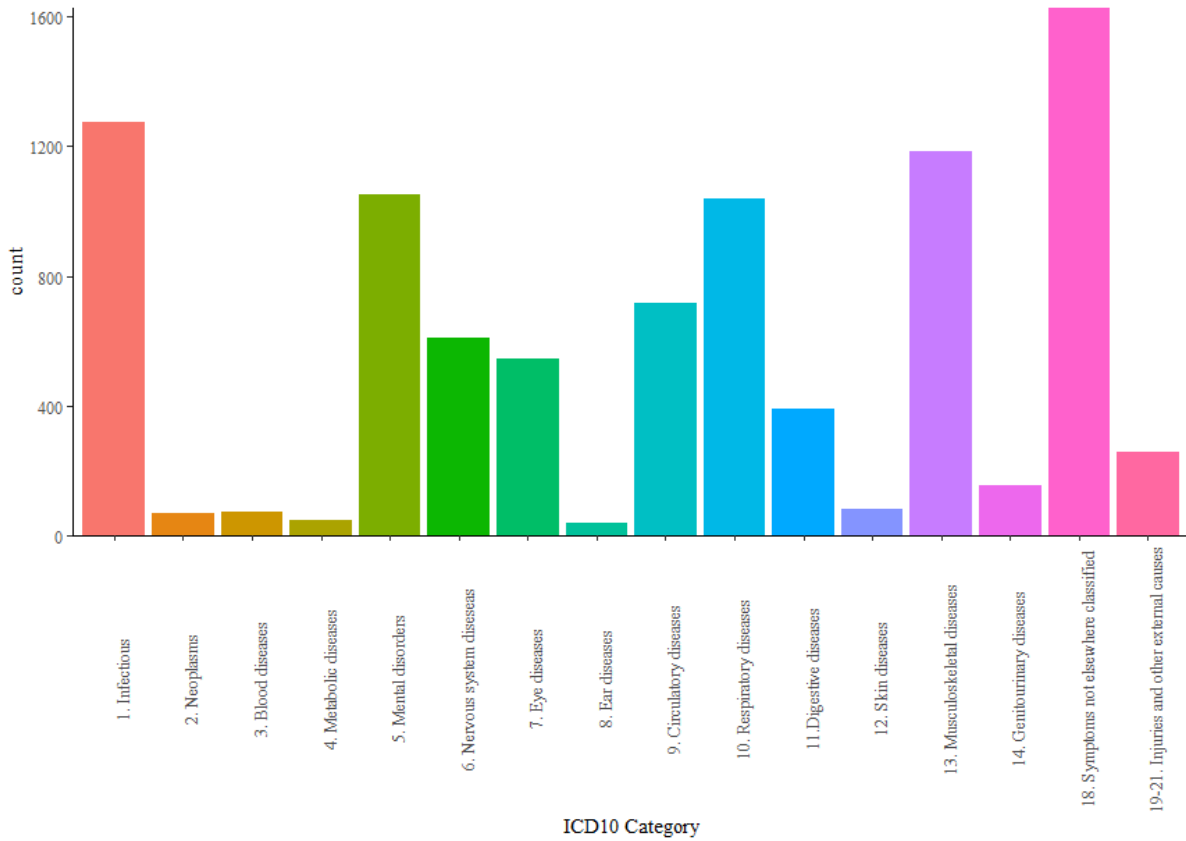
Figure 2. Count of causes of retirement classified by ICD10 categories, 1860-1899.
Source: Addressing Health Pensions Database.
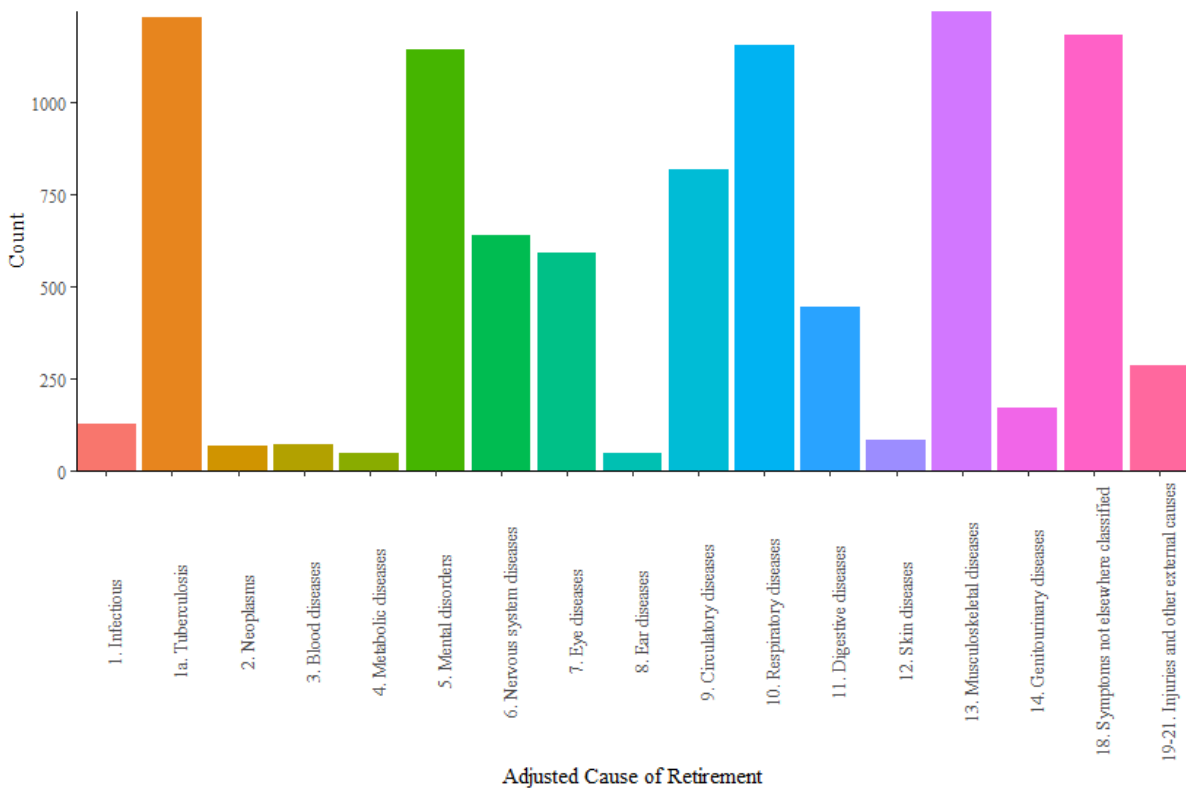
Figure 3. Count of causes of retirement classified by adjusted ICD10 categories, 1860-1899.
Source: Addressing Health Pensions Database.

These changes have removed 342 causes of retirement from the ill-defined category (21 per cent of the original number in that category). While that group is still large, it is now of a similar size to the other most common cause of retirement categories: tuberculosis, mental health, respiratory diseases and musculoskeletal diseases. The share of retirees in each category was not stable over time, as figure 4 shows. In particular, the share of ill-defined causes decreased over time: in the 1860s 20-30 per cent of all causes were in this category, by the 1890s this proportion has dropped to 6-15 per cent. Thus, the issues with ill-defined causes becomes less of a concern over time.
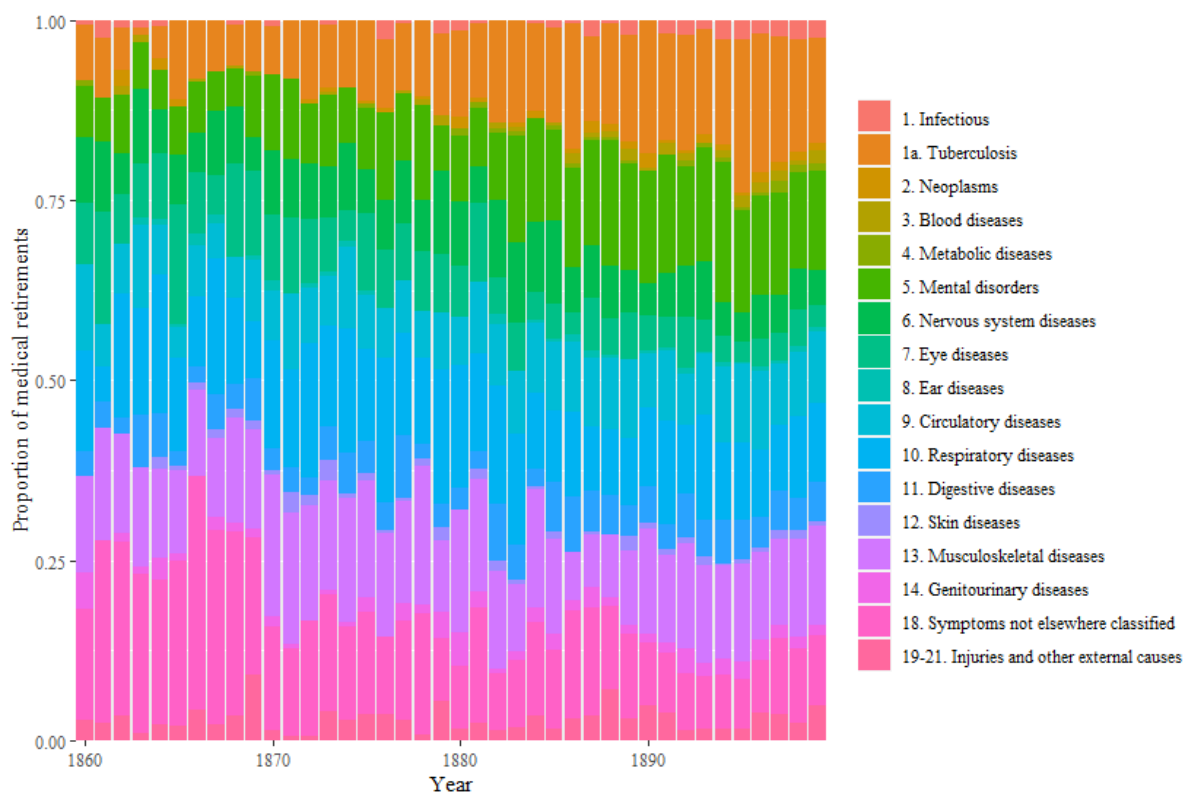
Figure 4. Share of postal workers in each adjusted ICD10 category, 1860-1899.
Source: Addressing Health Pensions Database

This adjusted ICD10 classification, therefore, provides a useful aggregation for the coded data. It provides us with a manageable number of categories for analysing these data over time, defined in general by the part of the body affected by the cause of retirement, with some special categories to separate out infectious diseases, cancers, injuries and ill-defined causes. Some of these categories contain small numbers of postal workers, such as neoplasms, blood disease, metabolic diseases and so on. These can be combined or excluded when necessary to enable certain kinds of analysis. Additionally, as the underlying ICD10h codes are constant, should a different classification scheme be required, it can easily be applied by producing a look up between the ICD10h codes and any given alternative classification.

Conclusion
This working paper has described the method by which the causes of retirement provided by Post Office Medical Officers and recorded in the Pension Application Forms were cleaned, coded and classified. The causes provided were complex objects, they were medically

certified causes that specified why an individual worker could no longer perform their duties. As such they varied by occupation, as well as by place, age, gender and time. Any coding inevitably flattens some of that complexity, albeit much can be restored by breaking the data down by the characteristics of the workers themselves, and the original strings remain and can be analysed in their own right.

The process of classification involved considering how the wide variety of medical and quasi-medical terminology used in these causes of retirement were understood in this period. As the example of the 'rheumatic disorders' demonstrated, these uses could be complex and uncertain, but in many cases the meaning of terms was relatively straightforward. However, this was in large part because the cause data include a substantial number of vague causes such as 'brain disease', disorder of the lungs' which, while they cannot be associated with a specific condition, nevertheless can be attributed to a broader category of disease. There were also a similarly large number of even more vague terms such as 'worn out' or 'general debility' which, while easy to code, are difficult to fully understand. The coding process attempted to give each cause a suitable ICD10h code which was as specific as possible, without imputing anachronistic meaning or assuming information that the cause did not provide, such as the issue of heart involvement in causes that simply read 'rheumatism'.

Once coded, the causes then require classification. In the first place, they have been aggregated to a slightly adjusted version of the ICD10 classification structure. This system is mainly organised by anatomy, with special categories for infectious diseases, injuries and so on. This scheme has a number of advantages, not least that many other studies have used ICD10 or classifications based on ICD10 and, as such, comparison made easier – whether with other studies of morbidity and mortality, historic or otherwise, or with cause of death data on postal workers collected during the Addressing Health project.