

Arthritis: The Evolution of its Prevalence, 19th and 20th Centuries^{*}

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ABSTRACT

This paper analyzes in some detail the prevalence of arthritis and its progress over the life cycle among Union Army veterans. It also compares patterns in arthritis of the Union Army veterans with that of white males during the last quarter of the 20th century. By calculating prevalence rates for white males with arthritis for the Union Army sample, as well as for the NHANES and NHIS samples, we try to analyze how the life-cycle pattern of this specific disease has changed over time.

We demonstrate that the current prevalence rate of arthritis is lower than in the late 19th century and beginning of the 20th century. Thus, to assess whether this trend is continuing, we try to identify the factors influencing the odds of having arthritis by estimating the effect of different health and socio-economic variables on the probability of being diagnosed with this disease.

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PART II: ARTHRITIS

In this part of the paper we analyze in some detail the prevalence of arthritis and its progress over the life cycle among Union Army veterans. We also compare patterns in arthritis of the Union Army veterans with that of white males during the last quarter of the 20th century.

The disease and its symptoms are described in section VIII. Section IX describes the data used to calculate the prevalence rates, and the results for the prevalence rates for arthritis are shown in section X. Section XI includes some preliminary results about factors that could affect the probability of having arthritis and how they have changed historically. Section XII summarizes our conclusions.

VIII. A Brief History of the Classifications and Treatment of Arthritis

Arthritis¹ is defined as a deforming disease of the joints, regarded by most authorities as distinct from gout and rheumatism, and characterized by destructive changes in the cartilage and bone, and by bony outgrowths restricting the motion of the joint.

The first written reference to arthritis was in 123 AD in a text from India called *Caraka Samhita*, which describes a disease where swollen, painful joints initially strike the hands and feet, then spread to the body, causing loss of appetite, and occasionally fever.

In 13th-century Europe any joint ailment was called gutta² for a noxious humor falling drop by drop into the joint. Gout and gouty diathesis were used as broadly as the term arthritis is used today.

Physicians such as Sydenham (1633), Musgrave (1763), Haller (1764), and de Sauvages (1768) alluded to the characteristic changes in the bone due to arthritis deformans, but the first correct description was read by Landre Beauvais before the Paris

¹ From the Greek *arthron*, meaning “joint.”

² From the Latin, meaning “a drop.”

Academy of Medicine in 1800, under the name “Goute Asthenique Primitive.” William Heberden, Sr. (1710-1801) of England was, however, the first to recognize its true clinical position as something distinct from gout. John Haygarth’s paper on “Nodosity of the Joints,” in 1805, describes the disease clinically, and he remarked upon the peculiar liability of its occurrence in the female sex.

In 1891, Arbuthnot Lane attached much importance to mechanical wear and tear in the production of lesions. In 1897, James Stewart of Montreal read a paper supporting an infectious origin of the disease before the Section of medicine of the British Medical Association.

In 1951 Guillaume de Baillou, the French physician and Dean of the University of Paris medical faculty, wrote one of the first books on arthritis, using the term rheumatism to describe a condition characterized by inflammation, soreness, stiffness in the muscles, and pain in and around the joints.

In 1680 doctors began treating rheumatism with a Peruvian bark that contains the antimalarial agent, quinine. In 1763, another weapon was found to fight rheumatism: willow bark, which contains salicylate, the active ingredient in aspirin.³ Still another drug emerged in 1929 when periodic injections of gold salts were first used to relieve muscle pain.

The year 1939 brought the first autoimmune theory of arthritis. Sir McFarlane Burnet, head of the Research Institute of Melbourne, Australia, found that autoimmunity, the process by which the body’s defense system malfunctions and attacks its own tissues, causes many arthritis conditions.

The development of x-rays in 1895, the surgical pin in 1907, and the ball and cup artificial hip joint in 1931 led to the formation of the American Academy of Orthopedic Surgeons in 1933.

It was not until 1859 that rheumatoid arthritis gained its own classification due to Sir Alfred Garrod, a London physician who coined the clinical term “rheumatoid arthritis.” Rheumatoid arthritis is an inflammatory disease that causes pain, swelling, stiffness, and

loss of function in the joints. It has several special features that make it different from other kinds of arthritis. For example, rheumatoid arthritis generally occurs in a symmetrical pattern. This means that if one knee or hand is afflicted, the other is also. The disease often affects the wrist joints and the finger joints closest to the hand, but can also affect other parts of the body. Some remissions do occur, but the illness progresses to produce permanent damage and deformity. Rheumatoid arthritis occurs in all races and ethnic groups. It often begins in middle age and occurs with increased frequency in older people.

Osteoarthritis⁴ was commonly used as a synonym for rheumatoid arthritis beginning in the 1860s. A clear distinction between the two ailments began emerging at the turn of the century with the development of x-rays. In 1904, Boston physician Joel E. Goldthwait described differences he saw using x-rays. Osteoarthritis is a joint disease that mostly affects the cartilage, which is the slippery tissue that covers the ends of bones in a joint. With this disease, the surface layer of the cartilage breaks down and wears away. This allows bones under the cartilage to rub together, causing pain, swelling, and loss of motion of the joint. Today, osteoarthritis is the most common type of arthritis, especially among older people, and one of the most frequent causes of disability among adults.

Migratory arthritis refers to pain and swelling in a specific joint that comes on fairly rapidly, disappears in the course of 24 or 36 hours, and then is followed by similar symptoms elsewhere (usually asymmetrically).

VIII. I. The Diagnosis of Arthritis

Arthritis is very difficult to diagnose in its early stages for several reasons. First, there is no single test for the disease. In addition, symptoms differ from person to person and can be more severe in some people than in others. The full range of symptoms develops over time, and only a few symptoms may be present in the early stages. As a result, doctors

³ The Bayer Company took the willow bark treatment one step further in 1897, manufacturing acetylsalicylic acid, better known as aspirin.

⁴ From the Greek *osteon*, meaning “bone.”

use a variety of tools to diagnose the disease and to rule out other conditions. These tools are: medical history (patient's description of symptoms and when and how they began), physical examination, laboratory tests, and x-rays.

The method used to diagnose arthritis has not changed much in history.⁵ The appearance of x-rays and the development of laboratory tests such as blood tests, only helped to make a distinction between different kind of arthritis. But the most important tool for the diagnosis of arthritis has always been the medical history.

The history is worth a great deal in the evaluation of arthritis patients. It probably provides 80% of the necessary information, whereas the physical examination provides 15%, and laboratory tests and x-rays, 5%. Moreover, the history influences many of the decisions to order laboratory tests and x-rays. The type of symptom onset is highly informative. The history may also reveal the presence of morning stiffness, a common symptom in many patients with rheumatic complaints. The duration and extent of morning stiffness are helpful guides to the degree of inflammation that may be involved. For example, in cases of rheumatoid arthritis morning stiffness typically extends for several hours, affects the whole body, and is associated with afternoon fatigue. In cases of noninflammatory joint problems such as osteoarthritis, morning stiffness may be brief, and is usually limited to the affected joint.

In a physical examination, helpful points of differentiation include the number of joints involved, their location, and, when multiple joints are involved, whether they are symmetric or asymmetric. The duration of symptoms and changes over time are important considerations. Age and gender should be noticed in the office evaluation because they can provide clues to rheumatic diseases seen more frequently in one age or gender group than another.

Classic signs and symptoms that can be readily diagnosed by the primary care physician accompany many musculoskeletal complaints. Others are much less obvious. In the office evaluation of patients with musculoskeletal complaints, the history along with the physical examination is the most informative element. Least helpful are

⁵ Since how arthritis is diagnosed has not changed much over time, comparing prevalence rates for this disease at different points in time seems plausible.

laboratory tests, since although available tests are sensitive to the presence of rheumatic diseases, they are not specific for any of them. Thus, the most commonly used laboratory tests for rheumatic diseases should be considered helpful but not diagnostic. They must be ordered and interpreted in the context of the history and the physical examination findings.

X-rays for a new joint complaint are helpful only in certain situations. They show bone best; they are less helpful in showing changes in soft tissue. It may take a long time for some symptoms to cause erosion visible by conventional radiography.

Scientists do not know yet what causes the disease, but they suspect a combination of factors, including being overweight, aging, joint injury, stresses on the joints from certain jobs and sport activities, and environmental factors. Also, scientists have found that certain genes that play a role in the immune system are associated with a tendency to develop certain kinds of arthritis. Thus, an infection followed by an altered or sustained immunologic response could be instrumental for development of the disease.

Patients with infectious arthritis frequently have underlying conditions such as neoplasia, liver disease, and chronic renal failure. Migratory arthritis is most common in patients with viral diseases, acute rheumatic fever and bacterial endocarditis. Other symptoms of arthritis could be psoriasis, Reiter's syndrome and inflammatory bowel disease. These conditions can cause inflammation of the joints. Another related disease is gout. Arthritis patients are often diagnosed as also having gout.

IX. Data

To explore the evolution of the prevalence for arthritis among the US population from the late 19th century to today we have used three different samples.

To calculate prevalence rates during the late 19th century and the beginning of the 20th century, we have used the data in the Surgeons' Certificates. This data set contains 87,223 medical exam records from 1862 to 1940 for 17,721 Union Army pensioners with a documented birth date. A medical examination was given when a Civil War veteran

originally applied for a pension and every time he asked for an increase in the pension amount. As part of the pension process, a veteran had to visit a board of physicians, appointed by the Bureau of Pensions, who would perform a thorough medical examination. The physicians would assess his general health as well as diagnose any specific impairment and record the symptoms. The majority of exams occurred between the years 1885 and 1920.

The exams in this data set are classified by disability groups. Those groups include cardiovascular, ear, eye, gastrointestinal, genito-urinary, respiratory, musculoskeletal, liver/spleen/gallbladder, as well as infectious diseases and fevers, injury, neoplasm/tumor, nervous disorders, rectum/hemorrhoids, varicose veins, hernia, and general appearance (conditions involving mainly blood, nutrition and skin, gum and teeth, and muscles). Specifically, the musculoskeletal group is defined by any one of the following conditions: rheumatism, sciatica, and spinal curvature. In this study we examine the rheumatism variable among these three conditions since it specifies the part of the body in which inflammation of the joint or muscle was detected.⁶

To compare the Union Army prevalence rates with recent ones, we use the National Health and Nutrition Examination Survey (NHANES) conducted by the National Center of Health Statistics (NCHS). This survey includes data on the health status of US residents as well as a number of demographic and socioeconomic variables. There are four phases of the NHANES that have been released so far: NHANES I was conducted from 1971 to 1975, NHANES II from 1976 to 1980, NHANES III from 1988 to 1994 and NHANES IV from 1999 to 2000.

Finally, the other data source used to calculate current prevalence rates comes from the National Health Interview Survey (NHIS). NHIS is a multi-purpose health survey also conducted by the NCHS and is the principal source of information on the health of the civilian, non-institutionalized, household population of the United States. NHIS has been conducted annually since its beginning in 1957 and public use data is

⁶ The sciatica variable is identified when the claimant had pain or tenderness of the sciatic nerve. The spinal curvature variable conveys information about the location of kyphosys, scoliosis, or lordosis.

released on an annual basis. The NHIS questionnaire items are revised every 10 to 15 years, with the last major revisions occurring in 1982 and in 1997.

In these two surveys one of the health conditions the individuals are asked about is arthritis. However, except in the last two NHANES, the type of arthritis is not specified.

Although NHIS has been conducted since 1957 suitable data on arthritis are available only since 1990. The variables referring to the health status of the population in NHIS are self-reported. By contrast, in NHANES the questions referring to health conditions specifically ask: “has a doctor ever told you that you have...?”

Another disadvantage of using the NHIS survey to study the evolution of prevalence rates over time is the fact that the questionnaire has changed a lot over the years. Specifically, the last change in 1997 has changed the question from “did you ever have arthritis?” to “does arthritis cause any limitation?” Because of this, we only use the available years for the NHIS prior to 1997.

Since the Surgeons’ Certificates contain information only for Civil War veterans, we limit the calculations in NHANES and NHIS to white males in order to be able to compare results across the different data sets.

X. Prevalence Rates and Duration of Arthritis

By calculating prevalence rates for white males with arthritis for the Union Army sample, as well as for the NHANES and NHIS samples, we try to analyze how the life-cycle pattern of this specific disease has changed over time.

For each individual observation that reports an arthritic condition in any of the data set used, a dummy variable coded 1 was created. If no arthritis is found, the arthritis dummy variable was coded 0. The arthritis prevalence rate is defined as the number of individuals with arthritis divided by the total number of individuals at risk in a given group.

First, in **Figure 1**, we graph the prevalence rates for birth cohorts over the years between 1873 and 1910. Then, in **Figure 2**, we graph the prevalence rates for veterans of a given age (for example, 50 to 54 years old) at each year between 1873 and 1910. This second way of looking at prevalence rates helps to assess the impact of changes in pension law and practices on the calculated rates.

Figure 1 shows that the rate of increase in prevalence rates was greater before 1892 than after that year. For example, the cohort born between 1820 and 1824 had a prevalence rate below 20 % in 1875, when it was between ages 51 and 55. A decade later, its prevalence rate was double. And when the cohort was age 71 to 75, its prevalence rate was over 70%. In other words, the prevalence rate of this cohort increased more rapidly before 1892 than afterward. Note particularly the sharp acceleration in the prevalence rates between 1890 and 1892. This acceleration is very likely due to the law of 1890, which removed the restriction that a veteran was eligible for the pension only if his arthritis was war related. Under the law of 1890, having arthritis, regardless of its cause, was sufficient to warrant admission to the pension system.

The suspicion that administrative decisions influenced the prevalence rates is confirmed by **Figure 2**. Here the line shows the prevalence rate of veterans under 50 for each year between 1873 and 1898, after which the line ends because all veterans were over age 50 by then. Notice that in 1875 the prevalence rates among veterans under 50 was less than 10%, but in 1895 the prevalence rate was over 70%. Since public health in the cities deteriorated badly between 1830 and 1860, one would expect the increased insults at developmental ages to be reflected in higher prevalence rates at middle ages, but hardly a 10-fold increase. Most of the increase in the prevalence rates of veterans under 50 years old reflects changes in pension policy.

How, then, should **Figure 1** be interpreted? Prevalence rates are too low before 1890. They are biased downward most sharply before 1880, after which year the pension officials became more liberal in interpreting whether arthritis was war related. Hence the acceleration in the arthritis rates between 1881 and 1890 is exaggerated. The further acceleration between 1890 and 1892 reflects the impact of the 1890 law. After 1892, the prevalence rates appear to be unbiased by administrative decisions. Notice also that the

difference in prevalence rates by birth cohort in any given year remain consistent and does not appear to have been affected by administrative directives. At late ages all of the cohorts show prevalence rates of arthritis between 70% and 80%. These extremely high prevalence rates at the end of the 19th century suggest severe environmental, socio-economic and health conditions during late 19th century.

To clarify this interpretation, we calculate the prevalence rates by age group and birth cohort for the NHANES survey. **Table 1** shows the prevalence rate by age group, as well as the average duration of arthritis in years, for each of the first three phases of the NHANES survey,⁷ as well as for these phases aggregated together. Here the prevalence rate is decreasing over time for the same age group. For example, for individuals aged between 60 and 64 the prevalence for the period 1971-1975 is greater (35%) than the prevalence for the period 1988-1994 (28%). **Table 1** shows that between 1971-1975 and 1988-1994, prevalence rates continue to fall at most ages. The maximum prevalence rate is 41% at age 80 to 84 in NHANES III, which is less than half the rate in the Union Army sample at the same age. Thus, over the past century prevalence rates of arthritis have decreased by about half.

We calculate the prevalence rate by cohort for each 5-year age interval when the three reported phases of the NHANES are aggregated together. **Figure 3** shows the line that represents the evolution of arthritis prevalence for the cohort born before 1920. The lines representing other cohorts are not shown since most recent cohorts are not numerous enough to graph. Although the prevalence rate increases with age, the rise is modest compared with the Union Army cohort.

The peak at age 70 in **Figure 3** is 40%, which is almost a half of that for the Union Army cohort.

Table 2 shows the prevalence rates for different stages of the NHIS survey as well as for all these stages aggregated. The level of the prevalence rates in this case is lower than for the NHANES. Self-reporting seems to undercount the prevalence of arthritis. It might be that with a lot of over the counter painkillers available, people do not

⁷ The data released for NHANES IV contain very few observations, and thus we obtained no reliable results to be compared with the prevalence rates for the other phases of the NHANES.

feel as if they have arthritis. This undercounting is present over all age groups. Consequently, NHANES is a more appropriate data set to work with.

The results suggest that aging was and continues to be a very important factor for the prevalence of arthritis in an individual's life. However, when observing the life-cycle evolution, the pronounced increase in the prevalence of arthritis with age during late 19th century moderated during the 20th century as reflected in the NHANES data.

A more interesting question that is possible to analyze only with the Union Army data is which is the average number of years a person has lived after first being diagnosed with the disease. **Table 3** shows the average number of years lived with arthritis by age groups for the Union Army veterans. For people diagnosed with the disease at earlier ages, its duration is greater than if the diagnosis has been done later in life. For example, people diagnosed with arthritis when they were between 50 and 54 years lived with the disease for another 20 years, while people first diagnosed when they were 70 to 74 years old had arthritis for almost 10 years. It follows that people who got arthritis later in life had a longer life span than those who developed it earlier.⁸

In order to obtain a more reliable evaluation of the effect of arthritis on longevity, it is necessary to run a set of regressions analyzing the impact of various diseases and socio-economic factors.

Table 1 has data of the duration of the disease for the NHANES survey.⁹ However, this duration is defined differently from the one reported for the Union Army in **Table 3**. Here, the average duration is defined as the number of years a person had lived with arthritis at the time of the interview.

Table 1 shows that duration increases with age. But increase in duration is less than the increase in age. For example, for NHANES I, people aged 60 to 64 have had arthritis for almost 12 years on average when interviewed, and people aged 65 to 69 have had arthritis an average of approximately 13 years. Thus, people aged 65 to 69 have had arthritis only 1 more year than people aged 60 to 64, despite the fact that they are 5 years

⁸ We consider arthritis a chronic condition, so once diagnosed, the disease will be present all the remaining years of life.

⁹ In the NHIS there is no similar data available on duration of arthritis.

older. This means that more and more persons get arthritis later in life. This is another fact that suggests that the longitudinal increase in prevalence rates of arthritis is less deep than in the Union Army.

Table 4 shows the average number of years Union Army veterans had lived with arthritis in 1895. Even with this is a lower bound estimate of the duration of arthritis in the Union Army because it is possible that veterans had the disease even before applying for a pension, this table is comparable with **Table 1**. Duration of the condition increases with age, but it is lower than in the NHANES sample for all age groups.

XI. What Affects the Probability of Having Arthritis?

We have demonstrated that the current prevalence rate of arthritis is lower than in the late 19th century and beginning of the 20th century. The question to be answered now is what is the possibility that prevalence rates will continue to decline.

To assess whether this trend is continuing, we run some probit regressions trying to identify the factors influencing the odds of having arthritis. To do so, we estimate the effect of different health and socio-economic variables on the probability of being diagnosed for arthritis.

As health variables, we consider other conditions that could cause or have some relation to the diagnosis of arthritis as explained in Section VIII. These variables include liver diseases, rheumatic fever, conditions of the skin,¹⁰ gout, infectious diseases, gastrointestinal conditions such as inflammation of the bowels, fractures or injuries, and kidney conditions.

The socio-economic factors affecting the probability of having arthritis could be the number of inhabitants in the place the individual lives, marital status, the amount of physical activity realized, and the level of income.

¹⁰ In the Surgeons' Certificates data, diseases of the skin are included in the general appearance disability group.

The results obtained are too preliminary to report, and will be included in the final version of this paper.

XII. Conclusions

Disability caused by arthritis has decreased over time when extending the time horizon further than the beginning of 20th century. One possible explanation is based on the progress of medicine over history. This has brought many new forms of treatment for arthritis that have allowed the severity of this condition to diminish since the late 19th century.

Moreover, prevalence rates in modern times are lower than in the late 19th century, reflecting changes in public health, lifestyle and the distribution of occupations.

The tremendous change in public health (improvements in the water supply, better sewage systems, cleaning of the milk supply) has reduced the probability of developing arthritis at later ages by reducing insults during earlier years of life. Also, for those people having arthritis, is less severe now partly because of many interventions that were not available in the late 19th century. Finally, the main thing medicine has done over the years is to alleviate the severity of the condition, both by drugs and changes in lifestyle that build up the muscles.

The aging process is critical for this condition and is one of the main reasons why older people suffer more from this disease. Over the life cycle of each individual, arthritis prevalence is increasing at any point in time.

The results obtained confirm the fact that older men in the past had worse health status than older men today.¹¹ What has been happening is that age-specific prevalence rates are declining and the average age of onset is 11 years later. Moreover, the proportion of males who ever got arthritis is substantially lower than it used to be.

¹¹ See the first half of this paper by D. Costa (“Heart, Joints, and Mind: Why Were Older Men in the Past in Such Poor Health?”)

XIII. References

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Figure 1

This graph shows the evolution of the arthritis prevalence rate from 1873 to 1910 using the Surgeons' Certificates data. Recruits are divided in birth cohorts. Each line on the graph corresponds to the prevalence rate for a different birth cohort.

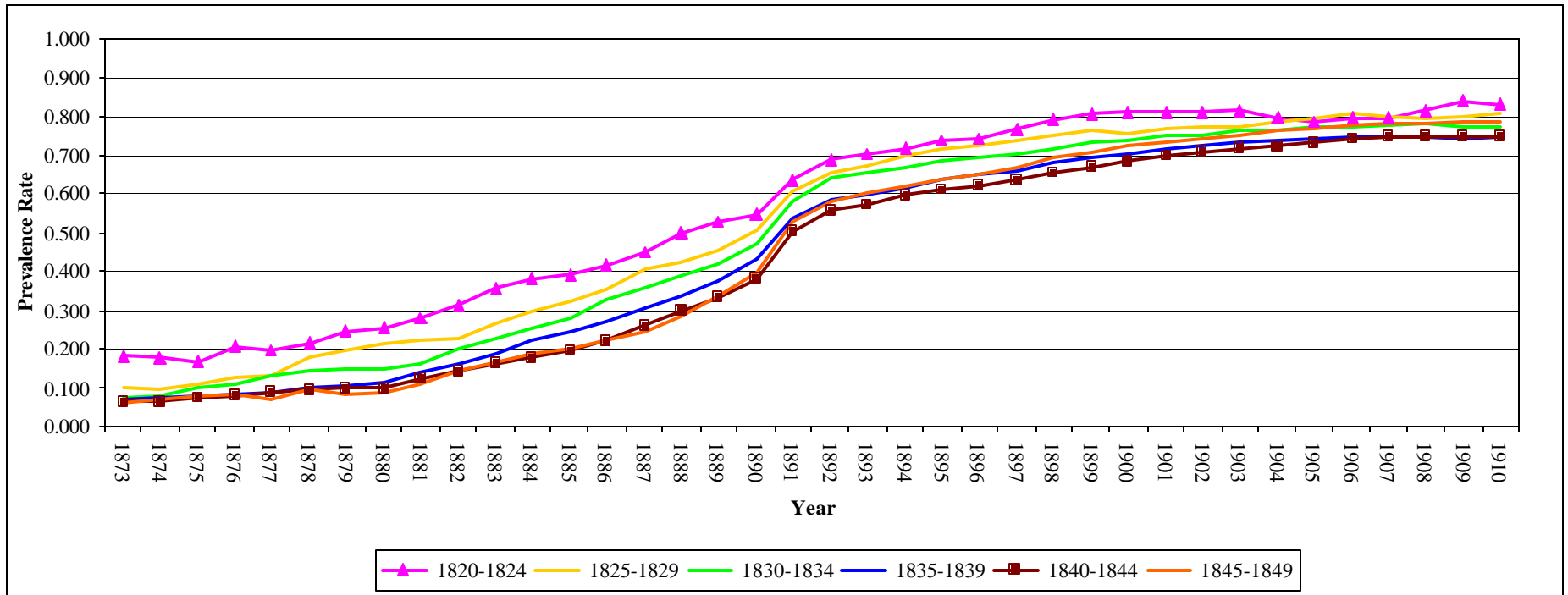


Figure 2

This graph shows the evolution of the arthritis prevalence rate from 1873 to 1910 using the Surgeons' Certificates data. Recruits are divided in 5 years age group according to their age in each year. The line on the graph corresponds to the prevalence rate for the age group of less than 50 years old.

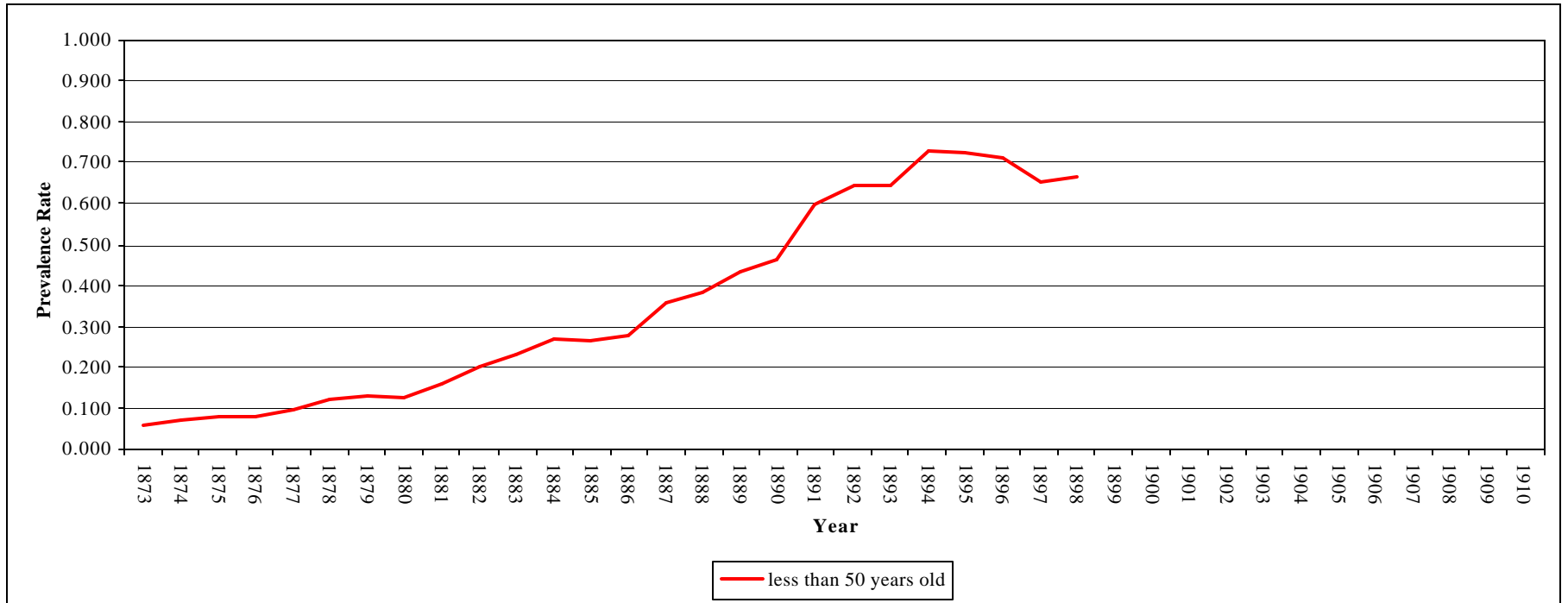


Table 1

This table shows the arthritis prevalence rates calculated using the NHANES data for white males who ever had arthritis. For each sequence of the NHANES we group people in 5-year age groups according to their age at the time of the survey. There is a column reporting the prevalence rates by age group and another column reporting the average duration of the disease in years. The last two columns refer to the aggregation of the three phases of the NHANES we use. The last two rows report the total number of persons surveyed in each phase of the NHANES and how many ever had arthritis.

Age Interval	Year							
	1971-1975 (NHANES I)		1976-1980 (NHANES II)		1988-1994 (NHANES III)		1971-1994 (TOTAL NHANES)	
	Prevalence Rate	Average Duration*	Prevalence Rate	Average Duration*	Prevalence Rate	Average Duration*	Prevalence Rate	Average Duration*
less than 50	0.054	6.974	0.048	7.256	0.054	8.307	0.052	7.490
50 to 54	0.261	9.424	0.191	10.026	0.167	8.500	0.211	9.393
55 to 59	0.280	11.558	0.302	12.065	0.201	11.125	0.263	11.649
60 to 64	0.352	11.816	0.337	11.270	0.276	10.758	0.323	11.258
65 to 69	0.354	13.137	0.351	13.030	0.348	12.393	0.352	12.943
70 to 74	0.382	13.519	0.371	15.695	0.371	13.071	0.375	14.172
75 to 79					0.402	14.121	0.402	14.121
80 to 84					0.411	15.487	0.411	15.487
85 to 89					0.372	14.424	0.372	14.424
Total Number of Persons	6,336		7,460		6,439		20,235	
Tot. Number Persons with Arthritis	1,094		1,226		1,164		3,484	

* in years

Figure 3

This graph shows the evolution of the arthritis prevalence rate for different age groups using the NHANES survey. The data for all four phases of the NHANES is aggregated and individuals are divided into birth cohorts. The line on the graph corresponds to the prevalence rate for the birth cohort born before 1920 at each age interval.

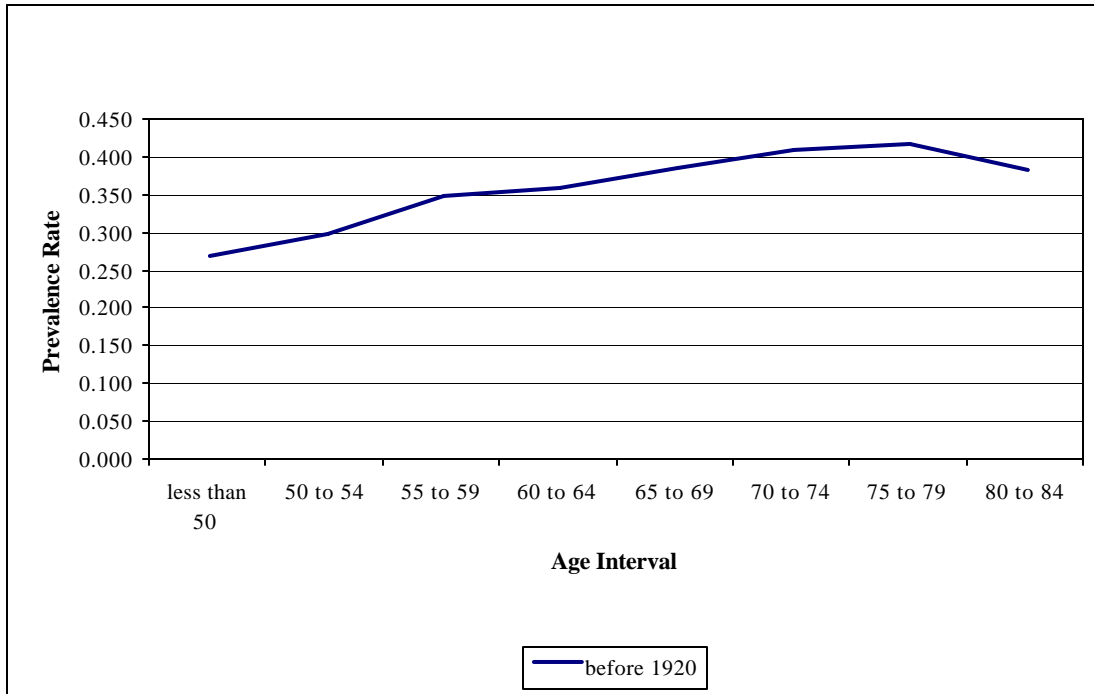


Table 2

This table shows the arthritis prevalence rates calculated using the NHIS data for white males who ever had arthritis. For the five analyzed years from the NHIS we group people in 5-year age groups according to their age at the time of the survey. Each column reports the prevalence rates by age group for a different year of the NHIS. The last column refers to the aggregation of the five analyzed years. The last two rows report the total number of persons surveyed in each year and how many ever had arthritis.

Age Interval	Year					
	1990	1991	1992	1993	1994	1990-1994 (TOTAL NHIS)
	Prevalence Rate	Prevalence Rate	Prevalence Rate	Prevalence Rate	Prevalence Rate	Prevalence Rate
less than 50	0.031	0.032	0.031	0.034	0.031	0.031
50 to 54	0.093	0.120	0.101	0.096	0.107	0.103
55 to 59	0.118	0.156	0.143	0.153	0.136	0.141
60 to 64	0.177	0.170	0.184	0.175	0.147	0.171
65 to 69	0.183	0.192	0.184	0.193	0.201	0.191
70 to 74	0.189	0.191	0.194	0.185	0.219	0.196
75 to 79	0.200	0.231	0.217	0.214	0.208	0.214
80 to 84	0.208	0.256	0.214	0.247	0.231	0.231
85 to 89	0.177	0.250	0.218	0.228	0.156	0.203
90 to 94	0.204	0.236	0.180	0.191	0.238	0.212
95 to 99	0.176	0.267	0.357	0.364	0.000	0.222
Total Number of Persons	19,114	18,166	19,616	17,109	17,671	91,676
Tot. Number Persons with Arthritis	1,567	1,583	1,634	1,468	1,487	7,739

Table 3

This table shows the years lived with arthritis after first diagnosis calculated using the Surgeons' Certificates data. Recruits are divided in 5-year age groups according to their age at the first diagnosis of arthritis. The first column reports the average years lived with arthritis after first diagnosis of that disease for each age group. In the other columns, the standard deviation, the minimum, the maximum and the number of observations for each age group are shown.

Age Interval	Years Lived With Arthritis After First Diagnosis				
	Mean	Std Deviation	Minimum	Maximum	Number Obs.
less than 50	24.320	10.561	1.000	58.000	4,088
50 to 54	19.531	9.028	1.000	42.000	2,644
55 to 59	16.410	8.356	1.000	39.000	2,044
60 to 64	13.501	7.592	1.000	37.000	1,484
65 to 69	11.274	6.766	1.000	30.000	711
70 to 74	9.531	6.461	1.000	27.000	243
75 to 79	6.305	4.477	1.000	20.000	59
80 to 84	5.313	5.606	1.000	20.000	16
85 to 89	4.600	3.578	1.000	9.000	5

Table 4

This table shows the duration of arthritis in 1895 calculated using the Surgeons' Certificates data. Recruits are divided in 5-year age groups according to their age in 1895. The first column reports the average years lived with arthritis until 1895 for each age group. In the other columns, the standard deviation, the minimum, the maximum and the number of observations for each age group are shown.

Age Interval	Duration of Arthritis in Years				
	Mean	Std Deviation	Minimum	Maximum	Number Obs.
less than 50	5.599	3.782	1.000	32.000	4,088
50 to 54	6.512	5.077	1.000	32.000	17,312
55 to 59	7.128	5.095	1.000	32.000	12,719
60 to 64	7.438	5.150	1.000	32.000	7,349
65 to 69	8.332	5.661	1.000	32.000	4,672
70 to 74	9.304	6.288	1.000	32.000	2,423
75 to 79	11.835	7.515	1.000	32.000	1,360
80 to 84	11.667	5.724	3.000	26.000	87
85 to 89	11.250	6.771	4.000	24.000	24