

Analysis of Total Work Inability in Poland in 2000 and 2001 According to Age, Disease Diagnosis and Occupation

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This study was to determine the main health-related reasons, age and occupation of those who took early retirement due to total work inability. This was done through an analysis of the data from Poland's Social Insurance Institution (ZUS) from 2000 and 2001. An analysis of these data showed an increase in the number of certificates confirming total inability to work in people over 40 years old. Over 50% of certificates work were issued to workers in 2 age-groups: 45–49 and 50–54.

Diseases of the circulatory system, musculoskeletal system and connective tissue as well as mental and behavioural disorders are the main causes of early inability to work. Approximately 70% of people who obtained certificates confirming total inability to work had blue- and blue-and-white-collar jobs.

early retirement total work inability disease occupation

1. INTRODUCTION

In Poland, like in other developed countries, life span has grown just as birth rate has fallen, which to a large extent accounts for the aging of society. An increased percentage of older people is a consequence of that process. At the same time, those countries have witnessed an increase in the number of people who terminate their occupational activity even over 10 years before their statutory age of retirement.

Health deterioration is the main cause of an early termination of occupational activity. There are reports, however, showing that even in the case of a severe health condition, the decision to stop working is affected by economic, social and psychological factors [1, 2, 3, 4, 5, 6].

Among the occupational factors that influence the decision to retire early, hard physical work, high physical demands, low degree of job control and low job satisfaction are frequently mentioned [6, 7, 8].

Martikainen, Stansfeld, Brunner, Fuhrer and Marmot [9] noted that job satisfaction, employment grade rate and one's own perception of health deterioration were all independent predictors of early retirement. Hayward, Friedman and Chen [5] studied the influence of the course of one's occupational career on early termination of occupational activity. They noted that such factors as employer shifts or periods of unemployment also strongly influence an early stop to occupational work.

Until October 1997, when a new Act changing some rules of the provision of pensions and on

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social insurance came into force [10], it was impossible to identify occupations or types of occupational activities in the context of the reasons why certificates of work inability were obtained. This was so because statistics previously followed only a division into branches of the national economy. Since the Act came into force, this has been possible: in the case of first-time certificates confirming inability to work¹, information on workers also covers their occupations.

Inability to work—as understood by the Act which is the basis of the new system of certifying inability to work—is defined as total or partial loss of the ability to do paid work on grounds of health.

This analysis aimed to determine the reasons, age and affiliation to occupation groups for which most certificates of total inability to work were issued.

2. METHODS

An analysis of the health reasons of a total inability to work was carried out on the basis of data obtained from the Centre of Analysis and Statistics of Poland's Social Insurance Institution (ZUS). Those data concerned first-time certificates issued by doctors—ZUS experts—in 2000 and 2001, according to the principles set out in the Act of June 28, 1996 [10].

The new principles of issuing certificates came into force in October 1997, but a detailed analysis was undertaken—after consultations with representatives of ZUS—on the basis of data from 2000 and 2001. Those years were considered the first ones when the new principles set out in the Act operated smoothly all over the country (in 1998 and partly in 1999 certificates to a large extent were ones originally issued in previous years and subsequently verified).

An analysis of data on the first-time certificates for 2000 and 2001 showed that, when compared with data from the first years of the new Act, the number of new certificates gradually fell. In the first year of the Act being in force, i.e., in

1998, there were a total of 204,202 certificates confirming inability to work: 119,833 for men (58.6%) and 84,369 for women (41.4%). That number gradually decreased with 184,308 certificates issued in 1999: 108,913 for men (59.1%) and 75,395 for women (40.9%). In 2000, there were only 125,649 certificates: 74,773 certificates for men (59.5%) and 50,876 for women (40.5%). Data for 2001 show a further decrease in the number of certificates issued. In that year, 104,148 certificates were issued: 63,315 (60.8%) for men and 40,833 for women (39.2%). In all the years that were analysed, men obtained slightly more certificates, about 60% of the total number [11, 12]. It can be concluded that the decrease in the number of certificates issued resulted mainly from stricter criteria of certification.

These authors decided to analyse data on first-time certificates issued only to people whose employment was based on a work agreement as only for them was it possible to establish occupation in accordance with the Classification of Occupations and Specialisations developed by the Ministry of Labour and Social Policy. In ZUS data, occupation was coded at the level of the fifth digit, in a seven-digit code, in which the first digit was the main heading, the second one denoted a large category, the third one an intermediate one, the fourth one an elementary one and the fifth one the place in the elementary group, i.e., the specific occupation that was considered in the study. In practice, however, it turned out that for some people data were incomplete (i.e., there was lack of information on their occupation).

Thus, in 2001, 83,072 certificates confirming inability to work were issued (788.1 per 100,000 workers) to workers whose employment was based on a work agreement. Out of that number, the occupation of those workers was established in 63,271 cases only.

For comparison, in 2000, the total number of first-time certificates issued to workers whose employment was based on a work agreement was 96,437 (874.36 per 100,000 workers),

¹ Called *first-time certificates* throughout this article.

including 78,900 certificates for people whose occupation was established.

An analysis of the data led to the results discussed in this paper. Occupational groups, age and diseases were considered in this analysis.

3. RESULTS

3.1. Analysis of First-Time Certificates According to Occupation

Because of the great distribution of the results, due to the large number of occupations and

specialisations (several hundred), the authors decided to focus on those with the percentage share in the total number of certificates issued in 2000 and 2001 greater than 1%. This group comprised a total of 28 occupations in 2000 and 29 in 2001.

Table 1 illustrates the distribution of the first-time certificates according to the basic groups of occupations (the third-digit level in the seven-digit code). Below we present those certificates according to specific occupations (the fifth-digit level in the seven-digit code).

The total number of certificates confirming total inability to work issued to workers in the

TABLE 1. Distribution of First-Time Certificates Confirming Total Inability to Work Among Occupational Groups

Occupation	Group	2000 (%)	2001 (%)
Managers of small and medium-sized enterprises	131	1.26	1.38
Post-elementary school teachers	232	1.73	1.40
Business specialists	241	1.13	1.06
Technicians	311	2.56	2.60
Nurses and midwives	323	2.34	1.74
Mid-level office staff	343	2.02	1.99
Finance/statistics personnel	412	1.11	1.00
Workers for material, transportation and production records	413	—	1.93
Other office staff	419	1.00	1.07
Domestic and catering services workers	512	1.60	1.58
Personal care workers and related occupations	513	1.10	—
Shop assistants	522	4.91	4.98
Miners and stone workers	711	2.57	2.53
Construction workers and related occupations	712	4.82	5.06
Construction (finishing) workers	713	1.73	2.0
House painters, construction cleaners and related occupations	714	1.01	1.06
Moulders, foundry workers, welders, sheet-metal workers, fitters of metal structures and related occupations	721	2.42	2.63
Smiths, locksmiths and related occupations	722	6.50	7.28
Machinery and equipment mechanics	723	2.24	2.23
Wiremen for electric and electronic equipment	724	2.15	2.18
Workers in the food industry	741	1.89	1.88
Woodworking equipment workers, cabinet makers and related occupations	742	1.75	1.86
Workers manufacturing textile products, clothing and related occupations	743	3.20	1.15
Drivers of motor vehicles	832	5.23	5.26
Operators of self-propelled agricultural machinery and related occupations	833	1.31	1.33
Domestic help, cleaners and washerwomen	913	8.07	7.58
Messengers, porters, doormen and related occupations	915	2.32	2.18
Auxiliary workers pomocniczy in agriculture, fishery and related occupations	921	—	1.25
Auxiliary workers in mining and construction	931	2.18	2.24
Workers in the food processing industry	932	3.86	4.05
Other occupations		25.01	25.52
	Total	100	100

28 occupational groups in 2000 was 59,184, which constituted 75% of all the first-time certificates issued that year, whereas in 2001 in the 29 occupational groups 41,436 certificates were issued, which amounted to 65.5% of all the certificates issued that year.

Domestic help, cleaners and washerwomen (occupational group 913) obtained 6,368 certificates (8.07%) in 2000 and 4,793 (7.58%) in 2001. In that group, office and hotel help and cleaners, and related occupations (group 91302) were particularly numerous: 6.92% in 2000 and 6.46% of the certificates issued in 2001.

Smiths, locksmiths and related occupations (group 722) were in the second place with 5,126 certificates (6.5%) in 2000 and 4,604 (7.28%) in 2001. Locksmiths (group 72202) dominated this group: 4.66% certificates in 2000 and 4.76% in 2001.

The third place went to drivers of motor vehicles (group 832): 4,128 certificates (5.23%) in 2000 and 3,329 (5.26%) in 2001, including the highest number of certificates for lorry drivers (group 83203): 3.14% in 2000 and 2001.

Construction workers and related occupations (group 712) were in the fourth place: 3,805 certificates (4.82%) in 2000 and 3,204 (5.06%) in 2001, including the highest number of certificates issued to bricklayers (group 71201): 2.53% in 2000 and 2.64% in 2001.

The fifth place—shop assistants (group 522)—3,875 certificates (4.91%) in 2000 and 3,154 (4.98%) in 2001.

Workers in the food processing industry (group 932) were in the sixth place: 3,043 certificates (3.86%) in 2000 and 2,563 (4.05%) in 2001.

The next places were occupied by, amongst others, workers manufacturing textile products and clothing (group 743): 3.20% certificates issued in 2000 and 3.14% of those issued in 2001.

3.2. Analysis of First-Time Certificates According to Age

Both in 2000 and 2001, most certificates were issued to workers in two age groups: 45–49 and 50–54. Taking into consideration the occupational groups that were analysed, in 2000, on average 26.23 and 24.87% of certificates were issued to people in those two age groups, respectively. Similarly, in 2001, 25.3 and 26.0% of certificates were given to people aged 45–49 and 50–54, respectively. The numbers of certificates classified according to age issued to workers in the five occupation groups with the largest number of pension certificates are presented in Table 2.

- Domestic help, cleaners and washerwomen. In 2000, in this occupational group 29.6% of certificates were issued to workers aged 45–49, whereas in 2001, 31.5% of certificates—to workers in the 50–54 age group.
- Smiths, locksmiths and related occupations. Both in 2000 and 2001, most certificates were issued to workers in the 50–54 age group (26.5 and 26.4%, respectively).

TABLE 2. Distribution of First-Time Certificates Confirming Total Inability to Work in 2000 and 2001 Among Age Groups (%), for Five Occupational Groups

Occupation	Age Group											
	≤19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	≥65	
Construction workers and related occupations	0.4/0.5*	2.5/2.0	3.5/3.4	5.0/5.0	8.6/7.8	17.7/16.6	25.2/25.3	23.1/23.7	8.3/12.0	3.1/3.1	0.4/0.2	
Smiths, locksmiths and related occupations	0.3/0.5	2.0/1.9	3.0/3.8	4.8/4.6	7.6/6.6	16.7/15.6	25.4/23.9	26.5/26.4	9.7/12.3	3.1/3.6	0.7/0.9	
Drivers of motor vehicles	0.04/0.03	0.8/0.8	2.2/2.1	3.4/3.0	6.7/6.2	16.9/14.4	26.3/24.8	27.7/31.0	13.4/14.9	2.2/2.5	0.2/0.2	
Domestic help, cleaners and washerwomen	0.04/0.10	0.9/0.6	1.9/2.3	3.0/4.2	7.0/7.4	18.3/16.4	31.5/29.3	28.5/29.6	6.5/7.7	1.9/1.8	0.4/0.6	
Workers in the food processing industry	0.2/0.1	2.6/2.6	5.0/4.6	5.8/5.5	9.0/8.7	18.2/16.5	27.2/25.3	22.0/23.5	7.2/9.6	2.4/2.8	0.5/0.8	

Notes. *—x/y: x is the value for 2000, y is the value for 2001.

- Drivers of motor vehicles. Both in 2000 and 2001, most certificates were issued to workers aged 50–54 (27.7 and 31%, respectively).
- Construction workers and related occupations. Both in 2000 and 2001, most certificates were issued to workers in the 45–49 age group (25.2 and 25.3%, respectively).
- Workers in the food processing industry. Both in 2000 and 2001, most certificates were issued to workers aged 45–49 (27.2 and 25.3%, respectively).

3.3. Analysis of First-Time Certificates According to Medical Cause

In 2000, five groups of diseases prevailed in the distribution of first-time certificates:

- diseases of the circulatory system (I00–I99)²,
- diseases of the musculoskeletal system and connective tissue (M00–M99),
- mental and behavioural disorders (F00–F99),
- neoplasms (C00–D48),
- diseases of the nervous system (G00–G99).

In 2001, diseases of the musculoskeletal system and connective tissue—as a basis for certificates—were in the third place, whereas mental and behavioural disorders in the second. Otherwise there was no difference in the order of the diseases.

The number of certificates, irrespective of the disease that was the basis for a certificate, increased with the workers' age beginning from 35–39, with the exception of mental and behavioural disorders, which showed high frequency between 20 and 49. Over 35–39, there was a gradual increase in the number of certificates issued for other medical reasons, i.e., diseases of the circulatory system and of the musculoskeletal system and connective tissue. The number of certificates confirming total inability to work that were issued due to these three groups of diseases became similar. In the next two age groups, i.e., 45–49- and 50–54-year-olds, there was a rapid increase in the number of certificates issued, especially in connection with

diseases of the circulatory system. The greatest number of pension certificates awarded because of diseases of the musculoskeletal system and connective tissue, mental and behavioural disorders, diseases of the nervous system was observed among workers in the 45–49 age group. On the other hand, most certificates related to diseases of the circulatory system and neoplasms were given to workers aged 50–54.

Above the age of 55 the number of certificates confirming inability to work gradually decreased and in the 60–64 age group it reached the pre-increase level. The diseases of the circulatory system were an exception: as a basis for certificates they remained at a fairly high level. In contrast to the youngest groups, those diseases were the main reason why certificates were issued.

The analysis showed that in 2000 and 2001 most first-time certificates were issued in connection with diseases of the circulatory system. In 2000, 23,356 (24.2%) certificates were caused by these diseases and in 2001 there were 18,906 (23.6%) certificates (Figure 1).

Three diseases were depicted as a cause of over 75% of all the certificates issued because of diseases of the circulatory system. They were ischemic heart disease (40.1 and 41.4% in 2000 and 2001, respectively), hypertension (25.3 and 21.0% in 2000 and 2001, respectively) and cerebrovascular diseases (10.5 and 12.6% in 2000 and 2001, respectively) (Figure 2).

Most certificates issued because of diseases of the circulatory system were found in the following occupational groups.

In 2000,

- managers of small and medium-sized enterprises: 34.8% of all certificates issued in this occupational group;
- drivers of motor vehicles: 33.4%;
- operators of self-propelled agricultural machinery and related occupations: 30.0%;
- technicians: 29.8%;
- business specialists: 29.5%.

² According to the three-digit classification developed by the World Health Organization (WHO) in 1992.

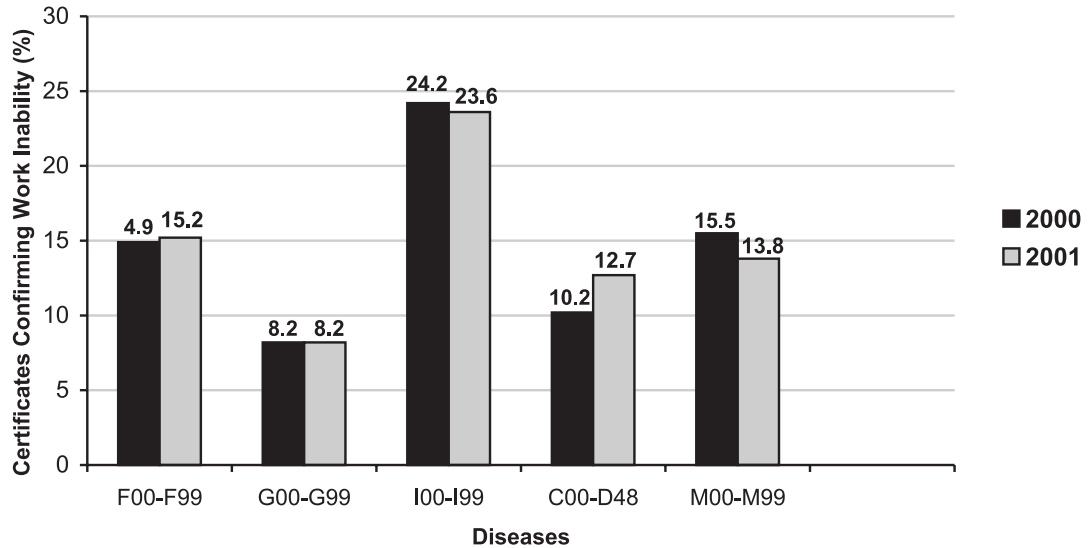


Figure 1. Certificates confirming inability to work in 2000 and 2001 according to groups of diseases. Notes. F00–F99—mental and behavioural disorders, G00–G99—diseases of the nervous system, I00–I99—diseases of the circulatory system, C00–D48—neoplasms, M00–M99—diseases of the musculoskeletal system and connective tissue.

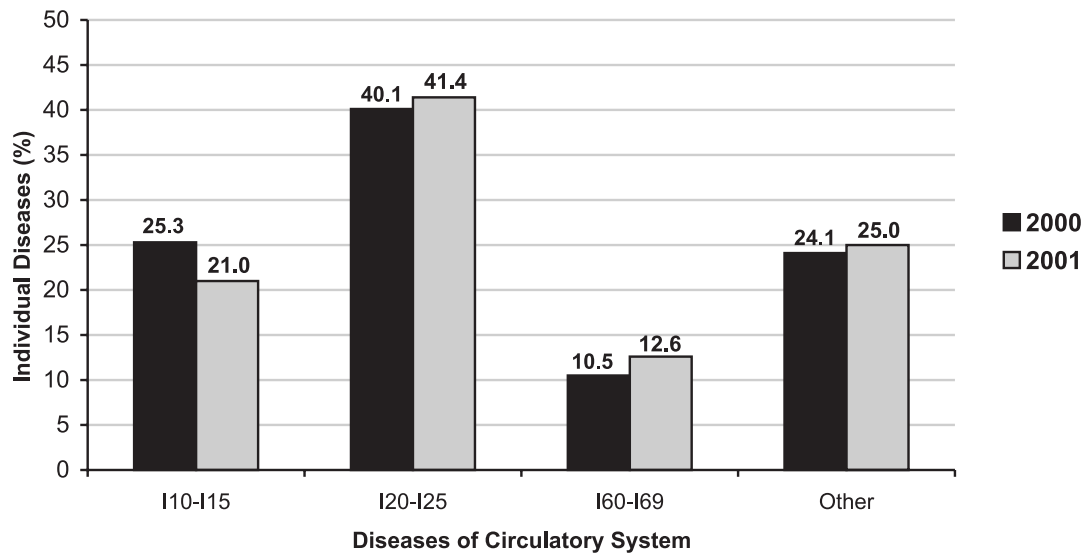


Figure 2. Individual diseases in the total number of certificates issued in connection with diseases of the circulatory system in 2000 and 2001. Notes. I10–I15—hypertension, I20–I25—ischemic heart diseases, I60–I69—cerebrovascular diseases, other—other disorders of the circulatory system.

In 2001,

- drivers of motor vehicles: 34.7% of all certificates in this occupational group;
- smiths, locksmiths and related occupations: 25.6%;
- construction workers and related occupations: 24.7%;
- domestic help, cleaners and washerwomen: 20.9%;

- shop assistants: 18.0%.

Most certificates issued because of diseases of the circulatory system were given to workers aged 50–54. In 2000, the number of certificates was 7,760 (33.6% of all the certificates issued in connection with that group of diseases) and in 2001, 6,464 certificates, (34.2%).

In 2000, the second greatest number of certificates was issued for diseases of the

musculoskeletal system and connective tissue. In total, in 2000, 14,934 certificates resulted from those diseases (15.4% of all certificates). In 2001, those diseases were in the third place with 11,064 certificates (13.3%) (Figure 1).

Figure 3 illustrates the percentage share of individual diseases in the total number of certificates issued in connection with diseases of the musculoskeletal system and connective tissue. Two diseases appeared to cover over 95 % of the certificates issued in connection with this group of diseases: dorsopathies 73% of certificates in 2000 and 68.1% in 2001 and arthropaties 21.20% in 2000 and 25.9% in 2001 (Figure 3).

Among the occupations that were analysed, the greatest number of certificates resulting from the aforementioned group of diseases was found in the following occupations.

In 2000,

- personal care workers and related occupations: 20% of all the certificates issued in this occupational group;
- workers manufacturing textile products, clothing and related occupations: 19.5%;
- domestic help, cleaners and washerwomen: 18.5%;

- construction workers and related occupations: 17.7%;
- domestic and catering services workers: 17.5%.

In 2001,

- shop assistants: 16.4% of all the certificates issued in this occupational group;
- domestic help, cleaners and washerwomen: 15.8%;
- drivers of motor vehicles: 14.2%;
- workers in the food processing industry: 14.0%;
- smiths, locksmiths and related occupations: 12.4%.

Most certificates resulting from diseases of the musculoskeletal system and connective tissue were issued to workers aged 45–49. In 2000, 4,247 (28.43%) certificates were issued in connection with this disease group and in 2001, 3,106 (28.1%) certificates.

Mental and behavioural disorders were in the third place among the causes of certificates issued in 2000. In that year there were 14,391 (14.9%) certificates issued in connection with this disease group. In 2001, mental and behavioural disorders

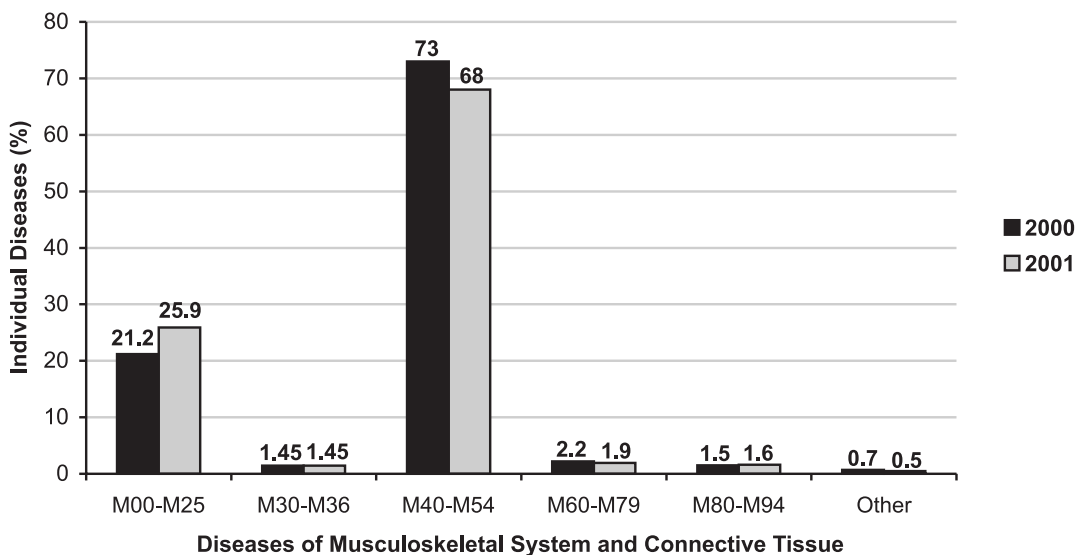


Figure 3. Individual diseases in the total number of certificates issued in connection with diseases of the musculoskeletal system and connective tissue in 2000 and 2001. Notes. M00–M25—arthropaties, M60–M79—soft tissue disorders, M30–M36—systemic connective tissue disorders, M80–M94—osteopathies and chondropathies, M40–M45—dorsopathies, other—other disorders of the musculoskeletal system and connective tissues.

were in the second place with 12,184 certificates (15.2%) (Figure 1). Most certificates issued because of the aforementioned disorders were found in the following occupational groups:

In 2000,

- nurses and midwives: 25.6% of the certificates issued in that occupational group;
- mid-level office staff: 24.1%;
- finance/statistics personnel: 23.1%;
- workers manufacturing textile products, clothing and related occupations: 21.6%;
- business specialists: 20.6%.

In 2001,

- workers manufacturing textile products, clothing and related occupations: 20.5% of the certificates issued in that occupational group;
- shop assistants: 19.4%;
- workers in the food processing industry: 18.2%;
- domestic help, cleaners and washerwomen: 17.2%;
- smiths, locksmiths and related occupations: 12.7%.

Most certificates resulting from mental and behavioural disorders were issued to workers aged 45–49. In 2000, 3,855 (26.78%) and in 2001, 3,185 (26.1%). certificates based on these diseases were issued to workers at this age.

In both 2000 and 2001, the fourth greatest number of certificates was issued due to neoplasms. In 2000, 9,868 (10.2%) and in 2001, 10,546 (12.7%) were issued in connection with this disease group (Figure 1).

Among the groups of occupations that were analysed, the greatest percentage of certificates resulting from neoplasms was found in the following occupations.

In 2000,

- shop assistants: 13.6% of all the certificates issued in that occupational group;
- domestic help, cleaners and washerwomen: 10.6%;
- workers in the food processing industry: 10.2%;
- drivers of motor vehicles: 8.5%;

- smiths, locksmiths and related occupations: 8.4%.

In 2001,

- shop assistants: 15.7% of all the certificates issued in that occupational group;
- workers manufacturing textile products and clothing: 15.1%;
- domestic help, cleaners and washerwomen: 15.0%;
- drivers of motor vehicles: 11.5%;
- smiths, locksmiths and related occupations: 12.0%.

In 2000, most neoplasm-based certificates (2,751) were issued to workers in the 50–54 age group: 27.8% of all the certificates issued in connection with these diseases and 29.6% of certificates (3,121) in 2001.

Both in 2000 and in 2001, diseases of the nervous system were also frequent among all recipients of certificates. In 2000, 7,952 certificates (8.23%) and in 2001, 6,571 certificates (8.2%) were issued in connection with this disease group (Figure 1). Most certificates issued on grounds of diseases of the nervous system were found in the following occupational groups:

In 2000,

- domestic help, cleaners and washerwomen: 9.4% of all the certificates issued in that occupational group;
- shop assistants: 9.3%;
- drivers of motor vehicles: 8.9%;
- construction workers and related occupations: 8.5%;
- smiths, locksmiths and related occupations: 8.2%;

In 2001,

- shop assistants: 9.6%;
- construction workers and related occupations: 9.0%;
- domestic help, cleaners and washerwomen: 9.4%;
- drivers of motor vehicles: 8.7%;
- smiths, locksmiths and related occupations: 8.0%;

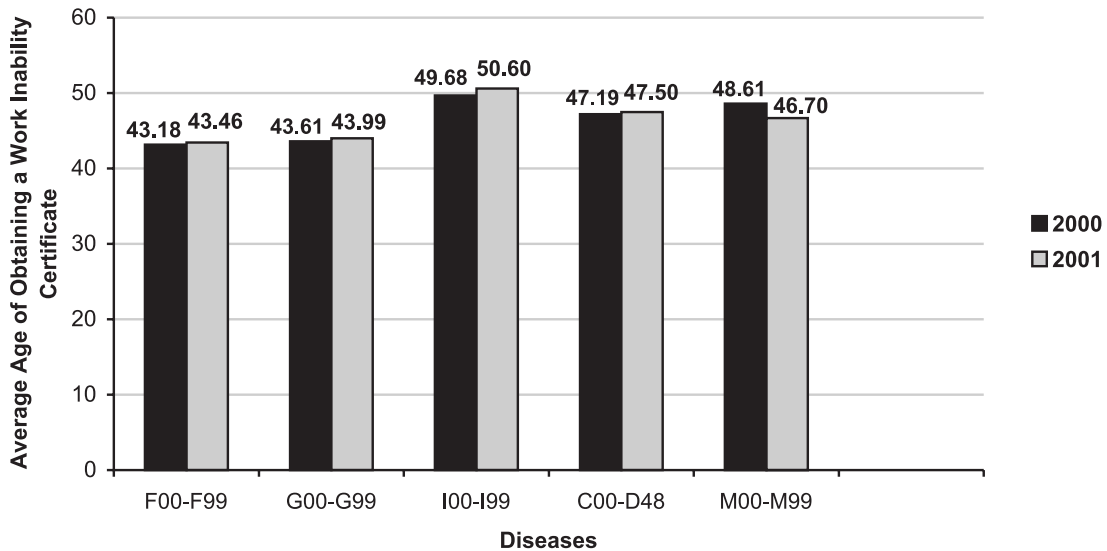


Figure 4. Average age of obtaining a certificate confirming total inability to work according to disease in 2000 and 2001 (per year). Notes. F00–F99 (mental and behavioural disorders, G00–G99—diseases of the nervous system, I00–I99—diseases of the circulatory system, C00–D48—neoplasms, M00–M99—diseases of the musculoskeletal system and connective tissue.

Most certificates related to diseases of the nervous system were issued to workers in the 45–49 age group: 2,074 certificates (26.1% of all the certificates issued in connection with those diseases) in 2000 and 1,627 certificates (24.7%) in 2001.

The average age when a certificate was obtained ranged between 43.18 (mental disorders in 2000) and 50.6 years of age (for diseases of the circulatory system in 2001) (Figure 4).

4. SUMMARY

These authors believe that this analysis is the first one of this kind in Poland. It was taken up in an effort to determine the health problems that lead to total inability to work in various occupational groups.

Since 1999 the number of first-time certificates has gradually decreased. As that period coincides with the Act on changes in some acts on the provision of pensions and on social insurance [10], which introduced new certification criteria, one should think that the number of first-time certificates decreased because the regulations were tightened.

An analysis of the first-time certificates issued in 2000 and 2001 showed that approximately

75% of all certificates were issued to people who worked in about 30 occupational groups. Out of this number of certificates approximately 68% certificates in each of the two analysed years were given to blue-collar workers (e.g., domestic help, cleaners and washerwomen, smiths, locksmiths and related occupations, workers in the textile industry, workers in the food processing industry) and to blue-and-white-collar ones (e.g., drivers of motor vehicles, nurses, shop assistants). In both years the greatest number of certificates was issued to domestic help, cleaners and washerwomen.

An analysis of ZUS data on the age of people at the time when pensions began to be claimed and the period they were claimed, shows that the number of certificates confirming total inability to work increases markedly between the age of 30 and 39 [11, 12, 13].

In 2000 and 2001, over 50% of the first-time certificates were issued to workers in two age groups: 45–49 and 50–54. This is 10–15 years before Poland's statutory retirement age, which is 60 for women and 65 for men.

The medical causes, which are the basis for issuing certificates confirming inability to work, have not changed for more than 10 years. The main causes of an early disability to work related to health in the years that were analysed were

diseases of the circulatory system, diseases of the musculoskeletal system and connective tissue, and mental and behavioural disorders.

REFERENCES

1. McGoldrick AE, Cooper CL. Why retire early? *Prev Hum Serv.* 1990;8:219–37.
2. Taylor M, McFarlane Shore L. Predictors of planned retirement age: an application of Beehr's model. *Psychol Aging.* 1995;10:76–83.
3. Henekens K, Tazelaar E. Early retirement of civil servants in the Netherlands. *J Appl Soc Psychol.* 1994; 24:1927–43.
4. Poole CJM. Retirement on grounds of ill health: cross sectional survey in six organizations in United Kingdom. *Br Med J.* 1997;314: 929–32.
5. Hayward MD, Friedman S, Chen H. Career trajectories and older men's retirement. *J Gerontol B Psychol Sci Soc Sci.* 1998;51:130–49.
6. Krokstad S, Johnsen R, Westin S. Social determinants of disability pension: a 10-year follow-up of 62 000 people in a Norwegian country population. *Int J Epidemiol.* 2002;31(6):1183–91.
7. Holte HH, Tambs K, Bjerkedal T. Manual work as predictor for disability pensioning with osteoarthritis among the employed in Norway 1971–1990. *Int J Epidemiol.* 2000;29(3):487–94.
8. MacDonald LA, Karasek RA, Punnett I, Scharf T. Covariation between workplace physical and psychosocial stressors: evidence and implication for occupational health and prevention. *Ergonomics.* 2001;44:696–718.
9. Martikainen GMP, Stansfeld SA, Brunner EJ, Fuhrer R, Marmot MG. Predictors of early retirement in British civil servants. *Age Ageing.* 2000;29(6):529–36.
10. Ustawa z dnia 28 czerwca 1996 r. o zmianie niektórych ustaw o zaopatrzeniu emerytalnym i o ubezpieczeniu społecznym [Act of June 28, 1996, on changes in some acts on the provision of pensions and on social insurance]. *Dz.U.* 1996;100(461):1–9.
11. Zakład Ubezpieczeń Społecznych (ZUS). Orzecznictwo lekarskie o niezdolności do pracy w 1999 r. [Medical certificates confirming inability to work in 1999]. Warszawa, Poland: ZUS; 2000.
12. Zakład Ubezpieczeń Społecznych (ZUS). Orzecznictwo lekarskie o niezdolności do pracy w 2000 r. [Medical certificates confirming inability to work in 2000]. Warszawa, Poland: ZUS; 2001.
13. Zakład Ubezpieczeń Społecznych (ZUS). Orzecznictwo lekarskie o niezdolności do pracy w 2001 r. [Medical certificates confirming inability to work in 2001]. Warszawa, Poland: ZUS; 2002.