Comparative Economic Research. Central and Eastern Europe
Volume 26, Number 4, 2023
https://doi.org/10.18778/1508-2008.26.37

COPE Member since 2018 JM13708

Measuring and Assessing Sick Absence from Work: a European Cross-sectional Study

Elżbieta Antczak https://orcid.org/0000-0002-9695-6300
Ph.D., Associate Professor at the University of Lodz, Department of Spatial Econometrics, Faculty of Economics and Sociology, Lodz, Poland, e-mail: elzbieta.antczak@uni.lodz.pl

Katarzyna M. Miszczyńska https://orcid.org/0000-0003-4924-7605
Ph.D., University of Lodz, Faculty of Economics and Sociology, Department of Public Finance, Lodz, Poland
e-mail: katarzyna.miszczynska@uni.lodz.pl

Abstract

This study analyses sickness absence in selected European countries. We suggested and applied three sick-leave measures: global sickness absence rate, frequency rate, and absolute crude absence rate. To calculate the rates, open access data from Eurostat, the OECD, and the WHO were used. On the one hand, assessing sickness absence is a challenge in spite of accessible numbers of people and days of absence in public and employer registers. Simultaneously, a detailed understanding of sickness benefits and sick-pay schemes is needed to elucidate cross-country differences in sick-leave rates. The long-term dynamic trajectory (1970–2020) and regional differentiation effects on absenteeism among countries were considered. Using correlation coefficients and one-way analysis of variance, a robustness check was performed, and the limitations of the proposed approach to measuring absenteeism were presented. The results evidence that the aforementioned indices present a unique and valid approximation to evaluate and monitor the state of sick absence and inequality in national policies.

Keywords: sickness absence, sick-leave measures, compensated absent workdays, European comparisons, regionality

JEL: C12, F66, J24

Received: 27.09.2022. Verified: 6.05.2023. Accepted: 21.09.2023

Introduction

Sickness absence entails a work disability that arises from one's own illness or injury (Mekonnen, Lamessa, and Wami 2018). It is high on government agendas, as sickness benefit systems have been reformed in almost all European countries over the past 20 years. However, benefit schemes vary considerably between countries, both in terms of measurable elements (such as the level of remuneration) and non-measurable features that concern the actual implementation of the schemes (Whitaker 2001, pp. 420–410). Assessing sickness absence is a challenge in spite of the accessible numbers of people and days of absence in public and employer registers (Sumanen et al. 2017). Despite this, there is an increasing understanding of sickness absence as a process, which contributes to a growing awareness that it is closely linked to overall economic development and can therefore be used to predict other outcomes.

A detailed understanding of sickness benefits and sick-pay schemes is needed to elucidate cross-country differences in sick-leave rates (Ose et al. 2022, pp. 619–631). Thus, cross-national comparative and collaborative research on sickness absence systems and statistics in Europe is desirable, not only to advance knowledge about return-to-work policies and practices, but also to improve them (Gimeno et al. 2014, pp. 663–666). Sickness absence has been analysed from a number of angles. It covers several different issues: the indirect cost of illness and injury, lost productivity, and the rate of social disengagement (Hill et al. 2008, pp. 840–851).

Scoppa and Vuri (2014) studied sickness absence in Italy. They modelled absenteeism by defining it as the fraction of weeks of sickness absences (over the total number of weeks worked) of individual i in period t (Scoppa and Vuri 2014). They found that unemployment can play a role as a means of disciplining employees because a higher sick-related working absence was related to a higher risk of becoming unemployed. Chimed-Ochir et al. (2019) analysed absenteeism and presenteeism in Japan through worktime lost rates and average working days lost per employee per annum (Chimed-Ochir et al. 2019, pp. 682–688). The worktime lost rate was calculated as the number of workdays lost to sickness absence/presence per year divided by the total number of available workdays and expressed as a percentage. Meanwhile, the average working days lost per employee per annum was calculated as the total number of days with sickness absence/presence divided by the total number of employees. The results revealed that the sick leave rate among Japanese workers is quite lower compared to other countries. However, the authors did not find any statistically significant difference between the work type and presence rates.

Fischer et al. (2020) estimated the potential reduction in future sickness absence in Germany by absence rate (SAR). They suggest that the psychosocial characteristics of work may explain a significant portion of future sickness absence rates at the workgroup level. The Institute for Employment Studies uses the crude absence rate (*ACR*) for measuring the sickness absence (IES 2022). The report points out the advantages of this measure, citing the simplicity of the calculation and its ability to calculate both the percentage of absences by employee group and the sickness absence costs themselves, which are so important from a company's management perspective. Both the frequency absence rate (*FQR*) and *ACR* were used by Lar, Ogbeyi, and Wudiri (2019, pp. 67–74), who examined absenteeism among hospital staff. They confirmed a statistically significant relationship between low wages and absenteeism.

Measures of sickness absence are valuable indicators of employee health and their ability to perform their jobs (Prasad and Puttaswamy 2017). Therefore, they are also an important public health issue in several respects. Lusinyan and Bonato (2004) report on the loss of labour supply (i.e., lost output) and spending pressures resulting from sickness absence. They also provide evidence on employees' health status, job satisfaction and integration in the workplace (Lusinyan and Bonato 2004, pp. 475–538). Another recent study revealed that sickness absence is a risk marker for all-cause mortality (Ropponen et al. 2021). Sickness absences and withdrawals from the labour market also represent a burden on public finances and business costs, a waste of human resources and a burden on those affected.

There is no internationally agreed definition of sickness absence or a specific data source for international comparisons of sickness absence. There are divergent definitions of absence, different inclusion and exclusion criteria, and differences in the populations being compared and in the accuracy of the data collected on sickness absence. Therefore, policymakers and politicians must be careful when interpreting absence data available at national and international levels. For example, social insurance in Poland is universal and compulsory, and therefore covers all employees. Insurance contributions are set in proportion to the salary of the insured. The principle of proportionality is also reflected in the amount of benefits paid out (Garbiec 2019, pp. 7–14). Contributions are charged to employees and employers. Social insurance in Poland includes pension insurance, disability insurance, sickness insurance (insurance in case of illness and maternity), and accident insurance (insurance against accidents at work and occupational diseases) (The Ministry of Familiy, Labour and Social Policy 1998).

By contrast, in the UK, the hours lost due to maternity leave are often not recorded as sickness absence. The contracted hours for those on maternity leave are often still included in the denominator, which could have a significant effect when calculating the rate in working populations with a high female population (Bevan and Hayday 2001). Within the European Union (EU), some countries exclude groups such as all public sector or self-employed workers from the national figures. Others include those on permanent disability benefits or maternity leave in the sickness absence figures, and one cannot separate absence due to illness from other reasons for absence (Whitaker 2001, pp. 420–410).

In this study, we analyse and explain the results of sickness absence in selected European countries by applying three sick-leave measures. We contribute to the very limited empirical literature in several ways. First of all, there is no unique data source to be used for international comparisons. Data availability differs across countries and programmes, and some types of information may be more difficult to obtain than others. Therefore, we ensure consistency and comparability across countries by keeping data collection efforts at a reasonable level. We use free and open access data from Eurostat, the OECD's Social Benefit Recipients Database, the WHO European Data Warehouse, and national administrative sources responsible for compensating absence from work due to illness. Thus, this analysis provides a degree of flexibility to take into account the data situation in each country.

To get the fullest possible picture of European sickness absence, the perspective was extended to Norway and the UK, and we considered the long-term dynamic trajectory of absenteeism in Europe (1970–2020). Using correlation coefficients and one-way analysis of variance, some limitations, a robustness check, and national implications of the proposed approach to measuring absenteeism were performed. The end of 2019 and the beginning of 2020 were marked by the outbreak of the COVID–19 pandemic, which led almost all governments around the globe to take restrictive measures; social distancing had a pivotal role. In this study, we provide findings that the pandemic might have increased rates of health-related workplace absenteeism during this period. The implications of this study also indicate an important contribution to the theory of investigating the economic impact of employee sickness absence. The measures proposed in the article are universally applicable. They can be used not only to look for causes of sickness absenteeism but also for differences in the pattern of absenteeism by gender, age, or disease. Importantly, they can also be used to calculate the indirect costs of lost productivity. A strength of the proposed measures is that they can be employed to study regional similarities and differences in patterns of absenteeism and its costs in different countries. Indirectly, this also identifies worker presenteeism. The presented measurements may also provide an important source of information about employee health and the consequences of illness in epidemiological studies.

The structure of the article is as follows. Section 2 presents the data set across time and countries and characterises the methods of analysis. Section 3 contains the results of international comparisons of sickness absence patterns, economic implications, and robustness check analysis. In Section 4, we present results that show the development of our proposed measures of sick-related absenteeism in 25 European countries. In section 5, we conclude the article by characterising the usefulness of our proposed measures in international comparisons. In addition, we also point out the study's limitations and suggest directions for further research.

Data and methodology

Data

As the work sickness absence measure has been defined in various ways, this section presents three indicators of sick-related absences based on openly available data from European Health for All database, from World Health Organization (2022), the European Labour Force Survey for European countries and national surveys for other countries, Eurostat (2022), National Central Banks (Working Group on General Economic Statistics), the European Commission (Havik et al. 2014; European Commission 2022), Health Statistics from Organisation for Economic Co-operation and Development (OECD 2022), and national administrative sources responsible for compensating absence from work due to illness (e.g., social security, public or private insurance agencies).

To calculate the global sickness absence rate, *SAR* (1) for working populations, we used the European Labour Force Survey for European countries and Eurostat's database for national surveys for other countries (Eurostat 2021):

$$SAR = \frac{\text{absences from work due to own illness or disability}}{\text{employed aged } 20-64} \cdot 100\% . \tag{1}$$

This SAR (1) includes the seasonally adjusted number of employed people who were absent from work due to their own illness or disability and the number of employed people aged 20–64. It excludes maternity leave. The SAR index refers to the share of the population indicating "sickness and disability" as the main reason for their inactivity. This annual rate can be calculated among the majority of European countries, i.e. Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, the United Kingdom, Liechtenstein, Norway, Switzerland and Turkey, three EFTA countries (Iceland, Norway and Switzerland), one candidate country (Serbia) and the South-eastern Europe Health Network members of Montenegro and North Macedonia. The available period for this measure is 2006–2020.

The frequency rate (*FQR*) refers to the average number of compensated absent workdays (number of days covered and compensated by social insurance) per employed person lost due to sickness or injury per year:

$$FQR = \frac{\text{Average number of working days lost due to own illness}}{\text{employed aged } 20-64} \tag{2}$$

Maternity leave is not included. The Labour Force Survey (LFS) defines an employee as an individual who works for a public or private employer and who, in return, receives compensation in the form of wages, salaries, fees, gratuities, payment by results, or payment in kind. Professional military staff are included here (Eurostat 2022). The values of this measure could be extracted from the openly available European Health for All database for 53 countries (World Health Organization 2022): Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, the Netherlands, North Macedonia, Norway, Poland, Portugal, the Republic of Moldova, Romania, the Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, the United Kingdom, and Uzbekistan. These countries are also divided into the following groups: WHO European Region, Members of the EU, Members of the EU before May 2004 (EU15), Members of the EU after May 2004 (EU13), the Commonwealth of Independent States, Central Asian Republics Information Network members (CARINFONET), South-eastern Europe Health Network members (SEEHN), Nordic countries, and small countries. We conducted the preliminary analysis for the period 1970–2020.

The third indicator (*ACR*) is the absolute crude absence rate (Ropponen et al. 2021; IES 2022). It is usually calculated as the time lost due to, or ascribed to, sickness absence as a percentage of contracted working time in a defined period. To calculate the total national number of available workdays, the number of employees was multiplied by the number of rostered workdays per year for each country (3):

$$ACR = \frac{\begin{array}{c}number\ of\ workdays\\ lost\ to\ sickness\ absence\end{array}}{\begin{array}{c}number\ of\ available\ workdays\\ {*}\,employed\ aged\ 20-64\end{array}} \cdot 100 \tag{3}$$

We obtain the total number of available rostered workdays per year for each of the 28 European countries (Austria, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the United Kingdom) from National Central Banks (the Working Group on General Economic Statistics) as a monthly number of working days (Monday to Friday), excluding public holidays (European Commission 2022). The number of compensated workdays (number of days covered and compensated by social insurance) lost per employed person due to sickness or injury per year and the number of employees was extracted from European Health for All database (HFA-DB, WHO). To calculate the *ACR* (3), we provided the data on the number of employed people aged 20–64 from European LFS (Eurostat 2021).

Methods of checking robustness

The collected data were checked and analysed by SPSS v. 20 and ArcGIS v. 10.6. Descriptive analyses, e.g., the mean, coefficient of variation, annual growth rate, and data visualisation, were calculated to provide the most complete picture of European sickness absence. To find, analyse, and compare trends in the data, we applied average annual least-squares growth rate (4), (5). It is estimated by fitting a linear regression trend line to the logarithmic annual values of the variable in the relevant period. The regression equation is of the form:

$$\ln xt = a + bt, \tag{4}$$

which is equivalent to the logarithmic transformation of the compound growth equation:

$$xt = x0(1 + r)t. \tag{5}$$

In this equation, x is the variable, t is time, and $a = \ln x0$ and $b = \ln (1 + r)$ are the parameters to be estimated. If b^* is the least-squares estimate of b, the average annual growth rate, r, is obtained as –1 and is multiplied by 100 for expression as a percentage. The calculated growth rate is an average rate that is representative of the available observations over the entire period. This approximation is appropriate for large percentage time changes. This approximation is appropriate for large percentage time changes (World Bank 2022).

To consider the uncertainty and sensitivity inherent in the suggested measures of sick-related absences from work (1)–(3), we performed a robustness check using Spearman's rank correlation (6), (7) and one-way analysis of variance (8). We tested the similarity (and the association) of measurements. We also examined the explanatory power of indices by linking these sickness absence rates with the unemployment rate, labour costs, labour productivity, and mortality.

Our data are not normally distributed; thus, we applied the non-parametric Spearman correlation (6). As our data include outliers, it necessitates the use of Spearman's correlation coefficient (Gauthier 2001, pp. 359–362):

$$r_s = 1 - \frac{6 \cdot \sum_{i=1}^{n} d_i^2}{n(n^2 - 1)}. \tag{6}$$

To test the significance of correlations, we employed the *t*-distribution formula to compute the appropriate *t*-value methods in this paper (Bishara and Hittner 2012, pp. 399–417):

$$t = \frac{r_s}{\sqrt{1 - r_s^2}} \cdot \sqrt{n - 2}\,, \tag{7}$$

where: *t* – *t*-value required for the test of significance of the correlation coefficient, and *r* – the computed correlation coefficient being tested for significance. The null hypothesis is that there is no significant relationship between variables (i.e., *rs* = 0). This is a two-tailed statistical test of significance, which is used when the null hypothesis is non-directional (Kpolovie 2011).

Finally, by applying the Kruskal–Wallis (*H*) technique (8), we tested the significance of the difference between year-wise and cross-country mean sickness absence rates for the respective period and country. The *H* test is a non-parametric test, which means that it does not assume the data come from a distribution that can be completely described by two parameters, mean and standard deviation (the way a normal distribution can) (McDonald, Verrelli, and Geyer 1996, pp. 1114–1118). The formula for the Kruskal–Wallis (*H*) test is:

$$H = \frac{12}{n(n+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(n+1)\,, \tag{8}$$

where: *Ri* – the different ranks for each of the different groups, *n* – the number of observations in all samples.

The Kruskal–Wallis statistic is approximately a chi-square distribution, with *k* – 1 degrees of freedom, where *ni* should be greater than 5 (Hecke 2012, pp. 241–247). The uncertainty and sensitivity analysis helped gauge the robustness of the indicators and improve the transparency of sickness absenteeism rates (OECD 2008).

Results

Data analysis

To provide the most comparable picture of European sickness absenteeism, the cross-country perspective was limited to 25 European countries: Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), the Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), the Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), the United Kingdom (UK), and Norway (NO). Moreover, because the data set was not a complete panel due to the gaps in some variables during the analysed period, we conducted the preliminary data analysis in various time spans, i.e., 2006–2020 for *SAR*, 1970/1995–2020 for *FQR*, and 1995–2020 for *ACR*. To overcome the panel-unbalanced problem, the main comparative study and robustness check were conducted for the 2006–2020 period. Table 1 displays the summary statistics of the sickness absence, frequency, and absolute crude absence rate.

Table 1. Statistics of *SAR*, *FQR*, and *ACR* (averaged over the years)

Measure	Mean	Std. Dev.	Min	Max	Median	CV in %
Time span 1970/1995–2020						
SAR	1.8	0.9	0.07	4.1	1.8	51.4
FQR	12.1	4.8	1.7	26	11.6	40.0
ACR	4.5	1.6	0.7	9.9	4.3	35.7
Time span 2006–2020						
SAR	1.8	0.9	0.07	4.1	1.8	51.4
FQR	10.8	3.6	1.7	21.2	10.8	33.7
ACR	4.3	1.5	0.7	8.5	4.2	34.2

Note: n = 25, data for 1970–2020 are only available for AT, BE, CZ, DE, FR, GR, HU, IT, LU, NL, NO, PT, and SE. CV – coefficient of variation; Std. Dev. – Standard deviation. For *SAR*, the data were only available for 2006–2020. We used non-parametric statistics because the test of normality carried out (the Shapiro-Wilk test) rejected the null hypothesis of normality at the significance level of 0.05. The results are available from the author on request.
Source: own elaboration.

The average rate of absence due to own illness or disability (*SAR*) corresponded to 1.8% of employed people in the 2006–2020 period. The statistics show that *SAR* values vary considerably across the countries (CV = 51.4%). Norway had the highest share of employed people who were absent from work due to their own illness or disability (4.1% in 2009). Romania and Greece, on the other hand, had the lowest *SAR* in this timeframe (0.07%). Between 1970 and 2020, and between 2006 and 2020, the average number of workdays lost per employee due to sick leave and sickness presence was calculated to be 12.1 and 10.8 days, respectively. The *FQR* values vary widely across the countries (CV = 40%), from 1.7 in Greece to 26 in Sweden (and in the period 2006–2020, from 1.7 in Greece to 21.2 in the Czech Republic, respectively). The countries lost an average of 4.5% and 4.3% of their workers' total working days due to illness or disability during the 1970–2020 and 2006–2020 periods, respectively. In general, the *ACR* values revealed strong cross-country variation, from 0.7% in Greece to 9.9% in the Czech Republic between 1970 to 2020, and from 0.7% in Greece to 8.5% in the Czech Republic between 2006 and 2020 (CV = 35%).

As shown in Figure 1, sickness-related absenteeism in Europe peaked in the period 2006–2020. Germany, Latvia, Portugal, and Slovakia saw the largest *SAR* increases, by more than 100 percentage points (pp.). For example, in Germany, the *SAR* increased by 125 pp., in Latvia by 112 pp., in Portugal by 147 pp., and in Slovakia by 142 pp. A decrease in *SAR* was recorded only in nine countries (Denmark, Finland, Italy, Lithuania, the Netherlands, Romania, Sweden, and the United Kingdom). On the other hand, the highest decline was observed in Romania – more than 30 pp. The share of employed people who were absent from work due to their own illness or disability in 2006 was highest in Norway, Finland, Sweden, Slovenia, and Spain (ranging from 2.6% in Finland to 3.6 in Norway).

The Netherlands (81.7%), Sweden (80.7%) and the Czech Republic (80.0%) had the highest employment rates in the EU, with more than 8 out of 10 people aged 20 to 64 in employment in 2021. Norway (3.9%), Spain (3.7%), Slovenia (3.2%), France (3.4%), Belgium (3.4%), and Germany (3.0%) had the highest *SAR* rates in 2020. In 2006, Norway (17.2) and the Czech Republic (21.2) had the largest average number of workdays lost per employee due to sick leave and sickness presence (*FQR*). By contrast, *FQR* was the lowest in Greece (3.4) and the United Kingdom (5.5). In 2020, the *FQR* was the highest in the Czech Republic (21), Denmark (19.5), Spain (17.4), Slovakia (16.9), Norway (16.8), and Luxemburg (16.2). As shown in Figure 1, in 2020, the average number of workdays lost due to sickness per employee was the lowest in Greece (3.4) and the UK (3.6). The largest increases in *FQR* between 2006 and 2020 were recorded in Lithuania (85%) and Luxemburg (67%). By contrast, in 2020, seven countries recorded a frequency rate lower than in 2006. The largest declines compared to 2019 were reported in the UK (–35%) and Romania (–28%). In 2006, the highest absolute crude absence rate (*ACR*) was in the Czech Republic (8.7%) and Norway (6.7%), while in 2020, it was in the Czech Republic (8.4%), Germany (7.8%), and Slovakia (6.6%). Between 2006 and 2020, the highest increases in the proportion of days lost due to illness or disability were recorded in Lithuania (80 pp.), Luxemburg (64 pp.), Germany (46 pp.), and Slovakia (41 pp.). The largest declines compared to 2006 were reported in the UK (–35 pp), Romania (–27 pp.), Sweden (–25 pp.), and Italy (–22 pp.).

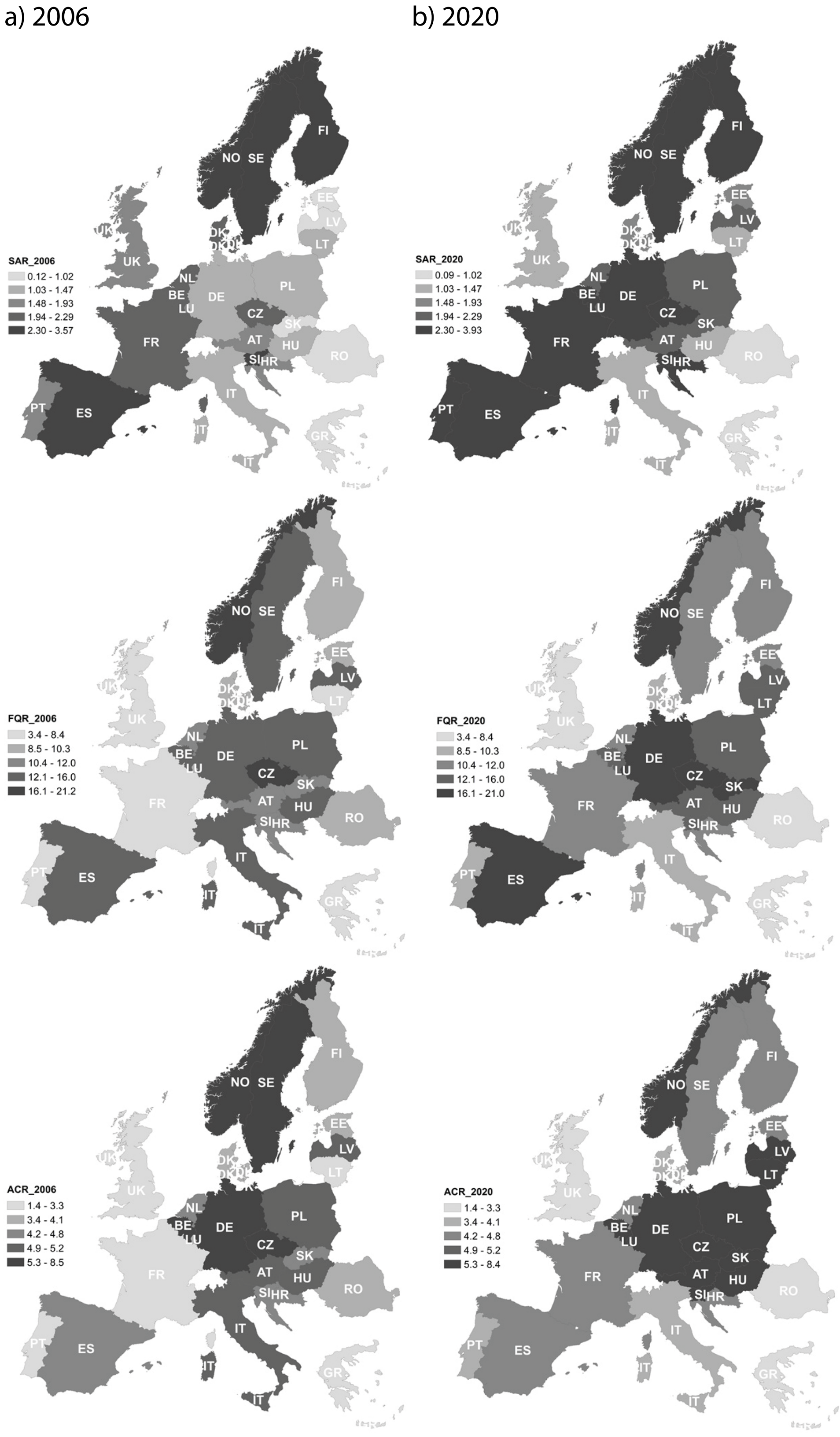

Figure 1. *SAR*, *FQR* and *ACR* for European countries in selected years

Source: own elaboration.

To examine trends in *SAR*, *FQR* and *ACR* assets, we applied an average annual least-squares growth rate (4), (5). The annual average percentage change in the mean volume of sickness absence, frequency, and absolute crude absence rates was 1.17 pp., 0.19% and 0.12 pp., respectively (Figure 2). It implies a yearly increase of 1.17 pp. of the share of employed people who were absent from work due to their own illness or disability, 0.19% of the number of workdays lost per employee due to sick leave and sickness presence, and 0.12 pp. of the proportion of days lost of workers' total working days due to illness or disability in 2020 compared to 2006. The fastest *SAR* growth rates were in Portugal (7.6 pp.), Slovakia (5.5 pp.), and Germany (5.4 pp.). However, 11 countries noted a yearly decrease in the sickness absence rate (from –3.1 pp. in Romania to –0.2 in Slovenia pp.). Similarities in time change patterns can be detected when comparing the year-on-year growth rate of *FQR* and *ACR*. Seven EU Member States registered a decrease in the share of employed people who were sick-absent from work and the proportion of lost days due to illness or disability (the UK stood out with the highest decline, of –2.98 % in *FQR* and –3.04 pp. in *ACR*). In contrast, Lithuania and Luxemburg experienced the largest increases in the yearly growth rate (+4.51 %. and 3.73 pp. in *FQR*, +4.30 % and +3.61 pp. in *ACR*, respectively).

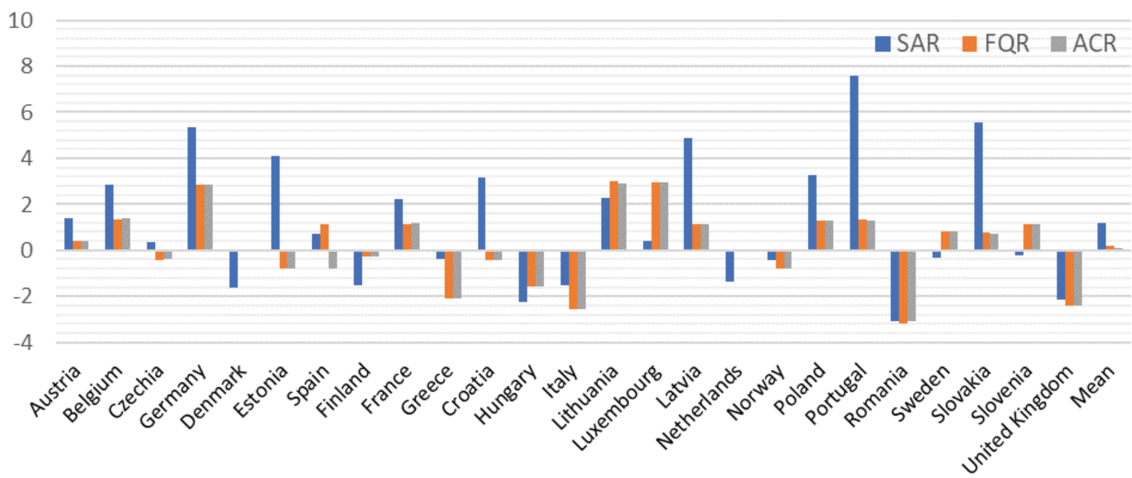

Figure 2. Annual average growth rate during the period analysed

Note: for *SAR* and *ACR* time-changes are noted in pp., and for *FQR* in %.
Source: own elaboration.

From 2019 to 2020, when the COVID–19 pandemic started, most countries registered an increase in all sickness-related absence rates. As shown in Figure 3, on average, the highest increase was observed in the sickness absence rate, *SAR* (21.1 pp.). However, the European average hides many differences among countries, with the highest increase in rates observed in Greece (over 100 pp.), Hungary (over 50 pp.), and Lithuania and Italy (over 40 pp.). Indeed, when comparing 2020 with 2019, only six countries saw a decrease. This was true for Germany, Croatia, and the UK for all measurements, Sweden and Latvia for *FQR* and *ACR*, and Slovenia for *ACR*.

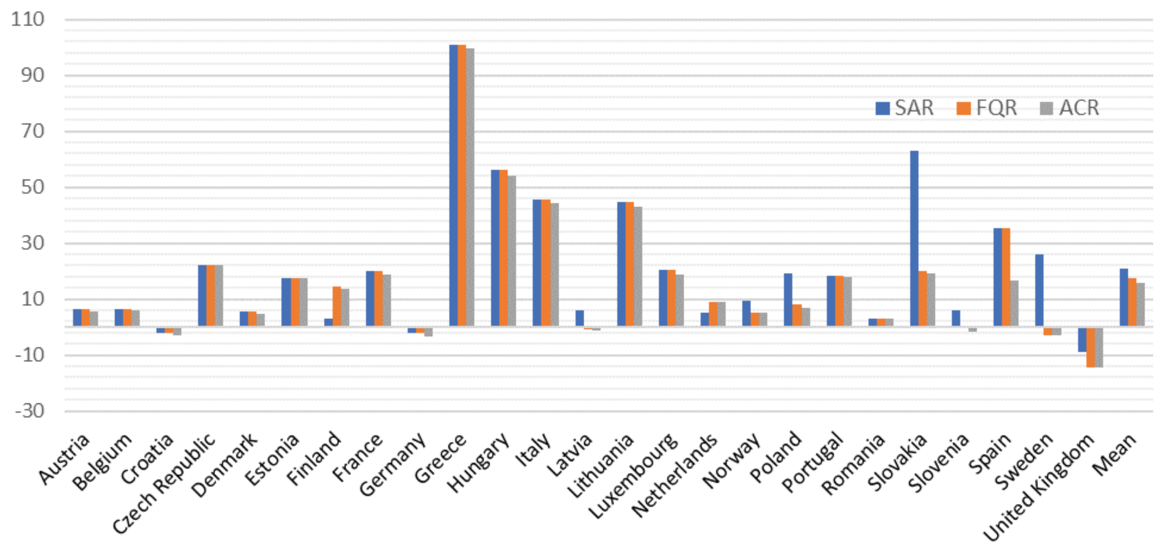

Figure 3. Changes in the absent rates (2020 versus 2019)

Note: for *SAR* and *ACR*, time changes are noted in pp., and for *FQR*, in %.
Source: own elaboration.

European economies and trends in sickness absence – implication analysis

Our data shows that the unemployment rate in most countries was negatively correlated with sickness absence measurements at the national level: the higher the unemployment, the lower the sickness absence. The strongest association was noticed for Denmark, Spain, Croatia, and Poland (from –0.60 to –0.98). Even though the correlation coefficients in some countries were somewhat modest, they were statistically significant during the 2006–2020 period. The measurements of sickness absence were also predictive of deaths for most countries. The strongest positive correlations were observed in Denmark, France, Poland, and Portugal (from 0.50 to 0.93). By contrast, in Romania, Finland, Italy, and the UK, the rise in absence rates decreased the death rate. In general, sickness absenteeism substantially dampens labour productivity (e.g. in Austria, Spain, and Romania), but for some countries, this association was the opposite (e.g., Poland, Finland, and Italy). These findings can help to value the burden of illness-related absenteeism. Finally, in many countries, higher sickness absence (regardless of the method of measurement) involves greater costs for society and for the entire economy (through the loss of working hours and production). The highest correlation values between sickness absence rates and labour costs (from 0.61 to 0.99) were particularly noted in Central and Eastern Europe, i.e., in Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia (Tab. 2).

Table 2. Spearman's rank correlations on the absenteeism-unemployment relationship calculated for each country, 2006–2020

	Spearman's rank correlations											
	UE			PD			RD			LC		
	SAR	*FQR*	*ACR*	*SAR*	*FQR*	*ACR*	*SAR*	*FQR*	*ACR*	*SAR*	*FQR*	*ACR*
AT	–0.07	–0.47*	–0.46*	–0.69**	–0.64**	–0.65**	0.74***	0.68**	0.71**	0.69**	0.71**	0.73**
BE	–0.46*	–0.52**	–0.52**	–0.12	–0.13	–0.12	0.44*	0.52*	0.51*	0.93***	0.99***	0.99***
CZ	–0.39*	–0.44*	–0.44*	0.15	0.20	0.21	0.68**	0.39*	0.40*	0.77**	0.87***	0.88***
DE	–0.98***	–0.96***	–0.95***	–0.61**	–0.60**	–0.59**	0.91***	0.93***	0.92***	0.85***	0.77**	0.71**
DK	–0.51*	–0.78***	–0.79***	–0.75***	–0.34*	–0.37*	0.82***	0.50*	0.49*	0.43*	0.67**	0.58**
EE	–0.42*	–0.63**	–0.61**	0.35	–0.29	–0.29	–0.20	0.78***	0.78***	0.90***	0.81***	0.80***
ES	–0.93***	–0.93***	–0.91***	–0.83***	–0.85***	–0.83***	0.68**	0.73**	0.20	0.79**	0.84***	0.80***
FI	–0.34	–0.55*	–0.79***	0.76***	0.59**	0.58**	0.79***	–0.12	–0.11	–0.13	0.73**	0.73**
FR	–0.13	–0.07	–0.04	–0.62**	–0.41*	–0.4*	0.91***	0.87***	0.87***	0.76**	0.82***	0.82***
GR	–0.39*	–0.54**	–0.53**	0.03	0.49*	0.48*	0.02	–0.3	–0.3	0.22	–0.13	–0.15
HR	–0.72***	–0.86***	–0.85***	0.16	–0.32	–0.31	0.59**	0.01	–0.01	0.81***	0.56*	0.54*
HU	–0.07	–0.35	–0.36*	–0.04	–0.17	–0.19	0.40*	0.48*	0.49*	0.61**	0.76**	0.78**
IT	–0.33	–0.53**	–0.54**	0.44*	0.65**	0.65**	–0.16	–0.32	–0.34	–0.35*	–0.35*	–0.35*
LT	–0.69***	–0.54**	–0.58**	0.15	0.68**	0.67**	0.49*	0.84***	0.84***	0.80***	0.83***	0.83***
LU	0.16	0.74***	0.74***	–0.17	–0.82***	–0.82***	0.14	–0.5*	–0.5*	–0.06	0.72**	0.72**
LV	–0.12	–0.48*	–0.47*	0.73***	0.21	0.21	0.44*	0.47*	0.47*	0.85***	0.88***	0.89***
NL	–0.54**	–0.77***	–0.75***	0.64**	0.08	0.08	–0.31	0.25	0.26	0.78**	0.83***	0.81***
NO	–0.49	–0.73***	–0.72***	0.14	0.50**	0.53**	0.41*	0.74**	0.75**	0.58**	0.25	0.11

	Spearman's rank correlations											
	UE			PD			RD			LC		
	SAR	*FQR*	*ACR*	*SAR*	*FQR*	*ACR*	*SAR*	*FQR*	*ACR*	*SAR*	*FQR*	*ACR*
PL	−0.60**	−0.89***	−0.89***	0.88***	0.71***	0.71***	0.88***	0.76**	0.73**	0.79**	0.85***	0.85***
PT	−0.23	−0.89***	−0.89***	−0.69***	−0.67***	−0.68***	0.85***	0.77**	0.75**	0.93***	0.94***	0.94***
RO	0.50*	0.48*	0.47*	−0.71***	−0.74***	−0.73***	−0.53*	−0.57*	−0.56*	−0.37*	−0.37*	−0.36*
SE	−0.32	−0.62**	−0.63**	0.16	−0.26	−0.25	0.36*	−0.01	−0.02	0.30	−0.24	−0.30
SK	−0.54**	0.06	0.05	−0.45**	0.05	0.04	0.65**	0.44*	0.44*	0.80***	0.73**	0.74**
SI	−0.92***	−0.31	−0.36*	0.15	−0.01	0.05	0.28	0.74**	0.70*	0.99***	0.94***	0.90***
UK	0.59**	0.55**	0.54**	−0.29	−0.2	−0.19	−0.17	−0.15	−0.16	−0.35*	−0.06	−0.06

Note: significance levels: α = 0.10*, 0.05**, 0.01***; UE – unemployment rate as a percentage of the population in the labour force, aged 15 to 74 years; PD – nominal labour productivity per person; DR – death rate, crude (per 1,000 people); LC – hourly labour cost per employee in PPP.
Source: own elaboration. Robustness check of outcomes

As Table 3 below shows, the results of the Spearman's rank correlation confirmed for most countries that the frequency rate and absolute crude absence rates were strongly related (the Spearman's values were close to 1.00 and statistically significant). It suggests that *FQR* and *ACR* are quantitatively similar indicators but could be applied to obtain diverse and country-case-specific conclucions on sick absences from work at the national level. The results also showed that the *SAR* moderated the relationship between *FQR* and *ACR* with noticeable differences between countries. For example, for Germany, to define the sickness absence rate, all the indices could be used alternatively and substantively (the Spearman's values are statistically significant and have an identical trend), but for Latvia, the results revealed differences.

Table 3. Spearman's rank correlations calculated for each pair of sick-related absence rates, 2006–2020

	Spearman's rank correlations		
	SAR vs. FQR	*SAR vs. ACR*	*FQR vs. ACR*
Austria	0.659***	0.686***	0.992***
Belgium	0.525**	0.525**	1.000***
Czech Republic	0.889***	0.889***	1.000***
Germany	0.968***	0.957***	0.996***
Denmark	0.646***	0.629**	0.984***
Estonia	0.3986	0.425	0.996***
Spain	0.988***	0.871***	0.865***
Finland	0.570**	0.571**	0.990***
France	0.734***	0.737***	0.990***
Greece	0.645***	0.629**	0.996***
Croatia	0.5036	0.496	0.986***
Hungary	0.817***	0.818***	0.996***
Italy	0.850***	0.846***	0.996***
Lithuania	0.693***	0.704***	0.996***
Luxembourg	0.3148	0.311	0.998***
Latvia	0.532**	0.500	0.993***
Netherlands	0.658***	0.565**	0.908***
Norway	0.744***	0.731***	0.999***
Poland	0.700***	0.711***	0.996***
Portugal	0.4781	0.484	0.998***
Romania	0.928***	0.944***	0.992***

	Spearman's rank correlations		
	SAR vs. FQR	*SAR vs. ACR*	*FQR vs. ACR*
Sweden	0.770***	0.761***	0.999***
Slovakia	0.2970	0.289	0.998***
Slovenia	0.2144	0.189	0.963***
United Kingdom	0.981***	0.981***	0.995***

Source: own elaboration.

The results of the Kruskal–Wallis test confirmed significant differences in sick-related absences indices among countries during the period analysed (Tab. 4). The mean ranks of the Kruskal–Wallis and Dunn's multiple comparisons show that Norway was the biggest discriminator of differences among sick-leave absence measurements, followed by Greece and the Czech Republic, whereas Slovakia and Slovenia were the weakest discriminators.

Table 4. Results of the Kruskal–Wallis test on the difference of sick-related absence index among countries

	Kruskal–Wallis on countries differences		
Measure	*SAR*	*FQR*	*ACR*
Chi-square	323.5***	312.9***	316.2***

Note: the results of mean ranks of the Kruskal–Wallis test and pairwise comparison of Dunn's post hoc tests are available upon request.
Source: own elaboration.

Discussion

As there is no single data source to be used for international comparisons, data availability differs across countries, and some types of information may be more difficult to obtain than others. The vast majority of European countries have statutory paid sick-leave systems, although there are differences in the legitimation of work incapacity, level of sick pay, and criteria for transferring people to invalidity insurance. The validity of diagnoses recorded in medical certificates is a kind of data; however, validity and reliability vary between registers and certificates. These complexities are often overlooked. Therefore, we have limited our study to 25 European countries and the available comparative time span. In spite of the quite close link among the suggested measurements, they vary across countries and therefore provide a substantially different and broader picture of a health problem in Europe. The *SAR* index, calculated by the Eurostat, is a basic measure of health status for working populations with the whole population of those who are sickness insured.

SAR is based on records from health insurance or company registers. While they provide the main source of information for each country, they are affected by different national practices in the recording of such absences. Moreover, *SAR* may be relatively stable over time, even though the number of absent staff may be increasing and the duration of absences falling, and vice versa. However, a robust set of indicators has been developed at the European level to track progress in compensated sickness absence (Eurostat 2021). Therefore, The results are comparable between countries since EU LSF is based on the same target populations and uses the same definitions in all countries (Weik 2000).

If data are unavailable for a country, the corresponding aggregates are calculated with estimates (Current Population Survey 2021). There is a limitation in our approach when it comes to measuring absenteeism using the *SAR* indicator. Sickness absence is recorded for administrative and economic reasons, and as such, the data are often valid, at least in terms of numbers. However, the validity of diagnoses recorded in medical certificates is a different type of data, and the validity and reliability can vary between registers and certificates. Even within the same country, sickness absence can be defined differently by different organisations. In some places, a month's sickness absence is recorded as four calendar weeks (28 days), while in others, it is four working weeks (20 days) (Whitaker 2001, pp. 420–410). Moreover, the insurance schemes vary widely between countries, both in terms of measurable entities (such as the compensation level) and unmeasurable traits concerning the actual implementation of the programs (Palme and Persson 2020, pp. 85–108).

Additionally, sickness absence can be self-reported. As such, it shares pros and cons with other self-reported information, particularly regarding recall bias (OECD 2007). The other two indices suggested in this study could be a good alternative to *SAR*. Thus, the *FQR* and *ACR* indicators answer a basic question about the proportion of lost working time. These measurements can be used for costing purposes. The difference between the absence rate (*SAR*), the absence frequency rate (*FQR*), and the absence crude rates (*ACR*) is that the absence rate indicates severity, while the absence frequency and crude rate are about the absence pattern (Scheil-Adlung, Sandner 2010). In our data, we also found a very close relationship between *FQR* and *ACR*. Both are relevant measures and can be used to assess the burden of illness in a region or society (Hensing 2010). The frequency rate shows the average number of absence days per insured person, whereas the annual crude rate refers to the number of workdays lost to sickness absence per year divided by the total number of available workdays multiplied by the number of rostered workdays per year. Confirming Johns and Al Hajj's (2016, pp. 456–479) statement, we also concluded that the idea that time lost and frequency reflect different degrees of voluntariness is an unsupported urban research legend.

Moreover, the outcomes of the implication analysis showed that *FQR* and *ACR* are highly (more than *SAR*) and statistically significantly negatively correlated with the unemployment rate (especially for Denmark, Spain, Croatia, Poland, and the Netherlands). The literature on the subject stresses that unemployment has been found to have a negative impact on workers' decisions to take sick leave (Blomgren, Laaksonen, and Perhoniemi 2021; Reuter, Dragano, and Wahrendorf 2021, pp. 574–580). Therefore, these measurements may report employee burnout and lost productivity (Knies et al. 2013). This is in line with recent results from Poland, where it is possible to confirm the impact of cyclical unemployment on absenteeism behaviour and determine several premises that may indirectly prove the impact of seasonal unemployment (Kusideł and Striker 2016, pp. 6–10; Jurek, 2021 pp. 197–219).

It is appropriate to analyse the situation in which employees are more likely to choose presenteeism over sickness absence, which is associated with high regional unemployment and, consequently, a much-reduced prospect of finding another job (Caverley, Cunningham, and MacGregor 2007; Janssens et al. 2013, pp. 132–141; Nowak et al. 2022). What is more, for some countries, the indices were positively correlated with the unemployment rate, but simultaneously, they decreased labour productivity. These results support the novel way of assessing and controlling presenteeism in Romania, Luxemburg and the UK (Cicei, Mohorea, and Teodoru 2013, pp. 325–329; Collins, Cartwright, and Cowlishaw 2018, pp. 68–83). Furthermore, the outcomes of the analysis revealed that for most countries, the sickness absence measurements were strong predictors of death (Ropponen et al. 2021). However, the associations between sickness absences and mortality were stronger for the *SAR* measure, and in some cases, they became non-significant after adjusting for *FQR* and *ACR* sickness absence rates.

These findings correspond with Finnish, Swedish and Danish conclusions, which suggest that measures of sickness absence, such as long-term absence and sick days (*FQR* or *ACR*), are strong predictors of the cause of mortality, but only due to cardiovascular disease, cancer, alcohol-related causes, and suicide (Qin et al. 2000, pp. 546–550; Vahtera, Pentti, and Kivimäki 2004, pp. 321–326; Billingsley 2020). Finally, the results indicated that sickness absenteeism directly affects labour costs (Csillag 2019, pp. 195–225; Garbiec 2019, pp. 7–14). It was particularly noticed in post-communist countries, where in the early 2000s, policymakers decided to change the sickness insurance system and decrease benefits to zero for the first three days of absence (Barmby, Ercolani, and Treble 2002, pp. 315–331; De Paola, Scoppa, and Pupo 2014, pp. 337–360). The opposite correlations were detected for Sweden, Norway, and the UK, as confirmed in the literature on the subject. For example, the higher level of absenteeism in Norway compared to Britain relates to the threshold for statutory sick pay in the Norwegian public sick pay legislation. Moreover, in those countries, private sick pay, as well as other benefits provided by employers, are chosen by employers in a way that maximises profits, having accounted for different dimensions of labour costs (Bryson and Dale-Olsen 2019, pp. 227–252).

The main limitation of *FQR* and *ACR* is that the time lost may consist of a small number of people absent for long periods or a large number absent for short periods, while "length of sickness- work lost" is a measurement relevant for use in studies of return to work (Hensing 2010). However, there are several advantages of these measurements of sick-related absences from work. They appear to be the most appropriate for measuring absenteeism from a macro perspective. They are calculated from free open data sources, and no additional rules, definitions, or modifications to existing data are needed to calculate these indices.

We conclude that the use of the surveyed measures could also identify and describe the changes made to the health workforce and medical system of each country as a result of the COVID–19 pandemic. This is consistent with the International Labour Organisation's (ILO) view that the COVID–19 crisis revealed important gaps in social protection entitlements in the event of illness (Ose et al. 2022).

Conclusions

The results of this analysis revealed that, despite the obvious quantitative nature of sickness absence, measured as an occurrence or as a period, assessing sickness absence is a challenge with little standardisation at the national level. Comparing sick-leave rates is a complex task that requires a clear understanding of the interplay between statutory, corporate and private forms of income protection during sickness absence. Because of the multiplicity of approaches to defining sickness absence, it is necessary to provide unambiguous definitions. This article presents three indicators of sick-related absences based on openly available data: the global sickness absence rate, the frequency rate, and the absolute crude absence rate.

Different measures are, of course, needed for different types of studies and different aims. However, the indices presented in this article may constitute new health management paradigms in European countries, and they can be used to show whether patterns of absence are stable or not. Such a comparison has not been done before, but it should be relevant when considering that absenteeism among employees represents a significant financial burden. In recent decades, monitoring sickness absence has become a priority in many management programs, and absenteeism data are increasingly used as an integrated measure of health status in the employee population. Crucially, the findings also help to value the burden of illness-related absenteeism.

They are also relevant in sickness absence research and health-related studies, and as such, they constitute the basis for epidemiological monitoring and studies of occurrence and causes of absenteeism. For instance, *SAR* is considered a global measure of health status, a marker of psychosocial and physical functioning for working populations. It is possible to develop and adapt that index to the micro-level, i.e., the individual enterprise. Therefore, it would be worthwhile for future research to focus on assessing the adequacy of using individual measures from a micro perspective. From the perspective of the objective pursued in this study, it would be worth extending the study to a less policy-homogeneous group of countries. Modelling carried out in this way would reveal a more accurate nature of sickness absence. Future research should also analyse the relationship between presenteeism and sickness absence. More generally, this is when individuals substitute sickness absence for presenteeism when absence is an unavailable choice, such as when there is job insecurity or financial insecurity, which is more pronounced when regional unemployment is high.

Regarding the study's limitations, the availability and quality of the data collected were major concerns. However, the results show that the aforementioned indices present a unique and valid approximation to evaluate and monitor the state of sick absence and inequality in European countries and to better set national policy priorities.

References

Barmby, T.A., Ercolani, M.G., Treble, J.G. (2002), *Sickness Absence: An International Comparison*, "The Economic Journal", 112 (480), pp. F315–F331, https://doi.org/10.1111/1468-0297.00046

Bevan, S., Hayday, S. (2001), *Costing Sickness Absence in the UK*, https://www.employment-studies.co.uk/system/files/resources/files/382.pdf (accessed: 19.09.2022).

Billingsley, S. (2020), *Sick leave absence and the relationship between intra-generational social mobility and mortality: health selection in Sweden*, "BMC Public Health", 20, 8, https://doi.org/10.1186/s12889-019-8103-4

Bishara, A.J., Hittner, J.B. (2012), *Testing the significance of a correlation with nonnormal data: comparison of Pearson, Spearman, transformation, and resampling approaches*, "Psychological Methods", 17 (3), pp. 399–417, https://doi.org/10.1037/a0028087

Blomgren, J., Laaksonen, M., Perhoniemi, R. (2021), *Changes in Unemployment Affect Sickness Absence and Disability Retirement Rates: A Municipality-Level Panel Study*, "International Journal Environmental Research Public Health", 18 (12), 6359, https://doi.org/10.3390/ijerph18126359

Bryson, A., Dale-Olsen, H. (2019), *The Role of Employer-provided Sick Pay in Britain and Norway*, "Health and Labour Markets", 47, pp. 227–252, https://doi.org/10.1108/S0147-912120190000047008

Caverley, N., Cunningham, J.B., MacGregor, J.N. (2007), *Sickness Presenteeism, Sickness Absenteeism, and Health Following Restructuring in a Public Service Organization*, "Journal of Management Studies", 44 (2), pp. 304–319, https://doi.org/10.1111/j.1467-6486.2007.00690.x

Chimed-Ochir, O., Nagata, T., Nagata, M., Kajiki, S., Mori, K., Fujino, Y. (2019), *Potential Work Time Lost Due Sickness Absence and Presence Among Japanese Workers*, "Journal of Occupational and Environmental Medicine", 61 (8), pp. 682–688, https://doi.org/10.1097/JOM.0000000000001646

Cicei, C.C., Mohorea, L., Teodoru, A.A. (2013), *Investigating Two Predictors of Sickness Presenteeism on a Romanian Sample. The Case of Performance-Based Self-Esteem and Overcommitment*, "Procedia – Social and Behavioral Sciences", 78, pp. 325–329, https://doi.org/10.1016/j.sbspro.2013.04.304

Collins, A.M., Cartwright, S., Cowlishaw, S. (2018), *Sickness presenteeism and sickness absence over time: A UK employee perspective*, "Work & Stress", 32 (1), https://doi.org/10.1080/02678373.2017.1356396

Csillag, M. (2019), *The Incentive Effects of Sickness Absence Compensation – Analysis of a Natural Experiment in Eastern Europe*, "Health and Labor Markets", 47, pp. 195–225, https://doi.org/10.1108/S0147-912120190000047007

Current Population Survey (2021), *Labor Force Statistics from the Current Population Survey*, https://www.bls.gov/cps/absences.htm (accessed: 12.09.2022).

De Paola, M., Scoppa, V., Pupo, V. (2014), *Absenteeism in the Italian Public Sector: The Effects of Changes in Sick Leave Policy*, "Journal of Labor Economics", 32 (2), pp. 337–360, https://doi.org/10.1086/674986

European Commission (2022), *Euro area and EU working days to build Calendar Adjustment Regressor*, https://ec.europa.eu/eurostat/cros/content/euro-area-and-eu-working-days-build-calendar-adjustment-regressor_en (accessed: 19.09.2022).

Eurostat (2021), *Absences from work – quarterly statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Absences_from_work_-_quarterly_statistics (accessed: 19.09.2022).

Eurostat (2022), *EU labour force survey*, https://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey (accessed: 19.09.2022).

Fischer, J.E., Genser, B., Nauroth, P., Litaker, D., Mauss, D. (2020), *Estimating the potential reduction in future sickness absence from optimizing group-level psychosocial work characteristics: a prospective, multicenter cohort study in German industrial settings*, "Journal of Occupational Medicine and Toxicology", 15, 33, https://doi.org/10.1186/s12995-020-00284-x

Garbiec, R. (2019), *The Impact of Social Security Reform on the Financial Effectiveness of the Polish Social Security Administration*, "Public Policy and Administration Review", 7 (1), pp. 7–14, https://doi.org/10.15640/ppar.v7n1a2

Gauthier, T.D. (2001), *Detecting Trends Using Spearman's Rank Correlation Coefficient*, "Environmental Forensics", 2 (4), pp. 359–362, https://doi.org/10.1006/enfo.2001.0061

Gimeno, D., Bültmann, U., Benavides, F.G., Alexanderson, K., Abma, F.I., Ubalde-López, M., Roelen, C.A., Kjeldgård, L., Delclos, G.L. (2014), *Cross-national comparisons of sickness* *absence systems and statistics: towards common indicators*, "European Journal of Public Health", 24 (4), pp. 663–666, https://doi.org/10.1093/eurpub/cku070

Havik, K., Mc Morrow, K., Orlandi, F., Planas, C., Raciborski, R., Röger, W., Rossi, A., Thum-Thysen, A.V.V. (2014), *The Production Function Methodology for Calculating Potential Growth Rates and Output Gaps, Brussels*, "European Economy. Economic Papers", 535.

Hecke, T.V. (2012), *Power study of anova versus Kruskal-Wallis test*, "Journal of Statistics and Management Systems", 15, https://doi.org/10.1080/09720510.2012.10701623

Hensing, G. (2010), *The measurements of sickness absence – a theoretical perspective*, "Norsk Epidemiologi", 19 (2), https://doi.org/10.5324/nje.v19i2.584

Hill, J.J., Slade, M.D., Cantley, L., Vegso, S., Fiellin, M., Cullen, M.R. (2008), *The Relationships Between Lost Work Time and Duration of Absence Spells: Proposal for a Payroll Driven Measure of Absenteeism* , "Journal of Ocbetween Lost Work Time and Duration of Absence Spells: Proposal Cupational and Environmental Medicine", 50 (7), pp. 840–851, https://doi.org/10.1097/JOM.0b013e31816b44dd

IES (2022), *Report Summary. Measuring and Monitoring Absence from Work*, https://www.employment-studies.co.uk/report-summaries/report-summary-measuring-and-monitoring-absence-work (accessed: 19.09.2022).

Janssens, H., Clays, E., De Clercq, B., De Bacquer, D., Braeckman, L. (2013), *The Relation between Presenteeism and Different Types of Future Sickness Absence*, "Journal of Occupational Health", 55 (3), pp. 132–141, https://doi.org/10.1539/joh.12-0164-OA

Johns, G., Al Hajj, R. (2016), *Frequency versus time lost measures of absenteeism: Is the voluntariness distinction an urban legend?*, "Journal of Organizational Behavior", 37 (3), pp. 456–479, https://doi.org/10.1002/job.2055

Jurek, U. (2021), *The situation on the labor market and sickness absence: a cyclical and seasonal approach*, "Studia Prawno-Ekonomiczne", 120, pp. 197–219, https://doi.org/10.26485/SPE/2021/120/11

Knies, S., Boonen, A., Candel, M., Evers, S., Severens, J. (2013), *Compensation Mechanisms for Lost Productivity: A Comparison between Four European Countries*, "Value in Health", 16 (5), pp. 740–744, https://doi.org/10.1016/j.jval.2013.03.1624

Kpolovie, P. (2016), *Statistical Techniques for Advanced Research*, New Owerri, Springfield Publishers Ltd.

Kusideł, E., Striker, M. (2016), *Sickness absence and unemployment in the labour market in Poland*, "Polityka Społeczna", 509 (8), pp. 6–10.

Lar, L.A., Ogbeyi, O., Wudiri, Z. (2019), *Absenteeism among staff of a state specialist hospital in Nigeria. International Research*, "Journal of Medicine and Medical Sciences", 7 (3), pp. 68–74, https://doi.org/10.30918/IRJMMS.73.19.038

Lusinyan, L., Bonato, L. (2007), *Work Absence in Europe*, "IMF Staff Papers", 54 (3), pp. 475–538, https://doi.org/10.1057/palgrave.imfsp.9450016

McDonald, J.H., Verrelli, B.C., Geyer, L.B. (1996), *Lack of geographic variation in anonymous nuclear polymorphisms in the American oyster, Crassostrea virginica*, "Molecular Biology and Evolution", 13 (8), pp. 1114–1118, https://doi.org/10.1093/oxfordjournals.molbev.a025673

Mekonnen, T.H., Lamessa, S.K., Wami, S.D. (2019), *Sickness-related absenteeism and risk factors associated among flower farm industry workers in Bishoftu town, Southeast Ethiopia, 2018: a cross-sectional study*, "BMC Research Notes", 12 (1), 181, https://doi.org/10.1186/s13104-019-4223-2

Nowak, J., Emmermacher, A., Wendsche, J., Döbler, A.S., Wegge, J. (2022), *Presenteeism and absenteeism in the manufacturing sector: A multilevel approach identifying underlying factors and relations to health*, "Current Psychology", 42, pp. 18641–18659, https://doi.org/10.1007/s12144-022-03013-1

OECD (2007), *Society at a Glance 2006: OECD Social Indicators*, OECD Publishing, Paris.

OECD (2008), *Handbook on Constructing Composite Indicators: Methodology and User Guide*, OECD Publishing, Paris.

OECD (2022), *Compensated Absence from Work Due to Illness. OECD Health Statistics 2022 Definitions, Sources and Methods*, OECD Publishing, Paris.

Ose, S.O., Kaspersen, S.L., Leinonen, T., Verstappen, S., Rijk, A. de, Spasova, S., Hultqvist, S., Nørup, I., Pálsson, J.R., Blume, A., Paternoga, M., Kalseth, J. (2022), *Follow-up regimes for sick-listed employees: A comparison of nine north-western European countries*, "Health Policy", 126 (7), pp. 619–631, https://doi.org/10.1016/j.healthpol.2022.05.002

Palme, M., Persson, M. (2020), *Sick Pay Insurance and Sickness Absence: Some European Cross-Country Observations and a Review of Previous Research*, "Journal of Economic Surveys", 34 (1), pp. 85–108, http://doi.org/10.1111/joes.12351

Prasad, D.K., Puttaswamy, M. (2017), *Community Based, Cross Sectional Study on Sickness Absenteeism among Agriculture Workers in Ramanagara District*, *Karnataka*, "Scholars Journal of Applied Medical Sciences (SJAMS)", 5 (3C), pp. 912–919

Qin, P., Agerbo, E., Westergård-Nielsen, N., Eriksson, T., Mortensen, P.B. (2000), *Gender differences in risk factors for suicide in Denmark*, "The British Journal of Psychiatry", 177 (6), pp. 546–550, https://doi.org/10.1192/bjp.177.6.546

Reuter, M., Dragano, N., Wahrendorf, M. (2020), *Working while sick in context of regional unemployment: a Europe-wide cross-sectional study*, "Journal of Epidemiology and Community Health", 75 (6), http://doi.org/10.1136/jech-2020-214888

Ropponen, A., Wang, M., Narusyte, J., Kärkkäinen, S., Blom, V., Svedberg, P. (2021), *The role of sickness absence diagnosis for the risk of future inpatient- or specialized outpatient care in a Swedish population-based twin sample*, "BMC Public Health", 21 (1), 957, https://doi.org/10.1186/s12889-021-10942-2

Scheil-Adlung, X., Sandner, L. (2010), *The Case for Paid Sick Leave: World Health Report*, "Background Paper", No. 9, World Health Organization, 30, https://www.who.int/publications/m/item/the-case-for-paid-sick-leave (accessed: 12.09.2022).

Scoppa, V., Vuri, D. (2014), *Absenteeism, unemployment and employment protection legislation: evidence from Italy*, "IZA Journal of Labor Economics", 3, https://doi.org/10.1186/2193-8997-3-3

Sumanen, H., Pietiläinen, O., Lahelma, E., Rahkonen, O. (2017), *Short sickness absence and subsequent sickness absence due to mental disorders – a follow-up study among municipal employees*, "BMC Public Health", 17 (1), 15, https://doi.org/10.1186/s12889-016-3951-7

The Ministry of Familiy, Labour and Social Policy (1998), Act Of 13 October 1998 On The Social Insurance System, https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=52428 (accessed: 25.09.2023)

Vahtera, J., Pentti, J., Kivimäki, M. (2004), *Sickness absence as a predictor of mortality among male and female employees*, "Journal of Epidemiology and Community Health", 58, https://doi.org/10.1136/jech.2003.011817

Weik, M.H. (2000), *Time Stamp. In: Computer Science and Communications Dictionary*, Springer, Boston, https://doi.org/10.1007/1-4020-0613-6_19677

Whitaker, S.C. (2001), *The management of sickness absence*, "Occupational and Environmental Medicine", 58 (6), https://doi.org/10.1136/oem.58.6.420

World Bank (2022), *How are aggregate growth rates computed for National Accounts series?*, https://datahelpdesk.worldbank.org/knowledgebase/articles/114952-how-are-aggregate-growth-rates-computed-for-nation (accessed: 12.09.2022).

World Health Organization (2022), *European Health for All database (HFA-DB)*, https://gateway.euro.who.int/en/datasets/european-health-for-all-database/ (accessed: 19.09.2022).

Pomiar i ocena absencji chorobowej pracujących: badanie przekrojowe w krajach Europy

W artykule dokonano obszernej analizy absencji chorobowej pracowników w krajach Europy. W tym celu skonstruowano i przetestowano trzy miary absenteizmu: globalny wskaźnik absencji, wskaźnik częstości absencji i surowy absolutny wskaźnik absencji. Do obliczenia wskaźników wykorzystano dane pochodzące z baz mających otwarty dostęp, m.in. Eurostatu, OECD, WHO. W artykule uwzględniono długookresową trajektorię (1970–2020) oraz wpływ zróżnicowania regionalnego na absencję chorobową pracujących. Wykorzystując współczynniki korelacji i analizę wariancji, przetestowano odporność miar oraz przedstawiono ograniczenia proponowanego podejścia. Wyniki dowodzą, że proponowane wskaźniki stanowią unikalne narzędzie służące ocenie i monitorowaniu stanu absencji chorobowej w krajach europejskich. Co więcej, miary dają pewną elastyczność i możliwość ich stosowania w kontekście porównywalności i dostępności danych statycznych. Wybór indeksu powinien być jednak determinowany celem badań nad absencją chorobową, ze względu na zróżnicowany potencjał interpretacyjny i aplikacyjny mierników.

Słowa kluczowe: absencja chorobowa pracowników, absenteizm, globalne miary absencji, międzynawowe porównania, zróżnicowanie regionalne, kraje Europy