Abstract. While considering a two-level approach, in the article we discuss systemic issues related to occupational safety and health (OSH) data. On the individual level, we focus on OSH incidents that indicate the status of occupational health. On the company level, we examine OSH management data that reveal the monitoring system. Our analysis shows that the Slovenian OSH data collection system depends on employers’ reporting rather than on professionals monitoring workers’ health. The OSH system is oriented to legal compliance more than the regular monitoring of OSH activities. The introduction of systemic measures that integrate the various OSH stakeholders and reintegrate occupational medicine into the health system is recommended.

Keywords: occupational medicine, occupational health, occupational safety, occupational diseases, occupational injuries, Slovenia

Introduction

Workers’ health is a major and growing public health issue, particularly in view of the negative impact of work on workers’ health and the ageing of the working population. The issue of occupational safety and health (OSH) is gaining the growing interest of policymakers and researchers in European countries. One principle of the European Pillar of Social Rights (European Commission, 2017) is to ensure that the place where people work is safe, fit for purpose, and maintains workers’ health. The European policy framework has positively impacted the assessment and management of risk factors in the workplace and promoted the spread of common standards across Europe. Over the years, the EU has struggled to overcome the harmonisation deficits in statistical standards. Data on occupational accidents are collected through national occupational accident reporting systems, while data on occupational diseases are limited due to problems with the

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DOI: 10.51936/tip.60.1.136
availability and comparability of data on recognised occupational diseases. In the recent Strategic Framework for Health and Safety at Work (European Commission, 2021), the Commission identified prevention as the main OSH priority. Effective prevention is seen as a tool for reducing occupational accidents and diseases. The prevention of work-related musculoskeletal disorders remains a major concern on the EU level.

A crucial and fundamental part of any prevention strategy is a clear understanding of the number of accidents and diseases, their severity, causes, and the workplaces and industries in which they occur. This means that a well-functioning and effective system for reporting accidents and diseases is a precondition for appropriate OSH measures on the national level. Sound information is especially needed for emerging occupational diseases and other occupational health hazards where rapid awareness, investigation and response can save lives.

The article examines the issue of measuring data in the field of occupational safety and health in Slovenia. We suggest that the quality of data depends mainly on the approach to the data measurement and monitoring of OSH. The measurement and monitoring of data can serve different purposes, either for reporting to external bodies like the health insurance fund or the labour inspectorate, or for the employer’s own use in planning preventive measures. Two main approaches to data measurement and monitoring can be identified in the literature on OHS. The outcome-based approach usually relies on outcome data or lagging performance indicators such as the frequency of occupational accidents and diseases, absenteeism due to accidents or illnesses, number of near misses etc. These measures provide feedback on deficiencies and safety incidents that have occurred. These indicators are often confronted with leading indicators, and numerous articles have addressed the selection and functions of various types of indicators (Mearns et al., 2003; Sinelnikov et al., 2015). The process-based approach relies on leading indicators that, on the other hand, provide information on OSH inputs or activities and allow companies to identify risks before an OSH incident occurs (Sinelnikov et al., 2015). Examples of such indicators are the number of workplaces where a risk assessment has been carried out or updated, the percentage of employees trained in OSH in each period etc.

The aim of this article is to address the aforementioned problem of measuring OSH data by considering a two-level approach to data analysis: (1) the individual level, which focuses on OSH incidents and indicates the current status; and (2) the company level, which indicates the current status of OSH management and monitoring system. We critically examine the concept of OSH data and propose a framework that encompasses both individual and enterprise levels that can contribute to a better understanding of OSH data quality. The article is structured as follows. First, the OSH system in Slovenia
is presented. Second, the methodological framework used for the study is described. The third section of the article provides a detailed overview of the current state of OSH data measurement in Slovenia, while the fourth section presents a conclusion.

Methodological approach

Our methodology consists of the two steps summarised below: (1) Individual level: a selected dataset describing the health status of workers in Slovenia was used; the process of collecting data on the health status of workers was analysed; and (2) Company level: a selected dataset was identified and employed to describe OSH management; the OSH surveillance system was analysed. Following Ule (2013), several types of data are used here to understand health issues. Objective data is the conventional category for safety indicators used in industrial practice. In addition, we include the subjective assessment of health, which is based on the individual’s own experience and may therefore reveal a different health situation than objective indicators given that these two groups of indicators do not necessarily coincide (Ule and Kurdija, 2013).

Individual level

In order to analyse the health status of workers in Slovenia, a systematic review of the data was conducted. Three types of approaches were used: (1) searches were conducted in electronic databases (ILO, NIJZ, ZPIZ, SURS) using the following keywords: “health” and “workplace” or “work”. To be included in the analysis, the data had to meet several criteria: Availability and potential for intervention; (2) a search was conducted for articles in electronic databases (SAGE Journals, EBSCOhost, ScienceDirect, Scopus) using the following keywords: “health” and “workplace” and “Slovenia”. The inclusion criterion for the analysis was research (original or secondary) on occupational health in English or Slovenian; and (3) data on different aspects of work in EU countries were sought (EU-OSHA, Eurofound). We analysed data from the sixth EWCS (Eurofound, 2017), which encompassed almost 44,000 workers (both employed and self-employed) in 35 European countries, where workers reported on their health situation.

Company level

A systematic review of data was conducted to analyse OSH management issues in workplaces in Slovenia. A search was performed for data on various aspects of the working environment in EU countries (EU-OSHA, Eurofound)
and in Slovenia (IRSD). We analysed data from the sixth EWCS (Eurofound, 2017) and data from EU-OSHA on risks in the working environment, covering a total of 45,420 establishments from 33 countries (EU-OSHA, 2019).

Legislative framework in Slovenia

Safety at work became a constitutional right in 1974 following amendments to the Constitution of SRS (Socialist Republic of Slovenia) and was regulated by the Safety at Work Act (ZVD, 1974). After the decline of factory clinics during the 1990s, adoption of the Occupational Safety and Health Act in 1999 (ZVZD, 1999) defined occupational health very precisely and introduced the safety declaration and risk assessment document. Employers were given the duty to ensure the health and safety of their workers at work. After several years of debate, a new law on health and safety at work was passed in 2011. The aim of the new law was to respond to employers’ lapses in safety, introduce new implementation measures, and address the promotion of health at work. Employers are required to ensure the health and safety of workers (ZVZD-1, 2011) and to provide safety and health at work free from occupational accidents, occupational diseases and work-related illnesses (ReNPVZD18-27, 2018). According to the Law on Safety and Health at Work (ZVZD-1, 2011), employers are responsible for the safety and health of their workers at work. The basic principles in implementing measures to ensure workers’ safety and health are the prevention, elimination and management of occupational risks, the provision of information and training to workers, and ensuring the necessary organisation and resources.

Unfortunately, the new law has not brought about any systemic changes. The system is still characterised by the expansion of external service activities and considerable marketability of transactions between employers and service providers. As regards OSH responsibilities like information, advice and risk assessment, employers in Slovenia largely rely on external service providers. Such providers provide OSH services to 90% of Slovenian companies, compared to other parts of Europe such as France (38%) and Switzerland (37%) (EU-OSHA, 2019). However, this does not absolve them of their responsibilities in this area. Employers use external services when in-house expertise is deemed insufficient for these tasks.

Health status of workers in Slovenia and data monitoring

Absences from work in Slovenia

Data on sickness absence due to illness, injury and other causes are collected by the National Institute of Public Health and based on medical
certificates issued by healthcare providers. In Slovenia, the share of sick leave days per employed person fell in the period between 2000 and 2014, reaching its lowest level of 3.75% in 2014 (NIJZ, 2020). The decline in sick leave can be attributed to the slow economic recovery, labour market instability and high unemployment reaching 12% in 2012 (SURS, 2015). In 2015, Slovenia was among the countries with the lowest sickness rate. At the same time, Slovenia was one of the countries reporting the highest rates of presenteeism, i.e., people reported working while sick at a higher rate (Eurofound, 2017). Since 2014, there has been a significant rise in sick leave days, as shown in Graph 1. Overall, the increase from 2014 to 2020 was 31% to reach 4.91% (NIJZ, 2020). The percentage of sick days increased with age and was the lowest among young workers (2.70%) and highest in the 55–64 age cohort (8.12%). This increase was much more pronounced for women (29%) than for men (13%).

Graph 1: TOTAL SICK LEAVE IN SLOVENIA BY GENDER AND YEAR

Source of data: NIJZ (2022).

In Slovenia, in 2020 musculoskeletal disorders (MSDs) were the main reason for temporary absences from work (out of 23) for both women (31.1%; 32.1%) and men (25.9%; 20.7%) respectively in the 45–64 age cohort and the 65+ age cohort (NIJZ, 2020). Research on musculoskeletal disorders (MSDs) also shows that the most problematic MSD health symptom is lower back discomfort (Zerbo Šporin et al., 2021). The prevalence of this symptom is higher in some economic sectors like agriculture, forestry and fishing with a long average duration of illness, and in certain types of work such as...
long-term computer use. Prolonged sitting is one of the most obvious ergonomic risks. The presence of this risk factor was reported most frequently in Slovenia (74%) and least frequently in Ireland (41%) (EU-OSHA, 2019).

The data on sick days do not reveal what proportion of sickness absence is due to work or the work environment, apart from workplace injuries. Workplace injuries are most common among young men in the 20–44 age cohort and are the fourth reason for absenteeism among the older (65+) male population. Injuries at work are also the third-most common cause of incapacity (2.8%), after illness (90.4%) and injuries outside work (5.4%), followed by occupational diseases (0.1%) (ZPIZ, 2022). According to International Labour Organization (ILO) statistics on non-fatal accidents at work, Slovenia ranks 19th out of 83 countries with 1,518.5 cases per 100,000 workers in 2019, just after Austria and Switzerland, and 57th in fatal accidents at work with a rate of 1.9 in 2020, right after Estonia and Poland (ILO, 2019).

Between 2014 and 2021, the total number of workplace injuries rose, peaking in 2020 at 17,621 incidents (NIJZ, 2022). These data is based on reported injuries and includes incidents where workers took sick leave due to a COVID-19 infection or had contact at work with a person with a COVID-19 infection. If we compare these data with the data on occupational accidents (Graph 2), which is one of the central indicators for the OSH system, we see that the total number of reported occupational accidents, excluding COVID-19 incidents, was rising until 2019 and then decreased in the epidemic year of 2020.

Graph 2: ACCIDENTS AND INJURIES AT WORK IN SLOVENIA BY YEAR

Sources of data: IRSD (2021) and NIJZ (2022).
The primary reason for this decrease could be the drop in the total number of injuries due to temporary layoffs and the increase in telework. The system for collecting data on fatal occupational accidents, collective accidents, dangerous occurrences or occupational diseases was changed in 2022. Today, the data can be accessed by the Labour Inspectorate of the Republic of Slovenia, the Slovenian Health Insurance Institute, and the National Institute of Public Health.

**The health status of workers in Slovenia**

The health status of workers in Slovenia is monitored by occupational health specialists during workers’ health examinations. Employers in Slovenia are obliged to offer preventive medical examinations to employees, whereby the type, scope, content and examination periods are agreed with the occupational physician. In Slovenia, around 150 occupational physicians provide their services in either the public or private sector. In 2020, occupational physicians performed 236,874 preliminary, periodic and special medical examinations of workers, accounting for over 21% of all examinations on the primary healthcare level (NIJZ, 2022). Not all countries have the same practices in this area of OSH. The national context and differences in national legal obligations are a determining factor in the use of medical services. In Slovenia, companies are mostly compliant (98%), while in some other countries, such as Denmark (11%), employers are not obliged to offer medical examinations. Slovenia is also at the top in the use of company doctors, whereas some countries appear at the bottom of the scale (EU-OSHA, 2019).

Occupational physicians also provide services on the employer’s premises, such as assessing specific health requirements, but have only an advisory role, without the right to take action in the event of employer misconduct. If they suspect signs of occupational diseases or work-related illnesses and disabilities, they rely on the employer’s permission for further investigations that could confirm their existence. Employers are obliged to report all occupational diseases detected and, if an occupational disease is suspected, to refer the worker to a specialist in occupational medicine for further examination. Again, verification of the occupational nature of the disease entails services additional to health examinations, which are usually not in the employer’s interest. These provisions of the existing Occupational Health and Safety Act regulating occupational diseases are not adapted to the new regulations on occupational diseases (Pravilnik o poklicnih boleznih, 2023) adopted in April 2023. After 20 years, under the new regulations on occupational diseases, a worker now has the right to request an occupational disease review from the Clinical Institute of Occupational, Traffic and Sports...
Medicine, with the costs being covered by the worker’s insurance against occupational accidents and diseases. The statistics on occupational diseases in Slovenia reveal cases of recognised occupational diseases. In 2020, the Labour Inspectorate received reports of three cases of occupational diseases (IRSD, 2021). The low number of reported occupational diseases might indicate that the actual incidence of occupational diseases is not known. With an adequate system of detection, verification and registration in place, we could detect about 290 cases of occupational diseases annually (Dodič Fikfak and Črnivec, 2009). The statistical occurrence of occupational diseases is not possible on the European level due to differences in legal systems and procedures for the recognition of occupational diseases in EU countries.

Perceived health of workers in Slovenia

Surveys reporting on the health of workers in Slovenia are inconsistent. The Slovenian Opinion Survey conducts the most consistent set of surveys reflecting subjective assessments of health and healthcare in a representative sample of the adult Slovenian population. Self-assessed health surveys conducted in Slovenia point to significant differences in subjective assessments of health between men and women in Slovenia, with even greater differences between different socio-economic categories in the female population. Health that is self-assessed is significantly lower among women at the lower end of the education and income scales. Women also consistently report more symptoms of stress than men, and the gap appears to be widening over time (Malnar and Hafner-Fink, 2013).

Surveys focusing on specific sectors of the economy, such as healthcare (Tabaj et al., 2015; Dobnik et al., 2018; Škerjanc and Fikfak, 2020; Lorber et al., 2020), public administration (Buzeti, 2022) and outdoor workers (Pogačar et al., 2019), are conducted in sectors where health indicators like sickness absence and workplace stress are expected to be higher. Workplace stress surveys in the health sector use different measurement scales, such as the Psychological Well-being Scale (Lorber et al., 2020), the Holms-Rahe Stress Inventory (Škerjanc and Fikfak, 2020), the Work Pressure Questionnaire (Tabaj et al., 2015) and the Nurses Stress Scale (Dobnik et al., 2018). The results indicate various sources of stress for different healthcare workers, such as psychosocial risk factors at work for healthcare professionals in a medical centre (Škerjanc and Fikfak, 2020), too much work and too many administrative tasks for vocational rehabilitation workers (Tabaj et al., 2015), and job satisfaction, disruptive factors at work and no opportunity for a day off to compensate for overtime for care workers in Slovenian hospitals (Dobnik et al., 2018). Sickness absence in public administration is related
to perceptions of leadership behaviour (Buzeti, 2022) and workplace heat stress for outdoor workers (Pogačar et al., 2019), which affects their productivity and well-being.

**The health of Slovenian workers compared to other countries**

In comparison with other countries, Slovenia had a high share of workers suffering from occupational stress in 2015 (Graph 3) (OECD, 2016).

**Graph 3: INCIDENTS OF JOB STRAIN BY COUNTRY**

![Graph showing incidents of job strain by country.](image)

Source of data: OECD (2016).

In terms of gender, men and women in Slovenia report similar levels of work intensity, but what distinguishes these two groups is how work intensity affects their health. In Slovenia, the relationship between work intensity and workers’ health has been found to be negatively correlated, especially with women’s health (Čehovin Zajc and Hafner, 2020).

Slovenians who work in intensive work environments have statistically significantly poorer health as evidenced by self-rated health, physical pain, and difficulties at work and at home caused by health problems (Kohont and Čehovin Zajc, 2019). Working conditions like work intensity and work pressure also strongly influence the extent of work–family conflict (Kanjuo-Mrčela and Ignjatović, 2013). This is in line with other studies based on subjective elements of satisfaction (Boye, 2009). They show that men’s well-being does not seem to be influenced by hours of paid work and housework, while women’s well-being increases with hours of paid work and decreases as housework increases.

In 2019, Slovenia led the EU-28 in the employment rate of women aged 15–64 with two children at 88%, followed by Sweden at 79% (European Commission, 2022). In this respect, Slovenia is similar to the Scandinavian countries where care/parental support allows for relatively high female
employment, which could also be associated with longer working hours and greater work pressure. Slovenia also belongs, together with Slovakia, Hungary and the Czech Republic, to the group of countries where only 10% or less of the respondents work part-time. On the other hand, in countries like the UK and the Netherlands, many mothers work part-time, which reduces the pressure on the family. Country differences in the distribution of working hours are important because they reflect both sectoral and occupational composition, national traditions and the influence of working time arrangements.

Worryingly, Slovenia also had an extremely high share of fixed-term contracts among young working women aged 15–24 in the first three quarters of 2021, accounting for over 60% of total employment (European Commission, 2022). In terms of work sustainability, Slovenia is also among the countries with the lowest proportion, with less than 50% of respondents aged 55 or below thinking they could work until the age of 60 (Eurofound, 2017). This is in sharp contrast to Germany, Portugal, Denmark and Sweden where the figure is than 80%. In most countries, the differences between men and women are small, but in Slovenia there is a gap of around 15 percentage points, with women being significantly less optimistic about their future ability to work. In Slovenia in particular, the differences between men and women are bigger for the second cohort of workers aged 56 or older. The desired retirement age workers reported is also the lowest in Slovenia (57 years) and Turkey (53 years) and the highest in the Scandinavian countries, i.e., Norway (65 years), Denmark (64 years) and Sweden (63 years).

**Occupational safety and health surveillance in Slovenia**

In Slovenia, occupational safety and health is the responsibility of both the Ministry of Labour, Family, Social Affairs and Equal Opportunities and the Ministry of Health. The main body in Slovenia that monitors OSH is the Slovenian Labour Inspectorate (IRSD). It monitors the implementation of OSH regulations, provides advisory services and strives to improve the knowledge of employers and workers. The IRSD reports to the Ministry of Labour, Family, Social Affairs and Equal Opportunities. It inspects the labour market with the aim of monitoring the introduction and enforcement of OSH measures by employers. It also educates workers and employers about OSH standards and risks. However, each of the 31 inspectors working on OSH is tasked with monitoring over 7,000 establishments that provide employment (IRSD, 2021).

Data from labour inspections show that employers in Slovenia frequently violate occupational health and safety regulations, such as medical examinations, despite being required to do so by law. In 2020, occupational health violations accounted for more than 13% of all violations detected by
health and safety inspectors (IRSD, 2021). Most of these violations were due to the lack of provision of preventive medical examinations and the failure to carry out tasks that under the law (ZVZD-1, 2011) should be performed by occupational health specialists. In 2020, safety and health inspectors conducted 7,016 inspections and detected 10,189 violations (IRSD, 2021).

The provision of risk assessments in written form is well implemented in Slovenia (EU-OSHA, 2019). However, the participation of internal staff while conducting risk assessments in Slovenia is extremely low. There is also a lack of regular OSH discussion in team meetings in Slovenian companies, which is an essential element of a company’s commitment to a safe and healthy work environment and a key building block for ongoing proactive OSH work by management. Once again, Slovenia lags far behind countries with a stronger tradition of employee involvement, such as Sweden (EU-OSHA, 2019). The most effective means of reducing occupational risks are technical changes to the materials, equipment, or manufacturing processes that cause the risk. In Slovenia, inadequate equipment, poor maintenance and improper use of equipment are common causes of workplace injuries identified by safety and health inspectors (IRSD, 2021).

In addition, violations of risk assessments account for nearly 25% of all 10,189 violations, mostly due to their inadequate content, risk identification, and revision (IRSD, 2021). The lack of consultation with internal staff on appropriate measures to ensure a healthy and safe working environment and the absence of specific conditions that should be established by the employer and an occupational health professional also play a role.

In the case of occupational accidents, occupational safety experts must monitor the situation and its causes. This service includes reports and proposed measures for the employer. Yet, this additional service is only provided on the employer’s request and depends on whether the employer is willing to pay for it. Many opportunities to improve the safety of the working environment accordingly remain dependent on the employer’s interest. In Slovenia, about 250 organisations are licensed to provide professional services. Similar to occupational physicians, occupational safety professionals are independent of the employer and are mainly tasked with advising the employer on work equipment and the work environment, conducting regular inspections of the hazardousness of the work environment and inspections and testing of work equipment, and training employees in safe work practices.

Conclusion

The article has examined the OSH data in Slovenia. We adopted a two-level approach, including the individual level of selected datasets to describe the health status of workers in Slovenia and the process of data
measurement, as well as the company level to describe OSH management and monitoring.

The analysis of data on the health of the Slovenian labour force shows that its health status may be denoted by a significant rise in sick leave days since 2014, a steady increase in (reported) occupational accidents since 2013, and a small number of reported occupational diseases based on incomplete data. Women in Slovenia are a group of the working population with a greater increase in sick leave days, which also increases with age. Women in Slovenia also consistently report high work intensity, which is negatively correlated with their health. Women also report more stress symptoms than men and are significantly less optimistic about their future ability to work than men, with this difference appearing to increase over time.

Our analysis additionally shows that the OSH system in Slovenia is characterised by a poor recording system. Data on sick leave days are provided by general practitioners, not by employers or occupational physicians. The two medical professions perform their activities essentially alongside each other and have no hand in monitoring employers and their management of occupational safety and health. Data on occupational accidents and diseases are also reported by employers. These data depend on the employer’s decision to report such injuries and to warn workers when an occupational disease is suspected. Therefore, the low numbers may be due to under-reporting rather than the absence of hazards. The use of the current data system for sick days, injury outcomes, and occupational diseases as the major measures of safety performance may therefore act as an obstacle to improving safety in Slovenia. The lack of comprehensive reporting on work-related health problems makes it difficult to determine the contribution of work-related injuries and illnesses to overall rates of illness and disability. A look at the data on perceived health shows that the Slovenian labour force suffers from occupational stress to a greater extent than most other EU countries, and that Slovenian women in particular are significantly less optimistic about their future ability to work.

On the operational level, our analysis shows that the IRSD plays a crucial role in the Slovenian OSH system. It is the only supervisory authority in the Slovenian OSH system that can monitor employers’ performance and take appropriate action. Inspections are hence the most important indicator of OSH performance. However, the Inspectorate conducts only a limited number of inspections per year in an area of more than 220,000 Slovenian companies, which means that a large proportion of work environments (69% in 2018) have never been inspected (Krištofelc, 2022). Our analysis of company data reveals that employers in Slovenia focus more on legal compliance than on regularly monitoring activities that contribute to
their OSH performance. Prevention should become the focus for employers in Slovenia. Risks are indicators and precursors of harm that provide early warning signals of potential failure. As such, they give organisations the opportunity to identify and mitigate risks or increases in risk before an occupational safety and health incident occurs. Improving working conditions by reducing workplace hazards and other health risks can help to protect workplace health and keep all workers employed.

It appears that several deficiencies in the Slovenian OSH system are hindering efforts to implement effective OSH measures. These deficiencies are not the lack of occupational health professionals like in some other countries (Drakopoulos, 2012: 59), but the lack of a thorough understanding and management of the risks that lead to injuries and illnesses, and subsequently the absence of oversight capabilities of the supervisory authority while enforcing the law. Slovenia needs to introduce systemic measures to integrate the various OSH stakeholders and bring occupational medicine back into the health system. This integrated system would overcome the existing dependence on funding by employers, who have a strong incentive to limit their costs. Their interests must not compromise the integrity of the professionals who perform their main task, which is to monitor working conditions and act on workers’ health.

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