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## **Pension provisions for workers in hazardous or arduous jobs**

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This chapter describes pension provisions for hazardous or arduous jobs in OECD countries, discusses the issues they raise and provides policy guidance in this area. The first section asks why hazardous or arduous jobs may call for special pension provisions. The second section documents differences across occupations in terms of health and life expectancy as well as the impact of working conditions on health and mortality. The third section analyses existing special pension provisions for workers in hazardous or arduous jobs among OECD countries. The following section presents trends in pension reforms for hazardous or arduous jobs. Then, the role of various policies (other than old-age pensions) in addressing hazardousness and arduousness of jobs is analysed. The final section provides policy implications.

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## Introduction

The debate on hardship of work is complex with respect to defining the criteria and controversial, which makes it hard to reach an agreement between social partners. Issues at stake are not limited to physical wear and tear at work; they extend to potential delayed effects of working conditions on health. The complexity of the subject has been compounded by increased focus on the psychological problems caused by stress at work, which is even more difficult to measure.

OECD countries differ fundamentally in how they approach hazardous or arduous work in pension design, from providing no special pension provision to covering many occupations or jobs. Yet, there are some common trends. Along with broader efforts to increase employment of older workers, many countries have tightened access or fully eliminated special pension provisions for hazardous or arduous work. Some countries have improved their targeting through linking eligibility to actual work characteristics considered hazardous or arduous instead of covering broad occupations or sectors.

This chapter aims to provide insights into questions raised by hazardous or arduous jobs for pensions. Should the serious issues raised by work capacity in hazardous or arduous jobs be dealt with by old-age pension systems? It is argued below that the measures which can provide the most efficient response (first-best policies) should primarily combine: health and safety regulations to limit the risks; informing about the remaining risks; lifelong learning and reskilling to allow job mobility into healthier jobs; and, disability insurance. Moreover, as delayed health impacts of some job characteristics (e.g. physical strain, noise or uncommon working-time patterns) are typically not covered by disability insurance, some special pension provisions can complement disability insurance. The objective is to compensate workers in these jobs for the potential long-term consequences, which occurrence should be backed by solid evidence, through well-targeted early retirement options.

The chapter is organised as follows. The first section asks why hazardous or arduous jobs may call for special pension provisions. It presents justifications put forward in national legislation as well as economic considerations about them. The second section documents differences across occupations in terms of health and life expectancy as well as the impact of working conditions on health and mortality. The third section discusses existing special pension provisions for workers in hazardous or arduous jobs among OECD countries. The following section presents trends in pension reforms for hazardous or arduous jobs. Then, the role of various policies (other than old-age pensions) in addressing hazardousness and arduousness of jobs is analysed, namely: health and safety regulations; communication; reskilling measures and age management; and, disability insurance. The final section provides policy implications.

## Key findings and policy implications

### ***Scope of pension provisions for hazardous or arduous jobs in the OECD***

- Workers in physically intensive jobs tend to have poorer health than other workers. Some factors such as income, education and lifestyle correlate with both health and occupations and may be the main drivers of bad health, rather than bad health being the result of hazardous or arduous jobs.
- While life expectancy differs by broad occupational groups, a large part of occupational differences in life expectancy is related to socio-economic factors that are not caused by working conditions. However, even when socio-economic factors are controlled for, the differences in health status and life expectancy across occupational groups remain significant. There is convincing evidence of some working conditions negatively affecting health, sometimes with some delay. This is the case in particular for working at night.

- There is no consensus across OECD countries on how to define hazardous or arduous jobs. Countries define eligibility conditions for special pension provisions for hazardous or arduous jobs based on either occupational titles or measurable characteristics of jobs.
- When they exist, special pension provisions for hazardous or arduous work are based on different approaches among OECD countries to compensate for tough working conditions, and to account for declining capabilities to work until retirement ages and for immediate or delayed health risks caused by working conditions.
- OECD countries can be classified into four groups in their treatment of pensions for hazardous or arduous jobs in mandatory or quasi-mandatory schemes:
  - The first group of 15 countries provide access to pension provisions for hazardous or arduous jobs for a large number of jobs: Austria, Belgium, Chile, Colombia, Estonia, Finland, France, Greece, Italy, Norway, Poland, the Slovak Republic, Slovenia, Spain and Türkiye.
  - The 8 countries in the second group provide early retirement options based on the hazardousness or arduousness to a limited number of jobs: Czechia, Germany, Hungary, Japan, Korea, Latvia, New Zealand and Portugal.
  - In the third group of 4 countries, only public safety and security jobs traditionally considered as hazardous, such as police, firefighters and military, are covered by special pension provisions: Canada, Ireland, Israel and the United States.
  - The 11 countries in the last group do not provide any early retirement options within mandatory pensions for hazardous or arduous jobs: Australia, Costa Rica, Denmark, Iceland, Lithuania, Luxembourg, Mexico, the Netherlands, Sweden, Switzerland and the United Kingdom.

### ***Most issues raised by hazardous or arduous jobs require interventions at working age***

- Hazardousness or arduousness of jobs raise first and foremost an issue for labour market policies. The first priority is to improve working conditions through health and safety regulations to limit exposure to risky factors as well as by encouraging or incentivising social partners to take measures to limit hardship and health risks. However, even if health and safety regulations are fully effective, some necessary jobs are likely to impair workers' health.
- Communicating about the risks – backed by evidence – involved in working in hazardous or arduous jobs is essential: first, as a moral imperative to ensure that workers accept the jobs in full knowledge of the facts; second, to help workers weigh different job opportunities and ask to be compensated for the risks the jobs bring with it.
- In many jobs, access to the information about effective risks is unlikely to ensure that these risks are well rewarded. Poor working conditions tend to coexist with low wages while impediments to labour mobility might result in limited options for workers in unhealthy and low-paid jobs to move into some offering better conditions. Many hazardous or arduous jobs are in the public sector where wage formation is more likely to deviate from the standard market mechanisms that in principle generate higher wages to compensate for higher risks. Those limitations that prevent wage levels from reflecting difficult working conditions should be addressed more by labour market and tax policies than by pension systems.
- Reskilling policies should facilitate career transitions well before older ages. The permanent withdrawal from the labour market in countries where special pension schemes exist, sometimes at very early ages, is an inefficient solution.
- A professional training framework providing reskilling and upskilling has therefore to be put in place by governments and social partners to allow workers in hazardous or arduous jobs to acquire the skills needed to prolong careers in different jobs. Establishing such a good framework is

challenging; the chapter includes some interesting examples of countries implementing career-guidance policies.

- Age-management policies shifting workers to different tasks as they age – e.g. from more physical to more clerical tasks – can boost employment opportunities within one institution or firm in the later stage of the career. Within civil service in particular, transferring workers between different positions need to be made possible by employment contracts.
- When job-related risks materialise at working age and impair workers' health, long-term sickness benefits and disability insurance should be fit for purpose, accessible, efficient and responsive; on top of cushioning income consequences until the retirement age, they should help prevent permanent labour market withdrawal.

### ***Pension reforms to deal with hazardous or arduous jobs***

- Incapacity to work in a *specific job* until the minimum retirement age that apply to all workers is not enough to justify granting special *old-age* pension provisions for hazardous or arduous work: the issues raised by hazardous or arduous work should primarily be dealt with by other policies outside the realm of old-age pensions.
- There have been serious issues of mistargeting the special pension schemes for hazardous or arduous jobs by including jobs in which hardship is questionable.
- In the wake of pension reforms over recent decades, special pension schemes covering workers in hazardous or arduous jobs have been reduced in scope. General reform trends to deal with the challenges triggered by population ageing have contributed to increasing employment at older ages and to unifying pension rules across occupations and sectors. One standard argument put forward for the initial design – allowing very early retirement based solely on not being able to continue a career in some specific job – has lost ground over time. Many OECD countries have phased out or tightened access to pension provisions for hazardous or arduous jobs.
- In some countries historically, some special pension rules for hazardous or arduous jobs were granted as a way to boost the attractiveness of some occupations and defer the related cost. In cases where special pension provisions are not or no longer justified, removing them may be done through so-called grandfathering, applying the new rules to new employees only, or by applying longer transition periods than with other parametric reforms. Avoiding the loss of attractiveness of these jobs requires to offer other, more efficient forms of compensation, higher wages in particular, which may, however, have some negative short- and medium-term impact on public finance.
- As any delayed health impacts of some job characteristics (e.g. physical strain, noise or uncommon working-time patterns) are typically not covered by disability or sickness insurance schemes, some special pension provisions might complement these schemes. The objective is to compensate workers for the potential long-term health consequences, through well-targeted early retirement options. Any such programmes should be backed by solid evidence.
- In general, for jobs for which working at older ages generates health and safety risks (e.g. firefighters, police officers and military), there is a stronger case for special pension provisions. Still, age-management policies should strive as much as possible to prepare for a career shift at some point in order to maintain individuals in employment until the minimum retirement age for all workers.
- Given the difficulties to assess the long-term impact of specific working conditions on health, limiting special pension provisions only to areas for which solid evidence exists creates the risk of unfair treatment of some workers. Yet, providing too broad a coverage also raises equity issues because some workers then unduly benefit from these provisions.
- Over the last two decades, some countries, including Finland and France, have improved the design of pension schemes covering hazardous or arduous jobs. These innovations link eligibility

to some actual job characteristics that are considered hazardous or arduous in nature, such as working at night, rather than based on occupational groups, thereby limiting mistargeting and ensuring the transferability of pension entitlements across occupations. These measures reduce retirement age by two years at most. However, there is cost involved for companies, workers and public institutions in tracking individuals' exposure to hazardous or arduous working conditions, which may be difficult to bear for small firms in particular. In Austria, the special scheme allowing individuals working at night to retire earlier is highly targeted and increases the cost of night work by imposing additional contributions on employers to help finance the scheme and limit such activities.

## Why special pension rules for hazardous or arduous jobs?

Arduousness of jobs or occupations refers to mental or physical effort related to work, e.g. unhealthy working hours, high stress, lifting heavy burdens or remaining in uncomfortable posture for prolonged periods of time. Hazardousness refers to health or life risks related to work, e.g. in relation with the use of chemical substances or larger risks of physical injuries. Hazardousness is often linked to risks of work-related accidents, sometimes severe ones. Arduousness or hazardousness may lead to immediate and/or delayed negative health consequences. In a very broad sense, they may also include the depreciation of some capabilities to work safely and efficiently in some occupations with age, such as ballet dancers or air traffic controllers who are not likely to be in worse general health than many other workers of similar age.

### *Different approaches to justify special pension provisions in the law*

OECD countries justify special pension provisions for workers in hazardous or arduous jobs in the legislation along several dimensions: accounting for health risks and health deterioration; facing difficulties to continue the career until retirement ages; and, compensating for tough working conditions. Zaidi and Whitehouse (2009<sup>[1]</sup>) note, in addition, that some countries have used special provisions for hazardous or arduous jobs as a way to improve the attractiveness of selected occupations.

In some countries, the law directly refers to the health deterioration of older workers in hazardous or arduous jobs, or its prevention as a rationale for special retirement provisions. Chile refers to premature ageing caused by accelerated physical, intellectual or mental exhaustion among the majority of workers in some occupations (for example miners, trash collectors, paramedics). Colombia refers to the negative health impact of working conditions. France uses different approaches in the public and in the private sector. In the private sector the focus is on the possible health impact of being exposed while working to physical risk factors: work in hyperbaric environments; extreme temperatures; noise; night work; alternating shift work; and, repetitive (assembly-line) movements. Lithuania refers directly to health risks and death risks. The Slovak Republic focuses on health risk factors that cannot be reduced by protective measures.

The legislation in some other countries reflects a broader approach and recognises both negative health effects of hazardous or arduous work and low employability of some workers as the reason for special pension provisions. Czechia's scheme includes the lack of abilities to work due to health conditions at older ages. In Finland, the years-of-service pension was introduced in 2017 to offer an early route to retirement for persons who are not entitled to a full disability pension despite their ability to work being reduced due to hazardous or arduous jobs (see below). Employability issues, due to skills and health deterioration before the statutory retirement age, are cited in Latvia. Poland's legislation highlights increasing health risks and the deterioration of abilities – those which cannot be eliminated with technical, organisational and medical preventive measures – with age in hazardous or arduous jobs. Slovenia states that occupational pensions for hazardous or arduous jobs are targeted at people working in demanding jobs and professions that they cannot be expected to hold until statutory retirement age.

Another group of OECD countries highlight that these special pension provisions compensate for tough working conditions beyond their health impact. The law in Portugal refers to the particularly painful or exhausting nature of some occupations. Türkiye states that the main reason for such early retirement provisions is to compensate for tough working conditions, including the risk of contracting diseases and having accidents and becoming mentally or physically exhausted. These provisions are supposed also to attract workers who perform physically intensive or strenuous jobs.

### ***Some economic considerations about special pension provisions***

Some jobs, including those of firefighters, police officers and armed forces, are particularly exposed to significant risks in performing the corresponding tasks or duties. Some of these risks can be mitigated by prevention measures. But prevention policies – even if well-designed – may not be sufficient in all circumstances. When risks materialise at working age and impair workers' health, sickness and disability benefits may help deal with the consequences until the retirement age. Disability pensions require individual assessments and only address risks that have materialised.<sup>1</sup> Additionally, as individuals age and as their capacity to work well and safely in some jobs diminishes, measures must be taken to protect workers. This chapter will discuss whether hazardous or arduous pension schemes are the best tools to ensure old-age protection in these cases.

Delayed impacts of hazardous or arduous jobs on health and mortality may be a valid reason for the existence of special pension provisions. This should be backed by solid evidence of the actual negative impacts of some job characteristics. The next section discusses this evidence in detail. These delayed consequences cannot be individually and immediately assessed, and they may materialise with different lags for different individuals. If so, they are certainly a reason to limit the exposure to such risks, and may justify redistributive policies to allow these workers to retire early or with higher pension benefits or both.

How wages adjust to compensate for the hazardous or arduous nature of jobs is an important aspect. To the extent that workers are informed or aware of the embedded risks in these jobs, they, in theory at least, choose to take the jobs provided that they receive some forms of compensation, for example through higher wages or shorter working hours compared to other jobs they can do. In practice, some labour market features might prevent or limit such a compensation. Poor working conditions tend to coexist with low wages while impediments to labour mobility might result in limited options for workers in unhealthy and low-paid jobs to move to those offering better conditions, in particular when bargaining power of workers is low (OECD, 2019<sup>[2]</sup>). Many of hazardous or arduous jobs are in the public sector where wage formation is more likely to deviate from standard market mechanisms, especially if financial resources are scarce (OECD, 2023<sup>[3]</sup>). In the private sector, insufficient coverage by collective agreements may limit wages for workers in hazardous or arduous jobs. In addition, notwithstanding individual preferences, short-sighted behaviours may limit the wage premium that balances supply and demand in the labour market. Indeed, delayed health impacts are likely to be overlooked by many workers (Viscusi, 1984<sup>[4]</sup>). The following sections investigate whether special pension provisions allowing to retire early may improve aggregate welfare given short-sighted behaviours, constraints on wage adjustments and exposure to health risks at work.

Early retirement can thus prevent, limit or at least compensate for delayed health deteriorations. However, by providing more generous pensions, whether in the form of early retirement options or higher benefit levels, these provisions improve job attractiveness with the following consequences: they may lower wages and eliminate the wage premia, thus working as a trade-off between income while working and during retirement as pension systems generally do;<sup>2</sup> and, through lowering labour costs of these jobs, they might even contribute to perpetuating these jobs. This relates to the ways hazardous or arduous pension schemes are financed, which is discussed later in this chapter.

### ***Pension provisions for hazardous or arduous jobs are often mistargeted***

Workers actually covered by retirement provisions for hazardous or arduous occupations do not necessarily have above-average mortality or worse health. In 2014, the National Audit Office of Estonia conducted a study showing that the health status of workers in professions covered by early retirement provisions for hazardous or arduous conditions was not worse than that in other professions (National Audit Office, 2014<sup>[5]</sup>).<sup>3</sup> Meanwhile, textile workers had high disability rates and were not covered by special schemes. As a result, the National Audit Office concluded that the special retirement provisions for hazardous or arduous occupations are not justified. Similarly, mortality rates among pensioners receiving early retirement pensions for hazardous or arduous jobs in Hungary are not higher than the average among all pensioners.<sup>4</sup> In Slovenia, standardised mortality rates are not statistically different in any occupational group covered by pension provisions for hazardous or arduous work from those of the general population based on 1997-2016 data.<sup>5</sup> However, assessing mortality differences across occupational groups might be influenced by the self-selection of workers into these jobs: poor health hinder entering arduous occupations, and health deterioration at the working age can lead to early exit from a given job or from the labour market in general.

Furthermore, workers actually covered by pension provisions for hazardous or arduous jobs often work beyond their minimum retirement age. For example, in Estonia, the National Audit Office found that the majority of people covered by early retirement schemes for hazardous or arduous occupations still work one year after having acquired the right to retire. It implies that the majority of them have substantial employment capacity. Many occupations that seem arduous are not among those benefiting from special pension rules. For example, workers performing the same jobs in the public sector may be covered while those in the private sector are not (e.g. dancers, actors etc.). In Norway, pension provisions for hazardous or arduous occupations emerged mainly in the public sector.

The mistargeting of pension provisions for hazardous or arduous occupations partially originates from the political process due to difficulties in managing different objectives. In the 1990s, as governments started responding to population ageing by tightening access to early retirement, some occupations were exempted from the changes. To what extent this process was driven by fairness and to what extent it was the result of the strong bargaining power of some occupational groups remain open questions. Zaidi and Whitehouse (2009<sup>[1]</sup>) highlight that the bargaining power of some occupations has played an important role, at least in the past. Furthermore, some of these schemes were designed to improve the attractiveness of certain public-sector jobs without creating an immediate cost to public finance; this applies in particular to special pension provisions for teachers.

The more recent design of special pension provisions that base their eligibility on job characteristics which have been identified as hazardous or arduous can better target the risks effectively taken than schemes built on broad occupational or sectoral categories. However, tracking individuals' exposure to hazardous or arduous working conditions increases the administrative burden on companies, workers and public institutions. Moreover, the process of recognising specific work characteristics may be subject to political pressure rather than be based on solid evidence.

### ***Hazardous or arduous jobs may not be the same as before***

Many pension provisions for hazardous or arduous occupations emerged a long time ago, when job tasks were very different. In France for example, farmers, marine workers and miners were among the first to be covered by pension schemes before social insurances were developed in the late 1920s (Bruno, 2016<sup>[6]</sup>). In Norway, many pension regulations for hazardous or arduous work date from 1917. In some countries, hazardous occupations such as firefighters, police officers and military were included in parallel to civil service pensions.

Technological and organisational innovations have tended to reduce the hazardousness and arduousness of work. On the technological side, automation in particular has been efficient in performing or supporting many physically intensive tasks, including in farming and manufacturing. This has raised productivity and reduced both employment in these sectors (deindustrialisation), and arduousness of some remaining jobs. For example, in OECD countries, modern mechanisation of coal mining began in the 1950s and since the mid-1990s new developments have improved equipment reliability, miner's health and safety as including through dust control techniques and remote control of machinery (Peng et al., 2019<sup>[7]</sup>). Recent evidence suggests that arduousness will continue to diminish as workers in jobs that are most likely to be automated have poor health (Liu, 2022<sup>[8]</sup>).

## Scope and causes of occupational differences in health and mortality

This section documents differences across occupations in terms of health and life expectancy as well as the impact of working conditions on health and mortality. First, it briefly looks into statistics that first come to mind when hazardousness and arduousness are discussed: work-related deaths, accidents at work, occupational diseases and work strain. It then takes a deeper look at substantial health differences by occupations and tries to assess the actual impact of job characteristics beyond the well-known correlation. Finally, differences in life expectancy across occupations are reviewed. A causal link of some job characteristics to health status and life expectancy would provide support for the existence of specific pension provisions for hazardous or arduous work. Likewise, in the absence of an established causal link, the justification of special rules would be less obvious.

### *Impact of the working environment on mortality, sickness and job strain*

Accidents at work happen mostly in physically demanding jobs involving machinery e.g. construction or transport. Many countries monitor outcome measures of occupational hazards: work-related deaths and injuries as well as occupational diseases and sick leaves. In Austria, Belgium, Canada, Costa Rica, Portugal and Türkiye among others, work-related deaths and injuries are concentrated in agriculture, construction, manufacturing and transport while they are less common in services, including electricity and water distribution as well as waste management. In Costa Rica in 2021, most accidents at work happened among occupations consisting of simple and routine tasks that mainly require the use of manual tools and often some physical effort, as well as among operators of machinery.<sup>6</sup> In Portugal in 2021, most work-related deaths happened among craftsmen, machine operators and unskilled workers. In Türkiye, most deaths at work concerned the following sectors in 2021: construction, civil engineering, mining, manufacturing of mineral products and land transport.

Fatal accidents account for only a small share of total accidents at work. Statistics on health disorders resulting from working conditions, or occupational diseases, are collected by many countries but international statistics are scarce. ILO statistics from 2003 show that in Western Europe and North America the number of fatal occupational accidents was around 5 per 100 000 workers<sup>7</sup> and the number of accidents causing an absence from work of at least four days were reported to be 4 000 per 100 000 workers in Western Europe and North America.<sup>8</sup> In Poland, occupational diseases are not very common and around 2000 cases have been reported yearly for about 16 million workers, being roughly equally distributed among those aged between 45 and 64 years. Most of these diseases are related to infectious and parasitic diseases, lung, vocal and hearing issues.

Work strain, however, is quite common among workers and more frequent among low-skilled workers. Based on the European Working Conditions Survey, about one-third of employees declare to be (moderately or heavily) strained at work in 28 OECD countries on average (Murtin et al., 2022<sup>[9]</sup>). The share of employees that are heavily strained is close to 10%. Job strain is relatively more frequent among employees with low education and low occupational skills, and is relatively less frequent in the service

sector, and in the public sector in particular. Given the high share of women in the public sector, this implies that women hold on average slightly less straining jobs than men.

### ***Physically intensive work often negatively affects health***

There is substantial evidence that workers in physically intensive jobs often have poorer health than other workers. In Belgium, workers in physically demanding occupations were found to be more likely to report poor health, in particular in extraction, construction and elementary services such as cleaning or delivering goods, while it was the opposite for employees in teaching, scientific, health-related and managerial positions (Van den Borre and Deboosere, 2018<sup>[10]</sup>). In Finland, workers in physically intensive jobs use relatively more healthcare (Rinne, Laaksonen and Blomgren, 2022<sup>[11]</sup>). This is particularly the case for personal care workers, machine operators, and workers in mining, construction and transport. Higher healthcare consumption may reflect more the effects of other factors such as unhealthy diet that may be correlated to both holding a manual job and being in relatively bad health rather than resulting from a causal impact of manual jobs on bad health. In Germany, various measures of workload are strongly associated with health outcomes such as self-perceived health status, perceived health risks at work or sickness absence days (Kroll, 2011<sup>[12]</sup>).

Holtermann et al. (2021<sup>[13]</sup>) point to the paradox that leisure physical activity has a strong positive impact on health while physically demanding jobs have negative effects. An article from the Institute for Work & Health in Canada adds the following comment: “Don’t think of physically demanding work as being the same as exercise. The physically demanding work that we’re seeing associated with heart disease is more like snow shovelling, where you’re doing a lot of arm work that increases blood pressure drastically, while your legs don’t move much, raising your blood pressure even more”.<sup>9</sup> Some mitigating measures can be taken including “allowing and encouraging workers to do warm-ups before starting a physically strenuous job task and to take frequent breaks to give their bodies time to recover”.

Identifying the causal impact of working conditions on health is key to design correct policy responses, but it raises intricate issues. Researchers who want to estimate a causal impact of working in some occupations or of working conditions on health status have to take into account the possibility of reverse causality. Additionally, some factors such as income, education and lifestyle, correlate with both health and occupations and could be the main drivers of bad health, rather than bad health being the result of hazardous or arduous jobs (omitted variables bias).<sup>10</sup>

Accounting for these methodological difficulties, there is convincing evidence of a causal negative impact of some working conditions on health. Based on a summary of 17 studies, Bøggild and Knutsson (1999<sup>[14]</sup>) conclude that shift work increases the risk of cardiovascular diseases by 40% on average e.g. through a mismatch between circadian rhythm and sleep and through disturbed socio-temporal patterns leading to stress. More recently, reviewing the evidence covering 600 000 people from 27 cohort studies in Europe, the United States and Japan, Kivimäki and Kawachi (2015<sup>[15]</sup>) found that job strain, long working hours and other job stressors are robustly associated with a 10-40% elevated risk of incident coronary heart disease, stroke and diabetes, but without any significant impact on risk of cancers or lung diseases. Fletcher, Sindelar and Yamaguchi (2011<sup>[16]</sup>) control for initial health and earnings and find a causal impact of physically demanding jobs on health outcomes of female and older workers. For France, Defebvre (2017<sup>[17]</sup>) estimates that workers in physically demanding jobs suffer from a faster development of chronic health conditions. For miners specifically, based on a review of evidence, Donoghue (2004<sup>[18]</sup>) concludes that noise-induced hearing loss and respiratory diseases were common occupational risks in many countries. Italian workers in shipyards exposed to asbestos saw significantly higher mortality rates due to cancers (Merlo et al., 2018<sup>[19]</sup>). Baurin, Tubeuf and Vandenberghe (2023<sup>[20]</sup>) estimate that whilst occupation arduousness is a significant contributor to poor health at later age, it is still quantitatively less important than other factors such as initial health endowment. According to Ravesteijn, Kippersluis and Doorslaer (2017<sup>[21]</sup>), selection bias and unobservable heterogeneity account for at least 60% of the association

between physical burden of work and health status in Germany. Furthermore, Nicholas, Done and Baum (2020<sup>[22]</sup>) control for socio-economic background and show that intense lifetime exposure to routine manual work is robustly associated with worse health and increased likelihood of disability claims in the United States. In addition, they interpret their results that those who are still working in physically demanding jobs after multiple years of exposure are likely to be healthiest, and able to retire at later ages, while those who are quickly harmed by physical or cognitive demands early on leave the work force after high average exposure. However, Lombardi et al. (2022<sup>[23]</sup>) does not confirm negative effects of physical work exposure in middle of life on disability of women aged 90 or more.

As for general health, regular physical activity is generally associated with better mental health outcomes but there is also evidence that mental health is negatively affected by physically intensive work. Nabe-Nielsen et al. (2020<sup>[24]</sup>) show that occupational physical activity increases risks of dementia while there is no impact of leisure-time physical activities in Denmark. More broadly, Harvey (2017<sup>[25]</sup>) reviewed 37 studies and found moderate evidence that high job demands, low job control, high effort-reward imbalance, low relational justice, low procedural justice, role stress, bullying and low social support in the workplace are associated with a greater risk of developing mental health problems. More specifically, in Belgium, Van Droogenbroeck and Spruyt (2015<sup>[26]</sup>) find evidence of poorer mental health for some low-skilled occupations but not for teachers.

### ***Life expectancy differs by broad occupational groups***

Due to both work-related and non-work-related reasons, manual workers face higher mortality rates than other workers. Higher mortality rates for manual workers are found for ages 20-59 in Finland (Rinne and Laaksonen, 2020<sup>[27]</sup>), Japan (Chan, Zimmer and Saito, 2011<sup>[28]</sup>), the United Kingdom (Katikireddi et al., 2017<sup>[29]</sup>) and for ages 50-75 in Denmark (Brønnum-Hansen, Foverskov and Andersen, 2019<sup>[30]</sup>), England, Finland, France and Sweden (Head et al., 2018<sup>[31]</sup>). Differences in mortality rates after age 30 among men result in workers in professional occupations living about 5 years more than manual workers in Italy (Luy, Di Giulio and Caselli, 2011<sup>[32]</sup>).

Remaining life expectancy of low-skilled and manual workers after retirement is relatively low, but workers covered by special pension schemes for hazardous or arduous work often do not belong to this group of workers. The difference in life expectancy at age 65 between high-earnings and low-earnings (which are mainly low-skilled) occupations has been estimated between 2 and 5 years in Germany in 1998 (Luy et al., 2015<sup>[33]</sup>), France in early 2000s (Cambois et al., 2011<sup>[34]</sup>) and in the United States in 1997-2014 (Singh and Lee, 2020<sup>[35]</sup>). Mosquera et al. (2019<sup>[36]</sup>) review 29 studies on socio-economic differences in life expectancy in Europe, which use different methods, and conclude that differences at age 65 between top and bottom occupational groups are of about 2-3 years in Germany, Norway, Sweden and almost 5 years in France. Among hospital workers in France, life expectancy at age 65 of middle-level employees is shorter by 2.3 years for men and 1.4 years for women compared to executives while for blue-collar workers these differences increase to 3.7 and 2.2 years, respectively (Bulcourt, Lemonnier and Soulat, 2022<sup>[37]</sup>). Similarly in Norway, life expectancy at age 67 of cleaners is about 1-year lower than for all professions on average, and 3-year lower than for academic professions that record the highest life expectancy (Borgan and Texmon, 2015<sup>[38]</sup>). More recently for Norway, differences in life expectancy at 62 between occupational groups were estimated at 3.5 years (Texmon, 2022<sup>[39]</sup>). In Finland, all occupations with higher-than-average mortality were found to be low-skilled (Rinne et al., 2018<sup>[40]</sup>). More precisely, mortality and disability incidence are high in occupations that are physically strenuous and where there is exposure to chemical risk factors. The differences in life expectancy are largely due to lung cancer, breast cancer and cardiovascular diseases. The transitions from work into disability are also more common among people from low-skilled occupations. From a broader perspective, life expectancy is the lowest among those not having worked at all (Luy, Di Giulio and Caselli, 2011<sup>[32]</sup>; Burgard and Lin, 2013<sup>[41]</sup>) and those with disabilities (Cambois et al., 2011<sup>[34]</sup>).

A large part of occupational differences in life expectancy is related to education, income and habits but even when these are controlled for the differences remain substantial. Rinne et al. (2018<sup>[40]</sup>) estimate that some of the differences between occupations in Finland can be attributed to education or level of income, but factors related to occupation itself have an independent effect on the incidence of disability and mortality. Physically strenuous work may lead to premature retirement, but the causes of death also indicate a higher incidence of unhealthy lifestyles and risk behaviours in many occupations in the construction, metal, pulp and paper industries as well as among non-specialised employees such as cleaners. Moreover, occupational differences in life expectancy at age 60 remain substantial in Spain once education and habits are controlled for (Lozano and Solé-Auró, 2021<sup>[42]</sup>).<sup>11</sup> For Italy, Lallo and Raitano (2018<sup>[43]</sup>) conclude that white- and blue-collar workers have very different mortality risks, even when controlling for a large number of proxies for individual demographic and socio-economic characteristics. Deeg, De Tavernier and de Breij (2021<sup>[44]</sup>) estimate that, after having accounted for differences in gender, age and education levels, workers in academic professions have a life expectancy at 65 that is 3.5 years longer than that of low-skilled workers in the Netherlands.

Differences in healthy life expectancy have been reported to be larger than differences in life expectancy in the United States and the United Kingdom (Zaninotto et al., 2020<sup>[45]</sup>), France (Platts et al., 2016<sup>[46]</sup>), England, Finland and Sweden (Head et al., 2018<sup>[31]</sup>). In Denmark, Pedersen et al. (2020<sup>[47]</sup>) concluded that high physical work demands tend to significantly shorten the number of working years and raise the number of sick-leave and unemployment years.

Results on the effects of working conditions on mortality and life expectancy may not correctly reflect the current labour market situations. This is because such evidence is based on past data as several decades are needed to gather mortality data. This is important because working conditions are changing rapidly due to improvements in regulation and technological progress. Moreover, working conditions in the same occupations differ substantially among countries.

## **Pension provisions for workers in hazardous or arduous jobs in OECD countries**

This section discusses existing special pension provisions for workers in hazardous or arduous jobs in mandatory or quasi-mandatory schemes among OECD countries. First, the scope of occupations and jobs covered by these provisions is described. Then the share of workers, new retirees and all retirees covered by those schemes are presented. The section then focuses on early retirement options for these workers and their benefits. Finally, the financing of these special pension provisions for workers in hazardous or arduous jobs is considered.

### ***Occupations and jobs covered***

Pension provisions for workers in hazardous or arduous jobs differ a lot among OECD countries in terms of jobs and occupations covered. In order to obtain a broad picture of how countries compare, some examples of occupations representing various dimensions of potential hazardousness or arduousness were grouped along four dimensions.

- abilities declining with age: airline pilots and ballet dancers;
- physical strain and irregular working hours: bus and train drivers, electricians, miners, marine workers and nurses.
- potential psychological pressure: journalists and teachers;
- public safety and security: police, military and firefighters.

Table 2.1 indicates the occupations listed above where special pension provisions cover new starters in each country. It shows that OECD countries can be grouped into four groups. This classification does not account for the rules that may apply to many workers today but are being phased out.

Countries define eligibility conditions to special pension provisions for hazardous or arduous jobs based on either occupational titles or measurable characteristics of jobs (e.g. lifting heavy weights, extreme temperatures, chemical risks, night shifts), which may apply to any occupation. Some countries mix these approaches and provide both a list of occupations, often in the public sector only, and a list of criteria related to job tasks. Selected occupations can be based on some explicit characteristics of work or on some less precise definitions of arduousness or hazardousness; government or a designated public body, which might include social partners, sets and modifies the list of occupations or jobs covered. For example in Austria, a working party – consisting of social partners, occupational physicians, representatives of the social insurance institutions and representatives of government – makes proposals for possible adjustments of the list of occupations covered. In Chile, the procedure is simple as it does not involve public finance: an expert commission makes binding decisions about inclusion of a job as hazardous or arduous. In Greece, a council of experts makes a proposal, which upon approval of the Social Security Council, is conveyed to the Ministry of Labour and Social Affairs, and the final decision is made jointly by Ministry of Finance and Ministry of Labour and Social Affairs.

OECD countries can be classified into four groups (Table 2.1). The first group consists of 15 countries providing access to pension provisions for hazardous or arduous jobs to a large number of occupations or jobs. Among this group, Belgium, Estonia, Norway, Slovenia, Spain and Türkiye cover a broad list of occupations or sectors without a direct link to specific job characteristics. Also included in this first group, Austria, Colombia, Greece, Italy and Poland provide a selection of occupations based on more precise job characteristics (e.g. temperature, body postures, air pressure, working underground, night shifts, calories consumption). In France, some so-called active occupations in the public sector, including police officers, firefighters, underground sewer workers and caregivers are entitled to early retirement without penalty and with no explicit link to their work characteristics.<sup>12</sup> In addition, in France as in Chile, Finland and the Slovak Republic, the coverage of certain jobs by special provisions is done on case-by-case basis. In Chile, an expert commission (*Comisión Ergonómica Nacional*) assesses the application of employers and employees based on job characteristics. In Finland, workers are required to provide the description of their strenuous tasks (preferably confirmed by employers) and a medical proof of reduced work capacity. The direct links between occupational titles and specific pension provisions were gradually abandoned starting in 1995. In France, based on specific criteria related to hazardous or arduous risks, private-sector workers in some jobs – not occupation-specific – accrue points in *pénibilité* accounts (*C2P, compte professionnel de prévention*), which can be used for early retirement, training or part-time work paid full time. The Slovak Republic defines a broad criterion of an increased risk of developing an occupational disease or other work-related health damage but it does not provide a closed list of occupations covered except for military, police and firefighters. Based on this broad criterion, the public health authority decides whether specific jobs should be mandatorily covered by occupational pensions which are voluntary for other workers.

Similar to France, some countries treat hazardous or arduous jobs differently in public and private sectors. In the private sector in Belgium, there are specific regulations for miners, marine workers, journalists and the flying staff of civil aviation. In the public sector, entitlements to early retirement are accrued for work being “exposed to weather conditions, fatigues and dangers to which civil servants with a sedentary job are not exposed to”, which is called “active service”. In Greece, workers in some public-sector occupations can retire earlier, while early retirement in the private sector is linked to specific working conditions rather than occupational titles. In Latvia, early retirement for hazardous or arduous work is possible for selected public-sector workers only while in the private sector some railway workers are mandatorily covered by occupational pensions that finance early retirement. In the Slovak Republic, only firefighters, police officers and military staff benefit from exceptional early retirement while some private-sector occupations, including

ballet dancers, electricians, miners and nurses, are mandatorily covered by supplementary pensions, which can finance early retirement.

The 8 countries in the second group: Czechia, Germany, Hungary, Japan, Korea, Latvia, New Zealand and Portugal, provide early retirement options based on the hazardousness or arduousness to a limited number of jobs. All of them except for Latvia and New Zealand include miners. Germany includes no other workers than miners in the statutory public pension scheme, but some collective agreements provide options to retire early for some occupations (Natali, Spasova and Vanhercke, 2016<sup>[48]</sup>). Additionally, police officers, firefighters and military are covered by the separate pension scheme for civil servants. In Czechia, special retirement provisions apply to firefighters and paramedics (from 2023 only) while in Hungary this concerns only underground miners and ballet dancers. In Korea, special regulations apply to fishermen and the military; firefighters and police officers are covered by the scheme for civil servants. In Japan, coal miners are covered by mandatory pension scheme which is voluntary for others while special pension rules no longer apply to new firefighters, sailors and some law-enforcement occupations. Portugal covers air traffic controllers and pilots, ballet dancers, marine workers, sea fishermen, miners, quarry workers, some traditional craftsmen and firefighters in the public sector. In New Zealand, police officers, military, firefighters, airline pilots and train drivers are mandatorily covered by occupational pensions which are voluntary for others.

In the third group of countries: Canada, Ireland, Israel and the United States, only public safety and security jobs traditionally considered as hazardous, such as police, firefighters and military, are covered by special pension provisions. In the United States, firefighters, regional police officers and the military are covered by occupational schemes but not by social security.

The 11 countries in the last group do not provide any early retirement options within mandatory pensions for hazardous or arduous jobs. In Costa Rica, policemen, firefighters and teachers belong to sectoral schemes, which cover other occupations and are not aimed at hazardous or arduous jobs or occupations. In Lithuania, the early provisions for hazardous or arduous work were abandoned recently although some workers still benefit from them based on grandfathering. In some countries, occupational pensions provide more early retirement options for workers in hazardous or arduous jobs. In Switzerland, there are more than 1 400 occupational pension schemes with separate rules, which can grant benefits from the age of 58. For example, in the construction sector, collective agreements are binding for all firms and provide an option to retire at 60 to workers whose jobs considered hazardous or arduous (Natali, Spasova and Vanhercke, 2016<sup>[48]</sup>). Collective agreements provide some early retirement options in occupational pensions to workers in hazardous or arduous jobs in e.g. the Netherlands and Sweden (Jolivet, 2023<sup>[49]</sup>).

**Table 2.1. Occupational scope of pension provisions for hazardous or arduous jobs in OECD countries**  
Rules for workers starting career in 2023

		Airline pilots	Ballet dancers	Electricians	Marine workers	Miners	Train drivers	Bus drivers	Nurses	Journalists	Teachers	Firefighters	Police	Military
Group 1	Austria	Y	Y			Y							Y	Y
	Belgium	Y			Y	Y	Y			Y	Y	Y	Y	Y
	Chile*													
	Colombia*					Y					*	Y	Y	Y
	Estonia	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
	Finland*													Y
	France	Y	Y		Y	Y			Y			Y	Y	Y
	Greece			Y	Y	Y	Y	Y	Y			Y		
	Italy	Y			Y	Y	Y	Y	Y	*	Y	Y	Y	Y
	Norway	Y	Y		Y				Y			Y	Y	Y
	Poland	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
	Slovak Republic		Y	Y		Y			Y			Y	Y	Y
	Slovenia	Y	Y		Y	Y	Y	Y				Y	Y	Y
Spain	Y	Y		Y	Y	Y					Y	Y	Y	
Türkiye					Y			Y	Y		Y	Y	Y	
Group 2	Czechia					Y						Y		
	Germany					Y						*	*	*
	Hungary		Y			Y								
	Japan					Y								
	Korea				Y	Y						*	*	Y
	Latvia		Y				Y					Y	Y	Y
	New Zealand	Y					Y					Y	Y	Y
	Portugal	Y	Y		Y	Y						Y	Y	Y
Group 3	Canada											Y	Y	
	Israel												Y	Y
	Ireland											Y	Y	Y
	United States											Y	Y	Y
Group 4	Australia													
	Costa Rica										*	*	*	
	Denmark													
	Iceland													
	Lithuania													
	Luxembourg													
	Mexico													
	Netherlands													
	Sweden													
	Switzerland													
United Kingdom														

Note: "Y" indicates that countries cover this occupation with special provisions for hazardous or arduous work;

\* indicates that the occupation is covered by special occupational or sectoral provisions but not considered hazardous or arduous.

+ In Chile, Colombia and Finland no or very few occupations are explicitly covered, but they are included in the Group 1 because the rules allow many jobs to be covered based on work characteristics as explained in the text in greater detail. In Colombia, special pension provisions apply also to air traffic controllers, and workers exposed to high temperatures, ionizing radiation, and to carcinogenic substances while teachers do have special pension provisions, but their work is not considered hazardous or arduous. In Finland, the "years-of-service" scheme is closer to disability as it requires medical certificate about reduced capacity to work and a confirmation of having worked in hazardous or arduous jobs. In Costa Rica, policemen, firefighters and teachers belong to judicial and educational sectoral schemes, respectively, which cover other occupations and are not aimed at hazardous or arduous jobs. Also in Denmark, the "seniority pension" scheme requires certificate of reduced work ability. On top of occupations ticked in the table, Latvia provides special pension provisions to some artistic occupations and employees of the State Emergency Medical Service, and other public sector jobs which are not necessarily hazardous or arduous. In Germany and Korea, military (only in Germany), police officers and firefighters are covered by the general pension scheme for civil servants and, thereby, they are not considered as being covered by special pension provisions for hazardous or arduous jobs. In Italy, journalists have their own pension scheme, but they are not considered as hazardous or arduous occupation while only early-education teachers are classified to this group. In Japan, coal miners are covered by mandatory private pension scheme (which has 132 active members) while special pension provisions for firefighters and police officers are expiring and do not cover newcomers. In France, nurses in general are not considered a hazardous or arduous job while midwives are. In the United States only a small group of workers, including local police officers and firefighters, are not covered by national social security and are covered by occupational schemes. Source: Information provided by countries.

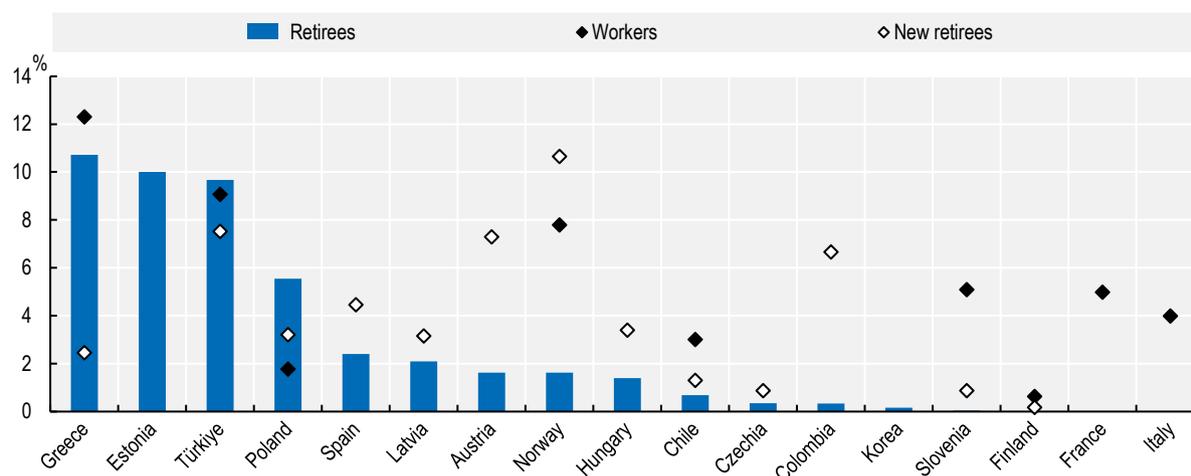
## Number of workers and pensioners covered by special pension provisions

Among OECD countries for which data are available, the coverage of special retirement provisions for hazardous or arduous jobs varies from less than 1% of *retirees* in Chile, Colombia, Czechia, Finland, and Korea to 10% or more in Estonia, Greece and Türkiye (Figure 2.1).<sup>13</sup> In Poland, that share – miners and police officers are the main group among beneficiaries – is 5.6%, higher than among new retirees (3.2%), and than the share of current workers accruing entitlements in these schemes (1.8%). In Greece, only 2.2% of those having retired in 2021 used provisions for hazardous or arduous jobs, which is substantially less than among total retirees or the share of covered workers, at 11.2% and 13.4%, respectively. This suggests that, even though many workers are still eligible to these provisions, using them is less beneficial than in the past. In France and Italy provisions for hazardous or arduous work cover 5% and 4% of workers, respectively. In France, workers in the private sector accruing points on the accounts dedicated to hazardous or arduous working conditions (C2P) make about half (47%) of workers covered by provisions for hazardous or arduous jobs (the above mentioned 5%), while “active” public-sector workers make the remainder. However, C2P accounts are not dedicated to pension entitlements only and account holders may use the acquired points for training or reducing working hours rather than for retiring early.

Despite the fact that the coverage of pension provisions for hazardous or arduous jobs is shrinking, the share of people retiring based on these provisions is higher among new retirees than among all retirees in Norway (10.7% vs. 1.6%), Austria (7.3% vs. 1.6%), Colombia (6.7% vs. 0.3%), Spain (4.5% vs. 2.4%), Hungary (3.4% vs. 1.4%), Latvia (3.1% vs. 2.1%), and Czechia (0.9% vs. 0.4%). This may be because some special provisions cover only temporary early retirement benefits until reaching minimum age to claim old-age pension. In Hungary, in particular, this is because since 2014 early retirement benefits for hazardous or arduous jobs are temporary until reaching the statutory retirement age.

**Figure 2.1. Coverage of pension provisions for hazardous or arduous jobs among workers, new retirees and retirees**

2022 or latest year



Note: French number refer to 2021 numbers from C2P scheme as well as for the active category of the public servant scheme. Italian number refer to 2011. For Latvia, numbers include workers covered by special pension provisions, of which only part are hazardous or arduous. For Poland, the number for current retirees includes beneficiaries of the bridge pensions (38 600), miners (194 000) and police officers (163 400) and it does not include farmers and military. For Spain, data refer to 2019.

Source: Countries responses to the questionnaire.

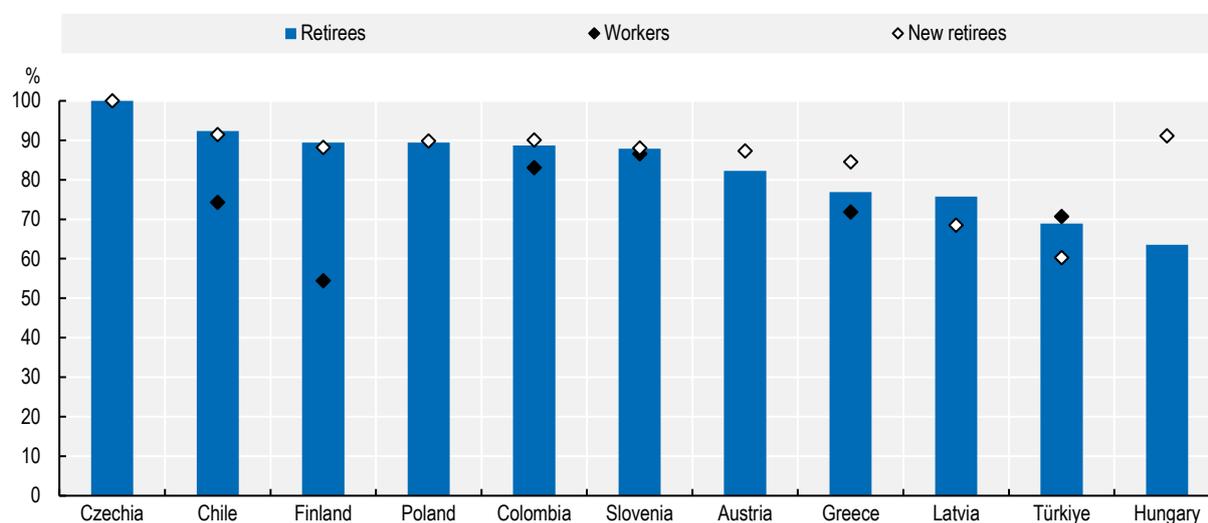
StatLink  <https://stat.link/1qn5ul>

In Chile and Slovenia, only part of the workers who have accumulated additional pension entitlements through employer's contributions to occupational pensions use them to finance early retirement while the majority prefer to boost income after having retired. Using additional assets for early retirement is possible only for workers who contributed for at least 20 years to pension from any job in Chile.<sup>14</sup> As a result of often not using the early retirement option, the share of workers in hazardous or arduous jobs among workers is much higher than the share of new retirees, at 3.0% vs. 1.3% and 5.1% vs. 0.9% in these two countries, respectively.

The vast majority of workers covered by hazardous or arduous pension provisions are men (Figure 2.2), because these schemes often cover male-dominated occupations, such as miners. Among retirees, men make more than 75% of beneficiaries in Austria, Chile, Colombia, Czechia, Finland, Latvia, Poland and Slovenia.

**Figure 2.2. Pension provisions of hazardous or arduous jobs effectively cover mainly men**

Share of men among retirees, new retirees and workers covered by the schemes



Note: Women make 70% among workers working in hazardous or arduous conditions in Norway, potentially due to the inclusion of care workers, where women are over-represented.

Source: Information provided by countries.

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### **Early retirement provisions for hazardous or arduous work**

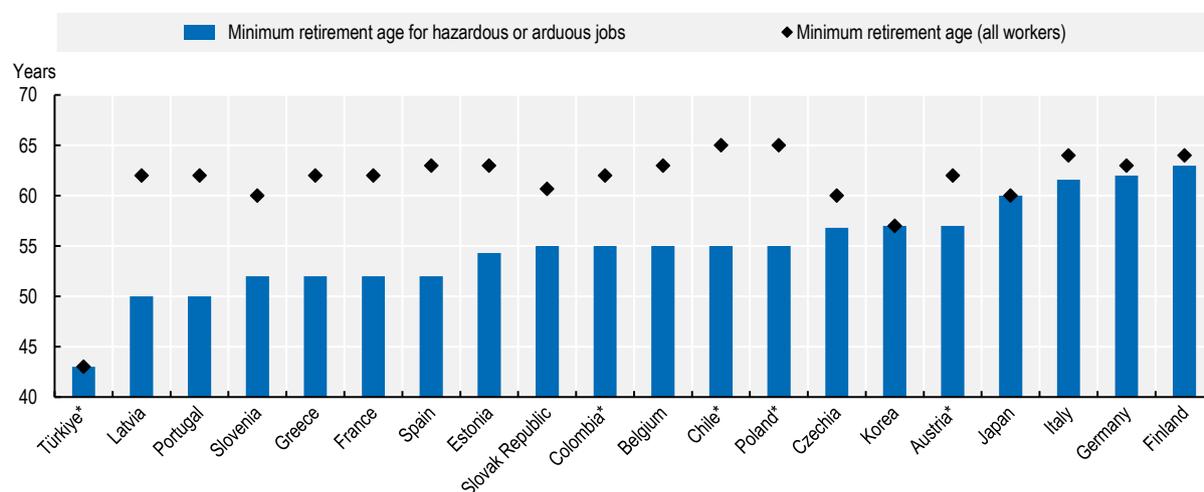
Pension provisions for workers in hazardous or arduous jobs allow them to retire before the minimum retirement age that applies in general. Rules differ among jobs, with e.g. ballet dancers in France, Norway and Portugal being generally allowed to retire very early, in their forties. Some other workers covered by provisions for hazardous or arduous work can retire at 55 or earlier in Belgium, Chile, Colombia, Estonia, Greece, Latvia, Poland, Portugal, the Slovak Republic, Slovenia, Spain and Türkiye, while in Finland, Germany, Italy, Japan and Norway they can retire at the age of 60 or later.<sup>15</sup> In Austria, workers working nightshifts can retire at age 57 and 52 for men and women, respectively, while other arduous working conditions allow to retire, after a 45-year career, at age 60 compared to the early retirement age of 62 for other workers. In Chile, workers in hazardous or arduous jobs are entitled to anticipate their retirement up to 10 years provided they have a general contribution record of at least 20 years. In France the minimum age for most so-called active occupations in the public sector is 57 and 52 for some other so-called super active while for private-sector workers the retirement age can be reduced through the C2P by up to 2 years

from the statutory age of 62 years. The 2023 reform increased all these ages by 2 years. Norway, depending on sectors and occupations, retirement ages are 60, 63 and 65 while the statutory retirement age is 67. Ballet dancers, vocal soloists and choral singers at the Norwegian National Opera and Ballet have an age limit of, respectively, 41, 52 and 56 years. Additionally, Norway applies a so-called “85-year rule” which makes it possible to retire three years before the special age limit if the sum of age and tenure exceeds 85 years. In Portugal, ballet dancers can retire without early retirement penalties from age 45, airline pilots from age 65, which is higher than in many other countries, and other occupations covered by specific rules are allowed to retire within this range. In Spain, the retirement age can be reduced by between 5% and 50% of years worked in hazardous or arduous occupations, with e.g. 10% applying to local police officers, 15% to train drivers, 40% to pilots and 50% for some miners. There is a general floor at age 52 but some occupations, such as miners and marine workers, are exempted from this limit.

Compared to the current minimum retirement age, i.e. the age at which workers can access a pension from the main earnings-related scheme, Chile, Estonia, Greece, Latvia, Poland, Portugal, Slovenia and Spain provide some workers in hazardous or arduous jobs with options to retire 10 or more years before (Figure 2.3). This is between 5 and 9 years in Austria, Belgium, Colombia, Estonia, France and the Slovak Republic; and less in Czechia, Finland, Germany, Italy and Norway. In Korea, workers in hazardous or arduous job cannot retire below the minimum retirement age for other workers but their pensions are not subject to penalties for early retirement. In Türkiye, the age-related eligibility condition for public pension in general applies only to workers who started their careers after 8 September 1999; for men and women who started working before that date 25 and 20 years of contribution, respectively, are required to receive a pension.

**Figure 2.3. Pension provisions for hazardous or arduous work reduce the minimum pensionable age by more than 5 years in some countries**

Excluding ballet dancers and artists, 2022



Note: (\*) In these countries, women can retire earlier than men, and shown values apply to men only. For Austria, 57 years applies to workers working in night. In France, the age of 52 applies to some “super active” public-sector occupations, including national police officers, prison officers and air-traffic controllers; while other “active” public sector occupations, including local police officers and firefighters, can retire at 57; the C2P in the private sector allows to lower the retirement age by 2 years. In Poland, the minimum age for the so-called bridge pensions for men is 60 in general, but it is 55 for some specific workers including marine workers and miners. In Spain, the minimum age applies to most hazardous or arduous jobs, but miners and marine workers are exempted. For Türkiye, the current minimum retirement age of 43 refers to a man starting career at age 18 and retiring with 25 years of contributions; men born in 1980 can retire with 25 years of contributions as the age-related condition has been introduced later.

Source: Data provided by countries.

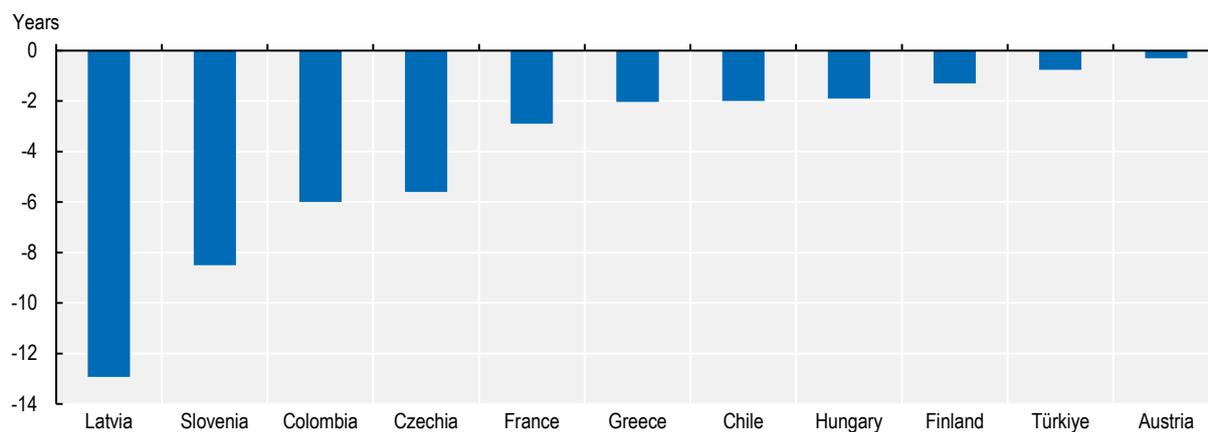
Both Austria and Italy have some special schemes for those who started their career very early and worked in arduous conditions. In Austria, 10 out of last 20 years in hazardous or arduous jobs are required to retire at age 60 on top of the 45 years of paying contributions. Workers with long careers (also 45 years) but not working in hazardous or arduous work can retire two years later, i.e. from age 62. In Italy, there are three options to retire early for workers working in occupations classified as arduous (different occupations qualify for different options): at age 61 and 7 months with at least 35 years of contributions and the sum of age and career contribution being at least 97.6; 41-year career and working before the age of 19; or, at age 63 with 36 years of contribution with the so-called Social APE. This compares with the statutory retirement age of 67 and to the so-called quota 103 allowing to retire at age 62 with 41 years of contribution (as of 2023).

Pension provisions for hazardous or arduous jobs require a substantial part, but not all, of the career to be performed in these jobs. For example, Poland requires 15 years, Greece 12 years, Portugal between 10 and 22 years and the Slovak Republic between 10 and 20 years depending on occupations. Like Austria (see above), Italy requires a minimum tenure of 7 years in hazardous or arduous work in the last 10 years before retirement. In Italy, eligibility conditions for some occupations are not linked to life expectancy developments contrary to the general rule. In Estonia and Korea, contribution period in hazardous or arduous work needs to make at least 50% and 60% of total contribution period, respectively. In Türkiye, workers in hazardous or arduous occupations accrue up to 50% more contribution period for up to 5 years. In Chile and France (C2P), workers accrue entitlements to early retirement for every period of work in hazardous or arduous jobs.

Workers covered by pension provisions for hazardous or arduous work actually claim their pensions earlier than other workers (Figure 2.4). Latvia stands out as workers covered by pension provisions for hazardous or arduous work, which apply to selected public-sector occupations, claim benefits almost 13 years earlier than other workers on average, at age 50. In Slovenia, pension provisions for hazardous or arduous jobs take the form of a supplementary occupational scheme, and workers covered retire at 54 on average, which is 8.5 years earlier than those in other occupations. In Colombia and Czechia having access to these specific pension provisions result in retiring around 6 years earlier, while the difference is less than 3 years in Austria, Chile, Finland, France, Greece, Hungary and Türkiye.

### Figure 2.4. Workers in hazardous or arduous jobs effectively claim pensions earlier

Difference in the average age of claiming pensions between workers in hazardous or arduous jobs and all workers, 2021 or latest year



Source: Information provided by countries, [www.cor-retraites.fr/sites/default/files/2023-03/Doc\\_15\\_SG\\_Cat%C3%A9gories%20actives\\_fonction%20publique.pdf](http://www.cor-retraites.fr/sites/default/files/2023-03/Doc_15_SG_Cat%C3%A9gories%20actives_fonction%20publique.pdf) for France.

StatLink  <https://stat.link/vtmqj4>

### ***Pension levels for workers in hazardous or arduous jobs are more generous***

Pension provisions for workers in hazardous or arduous jobs include higher accrual of pension entitlements and no penalty – or sometimes lower penalties – for retiring earlier. In Germany miners accrue one-third more per year than other workers. In Ireland, accruals are higher for some occupations. In Latvia, the specific schemes do not follow notional defined contribution (NDC) rules introduced for most workers in 1995, but are based on DB principles, granting a gross replacement rate of 45%-65% after 20-30 years of work. By comparison, based on the OECD pension model, NDC rules imply a replacement rate of 40% after a 42-year career for people retiring today.<sup>16</sup> There are no penalties for early retirement based on provisions for hazardous or arduous work in Belgium. In Austria, the penalty for retiring earlier, at 1.8% per year, for workers with arduous work other than night work is lower than the general 4.2% penalty while those working at night are subject to regular penalties capped at 13.8%.

In some countries, workers covered by retirement provisions for hazardous or arduous work receive additional benefits until reaching statutory retirement age. In Poland, men and women working in hazardous or arduous jobs can claim the so-called bridge pensions from ages 60 and 55 compared to the minimum statutory retirement ages of 65 and 60, respectively. Bridge pensions are calculated in the same way as old-age pensions and are therefore adjusted based on the age of granting benefits. This adjustment, however, does reduce pensions beyond the age-60 adjustment for those (women) retiring before age 60. In Italy, Social APE for workers in hazardous or arduous jobs is a tax-financed benefit that ceases when the beneficiary becomes eligible to old-age pensions. In Slovenia, early retirement for workers in hazardous or arduous jobs are calculated based on capital accumulated in a funded occupational scheme and its expected duration. It does not affect entitlements from the public old-age pension.

### ***Financing of pension provisions for hazardous or arduous jobs***

To finance earlier benefits for hazardous or arduous jobs within PAYG schemes, countries often use both additional (employee and employer) contributions and general pension revenues. In Portugal, the schemes are financed from the general social security budget, with additional contributions for miners and air traffic controllers paid by employers. In Türkiye, additional contributions vary from 1 to 3 percentage points in the private sector and between 3.33 and 10 percentage points in the public sector. In France, C2P is financed from contributions paid by all employers through a work-accident insurance fund.<sup>17</sup> In Austria, employers pay additional contributions at the rate of 2% for workers working at night while exposure to other arduous working conditions such as high or low temperature, or heavy physical work do not incur additional contributions and are covered by the general public pension budget. In Colombia, additional contribution for hazardous or arduous jobs of 10 percentage points are made by employers.

In some countries the financing of early retirement provision for hazardous or arduous jobs is partially or fully separated from general pension finances. In Chile, higher contributions lead to higher benefits for workers in hazardous or arduous jobs compared to benefits of other workers; in both cases they are based on FDC calculations. In the Slovak Republic separate voluntary contributions are directed into a specific FDC scheme, with the minimum rate of 2% while up to 6% are tax deductible. In Slovenia, the contribution rate in an occupational FDC scheme is 9.25%. In Poland, these early pensions are financed from state subsidies and employers' contributions at a 1.5% rate. Latvia pays most pensions for hazardous or arduous jobs from the state budget, while a private FDC scheme finances early pensions for railway workers from employer's contributions. In Norway, early retirement benefit until reaching the statutory retirement age is financed from private occupational pensions through higher employers' contributions in the private sector while in the public sector they are financed from the state budget. By contrast, in Luxembourg early retirement for hazardous or arduous jobs are fully financed from the pension budget.

## Reform trends

### ***Tightening access to pensions for hazardous or arduous jobs***

Many OECD countries have tightened access to pension provisions for hazardous or arduous jobs. This trend started in the 1990s or even earlier as longevity improvements started putting financial pressure on pension systems. With increasing retirement ages across the board, very low retirement ages for some occupations became even more difficult to justify. As job mobility has tended to increase across sectors, there has also been a broader trend to simplify and unify pension systems across occupations, including for civil servants, and occupation-specific pension entitlements have become obsolete, particularly in heavy industry sectors.

For example, Ireland removed the lower retirement age for police officers, soldiers and firefighters in 1995, and Lithuania eliminated the special provisions for most occupations also in 1995. In Luxembourg, only workers who started work before 1999 can qualify for provisions for hazardous schemes, but all workers can retire early from age 57, which is very low in international comparison. Finland eliminated most occupational-specific early retirement options in the public sector in the 1990s, with a long transition period until the 2030s. In 2016, early retirement for marine workers was abandoned and only soldiers kept some special provisions. In the private sector, early retirement provisions were abandoned in the early 2000s. In 2017, the so-called years-of-service early retirement scheme was introduced to allow those with 38 years of contributions subject to a verifiable declaration that the job is arduous to retire 2 years below the statutory retirement age, which is currently of 65 years and will gradually increase. Hungary introduced additional contributions to finance early retirement for selected occupations in 2007. In 2011, early retirement for military personnel was eliminated. Since 2014 almost no new entitlements to early retirement are accrued among workers in hazardous or arduous occupations and the additional contributions are not collected, which leads to the gradual disappearance of additional pension rights for these occupations. The only two exemptions are underground miners and ballet dancers. The Slovak Republic has been extending the minimum contributory period to access early retirement for soldiers, police officers and firefighters from 15 years in 2013 to 25 years in 2032. The special provisions are fading out also in Japan.

In Estonia and Norway reforms limiting early retirement provisions for workers in hazardous or arduous jobs are underway. Estonia is working on terminating special provisions for workers in hazardous or arduous jobs based on improvements in working conditions over time. Moreover, the government is planning to improve workplace safety and retraining policies. The current plans assume maintaining already acquired pension entitlements while stopping any new accruals. In Norway, a systemic reform introduced NDC pensions in 2011, affecting cohorts born after 1962. In 2020, the early retirement scheme (AFP) for public-sector workers was aligned with the private-sector scheme and turned into a pension supplement. Reforms to early retirement options for workers in hazardous or arduous jobs are supposed to follow, but the negotiation process has been difficult.

In Belgium and Slovenia, despite some efforts, reforms to pension provisions for hazardous or arduous work have stalled. In Belgium, the issue has generated debates, especially in the wake of the 2014 report published by the Commission Pension Reform 2020-40. One of the Commission's recommendations was that social partners draft a list of so-called arduous jobs (within a certain framework established by the Commission) that could be used to decide about early retirement conditions. The subsequent government asked social partners to come up with such a list, but a consensus has never been reached. Setting up rules within social dialogue has been problematic and no agreement has been reached so far with the government.

## **Coverage of hazardous or arduous jobs and general pension reforms**

Systemic pension reforms have had a very different impact across countries on the pension coverage of hazardous or arduous jobs. When implementing systemic pension reforms a few decades ago, Chile and Poland adjusted pension provisions for hazardous or arduous jobs, while Latvia kept these provisions largely untouched. Sweden did not have any such provisions even before implementing new pension system in 1990s and it has not introduced any. Following parametric pension reforms increasing retirement ages, France and Finland have favoured special pension provisions based on job characteristics rather than occupations while Italy expanded these provisions to mitigate the impact of tightening access to early retirement for all workers.

Chile substituted a PAYG DB scheme with FDC pensions in 1981, which, among others, unified pension rules across occupations. In 1995, the FDC scheme was amended with the introduction of an early retirement option for arduous work. Additional individual contributions were set to finance options to retire before the statutory retirement age for selected workers.

Poland eliminated many occupational differences in pension provisions as a consequence of introducing notional defined contributions (NDC) scheme but introduced a unified early retirement option for workers having worked in hazardous or arduous jobs before the reform (Esser and Palme, 2016<sup>[50]</sup>). In 1999, Poland substituted its financially unsustainable and fragmented public DB pension scheme with an NDC scheme, for people born after 1949. As the first generation of people covered by the NDC rules introduced in 1999 reached the age of 60 in 2009, Poland introduced a so-called bridge pension scheme for a broad set of hazardous or arduous jobs. The scheme grants benefit for up to five years below the statutory retirement age of 65 and 60 for men and women, respectively, until reaching the statutory retirement age. The benefits are calculated following the NDC rules, without, however, any adjustment for retiring below 60. The scheme is financed by additional pension contributions of 1.5 percentage points and state subsidies. Initially it was planned to be a temporary solution only for those who started career before 1999 but in 2023, applying from 2024, it became permanent. As remaining exceptions, miners can retire after 25 years of work without age limit, or at age between 50 and 55 for shorter careers, and military and police officers can retire at age 55 after 25 years. Latvia introduced NDC in 1996 but many occupations, including those classified as hazardous or arduous, in the public sector were kept out of the new scheme, resulting in lower retirement ages and higher benefits calculated based on defined benefit principles.

In Sweden, the public pension system has been universal for more than 100 years and thereby the systemic reform in 1990s did not generate specific entitlements for workers who may, in other countries, be considered as having hazardous or arduous jobs.

In some countries, e.g. in Austria, Finland, France and Italy, early retirement options for workers in hazardous or arduous jobs may have been introduced to mitigate the impact of tightening general pension eligibility conditions and to replace past occupation- or sector-specific rules. New rules are linked to job-specific characteristics rather than occupation titles, making entitlements more transferable across jobs. Still, these schemes may incur substantial administrative costs on firms or on public administration. After having tightened general eligibility conditions to pension in 2000, Austria enacted the current rules for workers in arduous jobs (*Schwerarbeitspension*) in 2003, being effective from 2007. The scheme is effectively designed for those who started their career early as it requires 45 years of contributions.

In the 1990s, Finland started tightening access to early retirement for all workers. In 1995, special entitlements to early retirement stopped accruing for, among others, firefighters, nurses and police officers; and in 2016 for marine workers. To partially compensate for these, in 2017 the so-called years-of-service pension were introduced which allows to retire 2 years before other workers based on arduous job characteristics, assessed individually.

In France, early retirement provisions for some occupations were created in the late 1990s and early 2000s. These were, for example, early retirement options for workers working in arduous jobs (so-called

CATS), which expired from 2005 as early retirement for early-career starters (before age 20) had been introduced in 2003. Another early retirement option for asbestos-exposed workers (CAATA) was introduced in 1999 (Bonnand, 2016<sup>[51]</sup>). Since 2003 policy makers sought to establish arduousness criteria, which were enacted in 2010. Today, workers in jobs fulfilling the criteria accrue points in so-called C2P accounts (*Compte professionnel de prévention*).<sup>18</sup> These points can be used for three purposes: training (to facilitate moving into less arduous jobs), reduction in working hours or early retirement. The criteria are defined based on six work characteristics, based on working: at night; in successive shifts; in hyperbaric environment; in noise; in extreme temperatures; and, performing repetitive work. This is a reduction from ten criteria used until 2017 as four were excluded due to difficulties in their measurement: awkward postures, manual handling of heavy loads, mechanical vibrations and dangerous chemical substances. Along with this tightening access to these accounts, additional pension contributions of employers to finance the scheme were abolished. With the 2023 reform (Chapter 1) increasing retirement ages for all workers, some occupational schemes, including for public transport and the energy sector, were closed for new workers, who may become eligible to C2P accounts. Moreover, the 2023 reform eased the criteria to benefit from C2P for work at night work and in successive shifts, and removed the ceiling applying to the total number of points that can be accumulated through the career.

In Italy, following the substantial tightening of eligibility conditions to pensions in the 1990s, special pension rules for hazardous or arduous jobs were introduced in 1993. In 2012, for the first set of strenuous occupations (*lavori usuranti*), the minimum retirement age was set at age 60, which was 5 years below the statutory retirement age, to increase in parallel with the statutory retirement age (Jessoula, Pavolini and Strati, 2016<sup>[52]</sup>). In 2016, a broader category of arduous jobs was created (*lavori gravosi*) (Nadalet, 2020<sup>[53]</sup>). In 2018, this list was further expanded.<sup>19</sup> Workers in occupations included in this list can retire after a 41-year career if they started working before age of 19. Additionally, since 2017, the so-called social APE (it. *Anticipo Pensionistico*) social, financed from general taxation, is available from age 63 with 36 years of contribution, as of 2023, if having performed arduous jobs in at least seven out of the last ten years before retirement. Social APE was supposed to be a temporary measure, but it has remained in place ever since. The expansion of schemes for hazardous or arduous jobs in Italy after 2016 is part of a broader trend to ease early access to old-age pensions.

To address reduced work capacity of some workers before reaching the statutory retirement age, Denmark introduced senior pensions in 2020. This is a horizontal early retirement scheme that allows to retire six years below the statutory retirement age, of 67 in 2022, if work capacity is permanently reduced based on an individual assessment by specialists. It can be combined with up to 15 hours of work per week. The senior pension replaced the so-called Senior Disability Pension, which had stricter eligibility condition.<sup>20</sup>

Mandatory retirement ages for pilots do not exist in all countries, and these ages are influenced by factors going beyond safety considerations. Currently, the Civil Aviation Organization (ICAO), a specialised unit of the United Nations, sets the maximum age of pilots in international flights at 65. The age was increased from 60 in 2006 when it was raised from 45 since 1963.<sup>21</sup> Some countries, e.g. Australia, Canada and New Zealand, provide no mandatory retirement ages, which implies that the older pilots in these countries are only able to operate domestic flights. In the United States, the mandatory retirement age for pilots has increased from 60 to 65 in 2007, with a further increase to 67 currently undergoing legislative process; this would align it with the statutory retirement age for Social Security which is increasing to 67 for people born in 1960 or later. The political debate goes much beyond safety issues as pilots undergo strict medical tests regularly, and it includes discussions about labour shortages in the sector and the competition between older and younger pilots.<sup>22</sup>

## How labour market and other social policies address work-related risks

Whether pension provisions are needed for hazardous or arduous jobs partly depends on the existence and efficiency of other preventive, active and compensating policies. The section starts by discussing health and safety regulations which can reduce the scope of hazardous or arduous working conditions as well as their negative impact on health. There is large room for improving preventive measures, but they cannot by themselves fully eliminate the negative health impact of some jobs. Then the section turns to activation measures, related to lifelong learning and reskilling, which are key for workers to acquire and to maintain skills needed to remain in employment, in particular when it becomes difficult or even impossible to continue work in the same job due to ageing. Finally, the section looks into disability benefits which provide income when long-term health issues impede work. Some specific disability benefits require proving a strict causal link between working conditions and lost earning capacity, which is difficult when long-term exposure to some risks has delayed impacts.

### ***Health and safety regulations, and other preventive policies***

By setting minimum standards in terms of health, safety and well-being in the workplace, workplace regulations limit both hazardousness and arduousness of jobs and their impact on workers' health and well-being. The health and safety regulation of working conditions has at least a century-long tradition within OECD countries. There are some crucial elements to ensuring the efficiency of these regulations. First, duly reporting injuries and occupational diseases is the prerequisite to detect potential issues, target prevention and allow workers to make informed decisions. Many countries impose the obligation to disclose information about work-related risks on firms, as for instance in France, where employers must identify, evaluate and inform employees about work-related risks, take measures to prevent those that can be prevented, and specify the measures undertaken to mitigate the remaining ones based on collective agreements (Mittlaender, 2023<sup>[54]</sup>). Second, financial incentives for firms, such as contribution rates for accident insurance reflecting actual risks level at specific firms, tax credits and grants are an important lever to encourage employers to go beyond basic accident prevention and safety, and comprehensively promote health and well-being in the workplace (OECD, 2022<sup>[55]</sup>).

Government agencies or other institutions are often in charge of reporting cases, enforcing standards and implementing prevention programmes, including in Belgium, Chile, Czechia, Denmark, Luxembourg, Norway and Poland. For example, in Chile, a specialised institution<sup>23</sup> establishes plans for occupational trainings as well as the prevention of occupational accidents and diseases. In Denmark, the Danish Working Environment Authority can fine the enterprises that do not comply with the health and safety regulations. In addition, the National Research Centre for the Working Environment (NFA) conducts and disseminates research to develop healthy and safe working environment. In Norway, the National Institute of Occupational Health operates the national monitoring system for the working environment and publishes the Factbook on working environment and health every three years.<sup>24</sup>

Czechia, Luxembourg and Portugal have introduced interesting innovations to improving health and safety of work. In Czechia, the legislation limits the maximum exposition to various adverse working conditions, including noise. If the maximum duration of exposition is exceeded, the worker must be assigned to another job. Luxembourg is implementing the so-called Vision Zero strategy accepted by government, employers and employees for 2023-30 in order to decrease the number and severity of work accidents and occupational diseases by 20%. The strategy involves a series of communication events.<sup>25</sup> Portugal launched a campaign in 2016 on "Safe and healthy workplaces" emphasising that safe and healthy working conditions throughout the whole working life are good for workers, businesses and society as a whole. Specifically, the campaign had four objectives: promoting sustainable work and healthy ageing from the start of the working life; preventing health problems throughout the working life; providing ways for employers and workers to manage occupational safety and health in the context of an ageing workforce, and encouraging the exchange of information and good practice (OECD, 2022<sup>[56]</sup>).

In many countries, including Germany, Latvia, Norway and Poland, prevention programmes are individually tailored and often organised and financed by insurance institutions, for which reducing incidence of injury, occupational diseases and disability improves financial balance. For example, the Polish social security agency finances occupational disease prevention programmes. In Latvia, based on individual assessment, individuals at risk of disability are offered individually tailored assistance. In Norway, the government, businesses and social partners signed an agreement to reduce sick leave and labour market drop-out. The agreement focuses on improving the working environment by, among others, early mapping of work-related risks. In New Zealand, the Accident Compensation Commission (ACC) provides sickness insurance, and to reduce spending on benefits, takes efforts to reduce the number and severity of work injuries. These efforts often include retraining components which are preventively directed also at people at risk of disability or those with partial disability.

The complex issues of improving health and safety at work require comprehensive strategies, as implemented for example in Korea and Sweden (OECD, 2022<sup>[56]</sup>). In 2020, Korea overhauled the Occupational Safety and Health Act in 2019 and expanded regulations on preventive measures against industrial accidents. Sweden updates the *Work Environment Strategy* every five years, and the current one for 2021-25 takes into account not only preventing illnesses and accidents but it also aims to develop good work conditions through four priority areas: sustainable working life: everyone should be able to have the capacity to work a full working life; healthy working life: working life is to contribute towards development and well-being; safe working life: no-one is to place their life or health at risk due to their job; and, a labour market free from crime and cheating: a poor work environment is never to be a competitive tool.

### ***Lifelong learning, reskilling and age-management policies***

Continuous training throughout working lives is critical to ensure that employees have the right skills to stay in employment as they age. This is particularly the case where changing jobs is required to limit negative health effects or due to the lack of ability to continue the work at certain ages, as e.g. in the case of ballet dancers or football professionals. One objective of old-age pensions is to provide income security to face age-related limitations to work, with social norms helping to shape reasonable retirement ages. Not being able to continue work in one very specific job should not be dealt with by early retirement.

Reskilling and upskilling ensure that workers can remain productive and adapt to a new job, increasing the likelihood of remaining in employment (OECD, 2023<sup>[57]</sup>). Governments and social partners therefore need to put in place a policy framework that enables workers in hazardous or arduous jobs to acquire new skills (Global Deal, 2023<sup>[58]</sup>). Creating such a framework is an ongoing challenge, however, which requires substantial efforts from all parties involved: policy makers, employers and workers. Public policies should also ensure that training is attractive to older workers, particularly in small- and medium-sized enterprises.

There are many policy examples of reskilling policies applied to workers at different ages, but a systematic evaluation of these policies is often lacking. In 2018, the Australian Government introduced a new programme – the *Skills Checkpoint for older workers* – with the aim of providing older workers with guidance on either transitioning into new roles within their current industry or pathways to new careers. Overall, the programme encourages lifelong learning and helps older workers access training to upskill or reskill and participate in the labour market. Korea has implemented skills development programmes customised to middle-aged workers (OECD, 2022<sup>[56]</sup>). In Luxembourg, workers who are incapable of performing their jobs due to health reasons, disability, or wear and tear, but who are not eligible to disability benefits, are proposed to remain in the same company in a different position, or to be employed in a different company (OECD, 2023<sup>[59]</sup>). The Netherlands introduced a five-year subsidy scheme for firms to invest in the employability of workers, including older workers. For older workers for whom it is hard to continue working until the retirement age because of physical or mental burn-out, the programme offers training and counselling, but it can also subsidise early retirement up to 3 years before the statutory

retirement age. The skill development centre in Scotland has been assessed as very successful (Rising et al., 2021<sup>[60]</sup>). It offers a wide range of services to support individuals facing redundancy.<sup>26</sup> The centre aims to anticipate skills demand, adjust training programmes and offer career guidance.

Tools like mid-life career reviews, personal development plans and career conversations can help workers make informed decisions about investments in future skills. Mid-life career reviews are indeed simple and cost-effective ways to identify upskilling and reskilling needs. In 2021, France introduced a new medical examination at age of 45, intended to raise employees' awareness of ageing at work and to prevent occupational wear and tear. During the visit, a professional reskilling agreement in the company can be proposed (OECD, 2023<sup>[59]</sup>).

When not fit to perform arduous tasks, older workers can remain at work in different roles that may involve more clerical tasks, mentoring or coaching. Mentoring and coaching as devices to develop skills and competences in the workforce are amongst the most widespread tools in talent management (OECD, 2020<sup>[61]</sup>). For example, in France, older bus drivers are sometimes moved to easier tasks.<sup>27</sup> In the case of bus drivers, age-management practices might include for example drastically limiting night shifts for older drivers. Also, job rotation programmes might minimise long-term exposure to harmful working conditions and increase the ability to perform different jobs. Through job rotation, employees familiarise themselves with various tasks while acquiring technical and practical skills applicable throughout firms, thereby being more versatile and competent to handle multiple functions. Small and medium enterprises face serious challenges, however, to implement these solutions.

Public employment services in many OECD countries try to act proactively and provide re-qualification programmes to both the unemployed and workers who risk losing their job. In Latvia, workers facing work-related risks of health deterioration or being unable to continue working in a profession with high emotional or physical strain can be trained in a new profession. Public employment services in Estonia offer career counselling to both workers and the unemployed. If needed, a career-information specialist helps find the relevant information to develop the career. In Norway, labour market policies contain a wide range of general measures targeting employees with health-related challenges. This includes various programmes for skills development and other measures to get or keep work. People with health-related challenges are the largest group participating in labour market programmes in Norway. Unemployment benefits complement the activation measures to smooth job transitions, in particular when acquiring new skills requires some time commitment that is hard to reconcile with working.

The transition from one career to another is never easy but it is often feasible, in particular when supported by good policies (Bimrose and Brown, 2010<sup>[62]</sup>). For example, ballet dancers in Australia, Switzerland and the United Kingdom are not covered by special pension provisions, and many of them successfully pursue alternative careers, be they related (e.g. as choreographers) or unrelated to dancing (Jeffri and Throsby, 2006<sup>[63]</sup>). Nonetheless, retraining comes with significant challenges. About half of former dancers in all three countries indicated that they had to make significant use of their own funds to finance their further retraining. Many countries systematically offer career reorientation for soldiers, including Czechia, Korea and the United States (Binková, 2018<sup>[64]</sup>).<sup>28</sup> Evaluation of reorientation programmes for soldiers in the United States show that such programmes improve employment outcomes compared to those not covered by such policies (Chief Evaluation Office, 2023<sup>[65]</sup>). Reskilling policies played an important role in absorbing labour market consequences that older workers faced during the phasing out of some economic activities like coal mining in Germany, Poland, and the United Kingdom; and fisheries in Canada (White, 2003<sup>[66]</sup>; Pollin, 2023<sup>[67]</sup>).

### ***Disability insurance and rehabilitation***

Social or occupational insurance provides benefits to workers in the case of disability, including when it results from hazardous or arduous work (OECD, 2022<sup>[68]</sup>). Work-related injuries and occupational diseases most often lead to higher disability benefits relative to those granted for other reasons. Many

OECD countries have special work injury insurance schemes that provide up to 100% wage compensation for work-related injuries.

Workers eligible to special pensions for hazardous or arduous jobs do not often qualify for disability benefits and in particular for work-related disability benefits. While pension schemes for hazardous or arduous jobs are typically accessible to all people in these jobs fulfilling the age and career requirements, eligibility to disability benefits is always based on an individual health and work-capacity assessment.<sup>29</sup> Moreover, eligibility to work-related disability benefits requires proof of a causal link between the illness or disability and work performed. This causal link can be difficult to prove, in particular for mental health issues and when prolonged exposure to hazardous or arduous conditions results in delayed occupational diseases. Viscusit (1984<sup>[4]</sup>) points out that some occupational illnesses have long latency periods and their symptoms do not appear until many years after the exposure to the risk.

There is a tension – magnified by the growing importance of labour shortages in some countries (OECD, 2023<sup>[69]</sup>) – between providing early retirement options for hazardous or arduous jobs and policy efforts by many OECD countries to limit the negative impact of sickness and disability on labour market participation (MacDonald, Prinz and Immervoll, 2020<sup>[70]</sup>) and to strengthen activation measures for those who receive disability benefits (OECD, 2010<sup>[71]</sup>). Related measures include providing rehabilitation and employment services to people with disabilities and to those facing disability risks, including workers in hazardous or arduous occupations. Some OECD countries, including Austria, Belgium, the Netherlands, Norway and Switzerland, have made substantial efforts to manage sickness absences in a more active way by promoting and facilitating a fast return to work, often through partial benefits and a gradual return to work (OECD, 2022<sup>[68]</sup>). In Finland, partial sickness and rehabilitation allowances support employees with reduced working capacity to return to work quickly on a part-time basis. Additionally, earnings-related pension providers organise occupational rehabilitation to people who have health issues and face problems at work because of disabilities. Rehabilitation may consist of training to a new job at the workplace or at educational institutions. Lithuania introduced vocational rehabilitation benefits and a programme for adaptation to new jobs in 2005.

## Policy implications

Arduousness or hazardousness are present in many jobs and exposure to work accidents, occupational diseases and work strain differs substantially across occupations (see above section). There is convincing evidence of a causal negative impact of some working conditions on health, sometimes with some delay.

Yet, the debate on hardship of work is very difficult, both from the point of view of defining the criteria and from that of reaching an agreement between social partners. As a result, most countries find it difficult to include hardship considerations in pension schemes. Issues at stake are not limited to wear and tear at work; they extend to delayed potential effects of working conditions on health. The complexity of the subject has been compounded by the fact that attention is now focused not only on physical problems or disability, but also on the psychological problems of stress at work, which is even much more difficult to measure.

### ***Reform trends have tightened or eliminated special old-age pension provisions***

OECD countries can be classified into four groups in their treatment of pensions for hazardous or arduous jobs (see Table 2.1 in a preceding section). Pension provisions for workers in hazardous or arduous jobs differ a lot among OECD countries in terms of jobs and occupations covered. Countries define eligibility conditions to special pension provisions for hazardous or arduous jobs based on either occupational titles or measurable characteristics of jobs (e.g. lifting heavy weights, extreme temperatures, chemical risks, night shifts), which may apply to any occupation. Some countries mix these approaches and provide both a list of occupations, often in the public sector only, and a list of criteria related to job tasks.

Following reforms of pension systems over recent decades, special pension schemes covering workers in hazardous or arduous jobs have been reduced in scope. General reform trends have contributed to increasing employment at older ages and to unifying pension rules across occupations and sectors. Over the last three decades, as a response to longevity improvements, statutory retirement ages have been raised, including through linking them to life expectancy, and early retirement options have been reduced (Whitehouse et al., 2009<sup>[72]</sup>; Boulhol, Lis and Queisser, 2023<sup>[73]</sup>). Many OECD countries, e.g. in Finland and Poland, have largely unified pension rules applying in particular to civil servants and the self-employed to improve risk-sharing and provide a fairer treatment of all workers (OECD, 2016<sup>[74]</sup>; OECD, 2019<sup>[75]</sup>). Unified rules becoming the default solution for the whole pension system make it harder to justify separate pension rules for workers in hazardous or arduous jobs.

The incapacity to work until minimum retirement ages for all workers does not justify granting special old-age pension provisions for hazardous or arduous work. From a work perspective, pension systems play a key role in shaping social norms about what is old age and what is working age. In modern societies and labour markets, individuals are not identified by one function or occupation. A career for life in one occupation or one job tends to be a thing of the past. Being unable to continue working in the same occupation only in the second part of a career – while being a serious issue that needs to be tackled by the adequate policies discussed above – does not and should not imply permanently retiring from the labour market.

There have been serious issues of mistargeting the special pension schemes for hazardous or arduous jobs by including jobs in which hardship is questionable. Evidence from Estonia, Hungary and Slovenia shows that: jobs of many workers covered by these schemes were not more hazardous or arduous compared to other jobs; workers did not experience higher mortality; and, many of them continued to work while getting their early pension benefits. Additionally, the selection of some jobs looks very ad hoc, as for example workers performing the same jobs in the public sector being covered while those in the private sector being excluded. In Poland, special pension provisions for teachers aimed to improve attractiveness and boost employment without creating an immediate cost to public finance. In France, ballet dancers from the Paris Opera were granted the right to retire at age 40 in the 17th century, which has been increased to 42 years in 2010.

Many OECD countries have phased out or tightened access to pension provisions for hazardous or arduous jobs. One standard argument put forward for their initial design has become particularly obsolete over time. This refers to allowing to retire very early based on the sole reason of not being able to continue the career in some specific job. Finland, Ireland, Lithuania and Luxembourg eliminated the special provisions for most occupations in the 1990s. When introducing systemic pension reforms, Chile and Poland adjusted pension provisions for hazardous or arduous jobs, while Latvia kept these provisions largely untouched. In Sweden, the public pension system has been universal for more than 100 years and there are no specific entitlements for workers who may, in other countries, be considered as having hazardous or arduous jobs. In some countries, however, e.g. in Austria, Finland, France and Italy, early retirement options for workers in hazardous or arduous jobs may have been introduced to mitigate the impact of tightening general pension eligibility conditions and to replace past occupation- or sector-specific rules. While in Estonia and Norway reforms limiting early retirement provisions for workers in hazardous or arduous jobs are underway.

Over the last two decades, some countries, including Finland and France, have improved the design of pension schemes covering hazardous or arduous jobs to better address actual risks. These innovations link eligibility to some actual job characteristics that are considered hazardous or arduous rather than based on occupational groups, thereby limiting mistargeting, ensuring the transferability of pension entitlements across occupations, and reducing retirement age by two years at most. While Finland started to phase out many occupation-specific early retirement provisions in the 1990s, it introduced in 2017 the so-called years-of-service pension which allows two years before other workers (currently 65 and increasing) based on arduous job characteristics, assessed individually. In 2010 France introduced

individual accounts in which workers accrue points for periods worked in jobs having strictly described arduous characteristics. These points can be used for three purposes: training (to facilitate moving into less arduous job), reduction in working hours or early retirement by up to two years. As it is difficult to prove the health and mortality impact of specific work characteristics with robustness, whether to cover a specific condition is strongly influenced by what is perceived as fair. Hence, the scope of the schemes, in terms of selected job characteristics is not uncontroversial.

### ***Should jobs with negative health effects be covered by special pension rules?***

While special pension rules seem to be a natural response to deal with the negative impacts of hazardous or arduous working conditions on health, other considerations must be brought into the debate. The most obvious situation justifying special pension rules for hazardous or arduous work seems to arise when there is robust evidence that job characteristics lower life expectancy. This case is extreme but keeping it in mind helps illustrate more general related questions at stake, which will be discussed below. First, authorising jobs with such dire consequences should be limited to those that are absolutely necessary despite being inherently associated with high risks. For example, many countries have reduced as much as possible the exposure of jobs to asbestos. For those that must be authorised, trying to prevent and mitigate these difficult working conditions is the first line of defence. Second, if despite these efforts, these jobs still raise mortality rates, it is critical to inform potential workers of the induced risks. Third, for those well-informed who take the risks, one question to consider is how special pension provisions modify compensation and whether they in the end improve welfare. Early retirement options increase the attractiveness of hazardous or arduous jobs, which otherwise would need to pay higher wages. The wage mechanism is likely not to work well in markets where alternative job opportunities are scarce and bargaining power of workers is low as well as in the public sector. However, these limitations in wage responses should be addressed where they arise, i.e. in the labour market, rather than being inefficiently addressed through pension provisions. Beyond health, the negative impacts of hazardous or arduous working conditions on the well-being of workers who feel tired and uncomfortable at work could be addressed by other measures than pension provisions, including through proper technologies, collective agreements and management decisions.

One main question is therefore whether the serious issues raised by hazardous or arduous jobs should be dealt with by old-age pension systems. It is argued in this chapter that measures which can provide the most efficient response (first-best policies) should primarily combine: first, health and safety regulations to limit the risks; second, informing about the remaining risks; third, lifelong learning; and, fourth, disability insurance. In general, for jobs for which working at older ages generates immediate health and safety risks (e.g. firefighters and military), there is a stronger case for special pension provisions. Still, age-management policies, including lifelong learning and reskilling, should strive as much as possible to shift the career at some point and prepare for this in order to maintain individuals in employment until the minimum retirement age for all workers. Moreover, as delayed health impacts of some job characteristics (e.g. physical strain, noise or uncommon working-time patterns) are typically not covered by disability insurance, some special pension provisions can complement disability insurance. The objective is to compensate workers in these jobs for the potential long-term consequences, which occurrence should be backed by solid evidence, through well-targeted early retirement options. For example, there is some robust evidence (Dutheil et al., 2020<sup>[76]</sup>; Wang et al., 2014<sup>[77]</sup>) showing that working at nights has a long-lasting negative health effects, and monitoring this working condition generates little administrative burden for employers; this condition is recognised by special pension provisions in Austria and France, among others. Given the difficulties to prove the long-term impact of specific working conditions on health, limiting special pension provisions only to areas for which solid evidence exists creates the risk of unfair treatment of some workers. Yet, providing too broad a coverage also raises equity issues because some workers then unduly benefit from the scheme.

The above policies help prevent, mitigate and compensate the effect of hazardous or arduous working conditions. They can create a framework of measures that is largely outside the scope of pension policies.

When a proper framework is in place to protect workers in hazardous or arduous jobs, this implies that pension measures such as linking retirement ages to life expectancy to deal with population ageing are largely orthogonal to those tackling the issues raised by hardship of work.

In countries where this good framework is not in place, the priority should be to develop it. Setting up effective lifelong learning policies in particular can have broader positive consequences, e.g. to help adjust to the future of work. What to do in the meantime is not obvious. On the one hand, some special pension rules for jobs assessed as hazardous or arduous based on solid evidence could be maintained as long as the framework is not sufficiently developed. On the other hand, as often when similar policy questions arise, maintaining the special rules might defer indefinitely this framework implementation by limiting its need. Similar considerations apply to limited incentives to improve working conditions when some forms of compensation for workers in harmful jobs are maintained.

### ***Policy priorities to address those issues are outside the realm of pensions***

Hazardousness or arduousness of jobs thus raise first and foremost an issue for labour market policies. That is, the policy priority should be, when possible, to improve working conditions for such jobs. Long-term exposure to related risk factors, such as physical strain, noise or uncommon working-time patterns, is likely to generate some delayed negative health consequences. Improving working conditions can be achieved through health and safety regulations to limit exposure to risky factors as well as by encouraging or incentivising social partners to take measures to limit hardship and health risks.

Communicating about the risks – backed by evidence – involved in working in hazardous or arduous jobs is essential for two reasons. First, information must be conveyed as a moral imperative to ensure that workers accept the jobs in full knowledge of the facts. Second, informing about the risks helps workers weigh different job opportunities and ask to be compensated for the risks to be taken, which in turn contributes to internalising the negative impact of those jobs, mainly by raising their cost and therefore the price of related goods and services. Likewise, effective communication could be used by employers to limit either hardship or the related activities. However, some workers may effectively have limited choice and take hazardous or arduous jobs without being duly compensated. Even in this case, it is not obvious that this issue should be dealt with by pension systems. Instead, policy efforts should focus on overcoming the labour market limitations that prevent the compensation mechanism from working.

Even if health and safety regulations are fully efficient, some jobs are likely to impair workers' health. Reskilling and upskilling aim to enable workers to remain productive and adapt to new job tasks, boosting employment prospects, albeit performing different tasks or moving to a different job, in the same or at different firm or institution. A professional-training and guidance framework has therefore to be put in place by governments and social partners to allow workers in hazardous or arduous jobs to make the needed extra effort into acquiring new skills, such that they can prolong their careers in different jobs. Not being able to continue working in one specific job should not be dealt with by early retirement. Special pensions for hazardous or arduous work cannot be in the long term an antidote for strong limitations in labour market policies.

The permanent withdrawal from the labour market in countries where special pension schemes exist, sometimes at very early ages, is an inefficient solution to address the decline in the ability to perform some specific tasks at older ages. Indeed, people in this case can most often successfully perform other jobs. In some countries, ballet dancers are covered by special pension provisions (but not sport professionals) which represents an extreme case in this context. While it may indeed be difficult to redesign careers in the middle of life or at advanced ages, many workers face similar challenges given changing labour markets. Active labour market and educational policies should facilitate career transitions.

Early retirement options for workers in hazardous or arduous jobs may indeed not be consistent with the activation priority set in labour market policies, especially at older ages, to deal with ageing challenges. In

2015, the OECD Council on Ageing and Employment Policies made three Recommendations that focus on strengthening incentives for workers to build up longer careers and continue working at older ages through, among others, restricting the use of publicly funded early retirement schemes and enhancing participation in training by workers throughout their working lives (OECD, 2015<sup>[78]</sup>). The Recommendations recognise the need to enhance job quality for workers at all ages in terms of strengthening workplace safety and physical and mental health as well as reducing the incidence of hazardous or arduous work. If too broadly defined, early retirement provisions for hazardous or arduous work provide obvious disincentives to continue working for people who can actually work (OECD, 2015<sup>[78]</sup>). Occupation-specific pension provisions can also reduce job mobility if changing jobs results in losing some pension entitlements. Furthermore, special pension provisions, when publicly financed, lower the incentives by firms to reduce the incidence of hazardous or arduous work.

Developing lifelong learning and reskilling programmes is an ongoing effort in most OECD countries. There are successful examples of such policies. Finland's skill development system is one of the most successful in the OECD (OECD, 2020<sup>[79]</sup>). Labour market training encompasses a range of tools such as vocational short courses; standard initial, further or specialist vocational qualifications; vocational qualification modules; and, entrepreneurship training. Public employment services purchase training, which is free for individual, from education providers and companies. Austria introduced a co-ordinated programme to enable adults to obtain basic competences and educational qualifications free of charge (OECD, 2020<sup>[80]</sup>) in 2012. Between 2012 and 2017 approximately 50 000 individuals participated in the measure. The Netherlands introduced several policies to help older (50+) unemployed back to work between 2013 and 2017. Training-related measures in this plan include the introduction of mandatory free-of-charge job-search training, and the introduction of training vouchers.

When job-related risks materialise at working age and impair workers' health, long-term sickness benefits and disability insurance may help deal with the consequences until the retirement age. While they increasingly aim at activating people with disabilities, disability benefits typically compensate for both work- and non-work-related disability based on the individual assessment of the capacity loss. However, they do not compensate for the health impacts that may become fully visible only after having retired. Eligibility to higher benefits provided by disability or injury insurance, requires establishing a causal link between work and the loss of work capacity. Even when existing, these causal links are often difficult to prove, in particular when prolonged exposure to hazardous or arduous conditions result in delayed diseases.

Even if some special pension rules benefiting certain professions are no longer justified, eliminating them should be done carefully. This chapter argues that most of the issues raised by hazardous or arduous jobs should be primarily addressed by a set of policies that are beyond the realm of pensions. This set includes regulations and prevention measures, communication of the health-related risks, lifelong learning and disability insurance. Eliminating special old-age pension provisions covering workers in hazardous or arduous jobs should be decided if the policy framework enables in particular these workers to develop employment prospects in other jobs as they age during their career.

Moreover, in some countries historically, these special pension rules were granted as a way to boost the attractiveness of some occupations, and by allowing policy makers or countries to defer the cost of these schemes in the medium to long term. This means that removing these special provisions may be done through so-called grandfathering, applying the new rules to new employees only, or by applying longer transition periods than with other parametric reforms. Avoiding the loss of attractiveness of these jobs requires to offer other, more efficient forms of compensation, higher wages in particular. In the private sector, this is likely to happen over time as a result of market forces. In the public sector, the wage adjustment requires policy action and policy makers should be ready to face the short- and medium-term cost for public finance of improving wage conditions.

How pensions for workers in hazardous or arduous jobs are financed has therefore important economic and social consequences. Except in the case where pensions are effectively claimed for shorter periods

due to lower life expectancy caused by poor working conditions, early retirement or higher benefits generate costs for public finance. Publicly financing special pension provisions for hazardous or arduous private-sector jobs is likely to lower wages, and thereby, labour costs leading to higher demand for harmful work, and in the end more public spending. In some jobs or occupations, potentially including the police and the military, it may be fair that these extra costs are shared broadly, but in other cases individual firms may need to at least partly finance special pension provisions, if only to provide them with financial incentives to improve working conditions.

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## Notes

<sup>1</sup> Theoretically, Pestieau and Racionero (2015<sub>[81]</sub>) develop a framework in which differentiating retirement age by occupation might be superior to individually-assessed disability pensions when health verification is expensive and imprecise, and occupations differ substantially in terms of disability and health.

<sup>2</sup> Mittlaender (2023<sub>[54]</sub>) summarises existing evidence and concludes that research has found positive wage premiums for shift work, work with contact to pollution, unsafe and dangerous work, work involving risks of fatal accidents. Also, reviewing the extensive evidence that wages may compensate harmful job characteristics, Ravesteijn, Kippersluis and Doorslaer (2017<sub>[21]</sub>) conclude that the assumption that all arduousness and hazardousness are fully compensated through wages lacks robustness.

<sup>3</sup> The study is entitled *Sustainability of the state pension system*.

<sup>4</sup> Based on an internal analysis of mortality data by the Hungarian State Treasury.

<sup>5</sup> [www.kimdps.si/sites/default/files/analiza\\_in\\_model\\_rangiranja\\_koncno\\_splet.pdf](http://www.kimdps.si/sites/default/files/analiza_in_model_rangiranja_koncno_splet.pdf).

<sup>6</sup> Based on country responses to the questionnaire sent for Pensions at a Glance 2023.

<sup>7</sup> [www.ilo.org/moscow/areas-of-work/occupational-safety-and-health/WCMS\\_249278/lang--en/index.htm](http://www.ilo.org/moscow/areas-of-work/occupational-safety-and-health/WCMS_249278/lang--en/index.htm).

<sup>8</sup> [www.ilo.org/moscow/areas-of-work/occupational-safety-and-health/WCMS\\_249278/lang--en/index.htm](http://www.ilo.org/moscow/areas-of-work/occupational-safety-and-health/WCMS_249278/lang--en/index.htm).

<sup>9</sup> [www.iwh.on.ca/newsletters/at-work/105/emerging-evidence-points-to-negative-health-effects-of-physical-work-demands](http://www.iwh.on.ca/newsletters/at-work/105/emerging-evidence-points-to-negative-health-effects-of-physical-work-demands).

<sup>10</sup> There is an additional difficulty due to unobservable heterogeneity and selection bias (Defebvre, 2017<sub>[17]</sub>).

<sup>11</sup> The results are based on Continuous Working Life Sample (CWLS), which is an administrative dataset including information from the Spanish Social Security system.

<sup>12</sup> [www.cnracl.retraites.fr/actif/ma-future-retraite/departs-anticipes/depart-anticipe-pour-categorie-active;www.cor-retraites.fr/sites/default/files/2023-03/Doc\\_15\\_SG\\_Cat%C3%A9gories\\_actives\\_fonction\\_publique.pdf](http://www.cnracl.retraites.fr/actif/ma-future-retraite/departs-anticipes/depart-anticipe-pour-categorie-active;www.cor-retraites.fr/sites/default/files/2023-03/Doc_15_SG_Cat%C3%A9gories_actives_fonction_publique.pdf).

<sup>13</sup> For comparison, Natali, Spasova and Vanhercke (2016<sub>[48]</sub>) summarise that the number of workers covered by special provisions in the European Union member countries is between 1% and 4% while it is between 5% and 8% among pensioners.

<sup>14</sup> Only 44% and 67% of all women and men, respectively, retiring in August 2023 have met this 20-year condition.

<sup>15</sup> These ages apply to both men and women in most countries, and only to men in Austria, Chile, Colombia Poland and Türkiye where retirement ages for women in all occupations are lower.

<sup>16</sup> [www.oecd.org/els/public-pensions/OECD-Policy-Brief-Future-Pensioners-2019.pdf](http://www.oecd.org/els/public-pensions/OECD-Policy-Brief-Future-Pensioners-2019.pdf).

<sup>17</sup> [www.editions-legislatives.fr/actualite/comment-fonctionne-le-nouveau-c2p-compte-professionnel-de-prevention/](http://www.editions-legislatives.fr/actualite/comment-fonctionne-le-nouveau-c2p-compte-professionnel-de-prevention/).

<sup>18</sup> [www.editions-tissot.fr/actualite/sante-securite/penibilite-feu-le-c3p-vive-le-c2p-compte-professionnel-de-prevention](http://www.editions-tissot.fr/actualite/sante-securite/penibilite-feu-le-c3p-vive-le-c2p-compte-professionnel-de-prevention).

<sup>19</sup> [www.leggioggi.it/lavori-usuranti-2023-elenco/](http://www.leggioggi.it/lavori-usuranti-2023-elenco/).

<sup>20</sup> [www.ssa.gov/policy/docs/progdesc/intl\\_update/2020-01/index.html#denmark](http://www.ssa.gov/policy/docs/progdesc/intl_update/2020-01/index.html#denmark).

<sup>21</sup> [www.aero-news.net/index.cfm?do=main.textpost&id=484c27c5-c198-4534-b55e-1b9c9fcb3f15](http://www.aero-news.net/index.cfm?do=main.textpost&id=484c27c5-c198-4534-b55e-1b9c9fcb3f15).

<sup>22</sup> [www.reuters.com/business/aerospace-defense/us-airline-pilots-fight-their-unions-increase-retirement-age-2023-08-22/](http://www.reuters.com/business/aerospace-defense/us-airline-pilots-fight-their-unions-increase-retirement-age-2023-08-22/).

<sup>23</sup> *Organismo Administrador de la Ley*.

<sup>24</sup> It also provides an online industry-specific tool to help firms improve working environment website. <https://enbradagpajobb.no>.

<sup>25</sup> <https://visionzero.lu/en/>.

<sup>26</sup> It has several programmes that facilitate access to employment: apprenticeships, for training in industry-specific skills, and programmes to support those with a more uncertain path to employment.

<sup>27</sup> [www.etf-europe.org/wp-content/uploads/2018/09/Arduous-Occupations-and-the-European-Pensions-Debate\\_EN.pdf](http://www.etf-europe.org/wp-content/uploads/2018/09/Arduous-Occupations-and-the-European-Pensions-Debate_EN.pdf) (page 38).

<sup>28</sup> [www.vnet.go.kr/VnetIndex.do](http://www.vnet.go.kr/VnetIndex.do).

<sup>29</sup> Disability benefits also do not compensate for health impacts that only become visible after having retired.



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