Excess work incapacity during and after the COVID-19 pandemic in Poland: evidence from population-level social insurance data

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Abstract

Background: COVID-19 disrupted occupational health and social protection systems; but, evidence on its medium- and long-term effects on work incapacity remains limited.

Objective: To quantify excess temporary and permanent work incapacity in Poland during and after the COVID-19 pandemic using population-level social insurance data.

Methods: This observational study used quarterly Social Insurance Institution administrative data (2015–2024) on rehabilitation benefits and disability pensions, by sex and ICD-10 chapter. Expected pre-pandemic trends (2015–2019) were modelled using log-linear regression. Excess incapacity for 2020–2024 was identified by comparing expected to observed incapacity rates.

Results: Temporary work incapacity increased substantially and remained elevated, resulting in 104,392 more rehabilitation benefits than expected, mostly after the acute pandemic phase. The largest increases occurred for mental disorders (over-80% above expected levels by late 2024) and musculoskeletal diseases, particularly among men (over-30% in some periods). In contrast, permanent work incapacity declined below expected levels, with 49,281 fewer disability pensions awarded, predominantly among men. The largest reductions were observed for circulatory diseases (up to 27% below expected levels) and neoplasms (19%), while musculoskeletal conditions were the only group with excess permanent incapacity, primarily affecting women.

Conclusions: Our findings reveal a divergence between excess temporary work incapacity and reduced permanent disability, likely reflecting the combined effects of health system disruption, delays in benefit adjudication, and pandemic-related mortality displacement. These results have implications for social insurance and rehabilitation policies, underscoring the need to strengthen mental health care, return-to-work pathways and monitoring of disability adjudication.

Keywords: COVID-19; work capacity evaluation; Poland; social security; disability evaluation; insurance benefits

HIGHLIGHTS

- Limited evidence exists on COVID-19 effect on rehabilitation and disability systems
- Temporary incapacity rose sharply, while permanent disability declined
- Mental and musculoskeletal conditions accounted for most excess incapacity
- Men and women showed distinct patterns of temporary and permanent incapacity
- Policies should strengthen rehabilitation and return-to-work systems post-pandemic

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RESEARCH IN CONTEXT

What is already known on this topic?

Previous research has shown that the COVID-19 pandemic temporarily increased short-term sickness absence, particularly for mental health conditions, but evidence on medium- and long-term work incapacity is scarce. Rehabilitation benefits and disability pensions are crucial indicators of prolonged functional limitation and labour market exclusion, yet they have rarely been analysed using an excess-burden framework. So far, it remained unclear how the pandemic affected work incapacity beyond acute sickness absence.

What does this study add to the literature?

This study provides the first population-level, cause- and sex-specific estimates of excess rehabilitation benefits and disability pensions during and after the COVID-19 pandemic. It demonstrates a sustained excess of temporary work incapacity, driven mainly by mental and musculoskeletal disorders, alongside a marked reduction in permanent disability pensions, particularly among men. The findings reveal a clear divergence between temporary and permanent incapacity trajectories that persisted into the post-pandemic period.

What are the policy implications?

The results highlight the need to strengthen mental health care, rehabilitation services and return-to-work pathways to address persistent excess temporary incapacity. They also underscore the importance of monitoring disability adjudication systems to distinguish health-related need from administrative and policy-driven effects during crises.

BACKGROUND

Work incapacity reflects both population health and the functioning of social protection systems (1,2). Empirical studies consistently associate chronic morbidity with subsequent work incapacity, labour market exclusion and increased social and economic costs (2–4). Although institutional arrangements vary across countries, most European systems distinguish incapacity allowances by duration and reversibility, separating short-term sickness absence from temporary and permanent incapacity. In Poland, this structure is reflected in three social insurance benefits: sickness benefit, rehabilitation benefit (RB) and disability pension (DP). While sickness benefits have been widely examined (5,6), considerably less attention has been paid to RBs and DPs, despite their relevance for medium- and long-term functional limitations, labour force participation and public expenditure.

The COVID-19 pandemic affected work incapacity through multiple, often opposing channels. Considering health status, acute infection and post-COVID sequelae increased morbidity risk, while restricted access to diagnosis and treatment may have impaired recovery and rehabilitation (7). At the same time, the pandemic disrupted healthcare delivery and administrative procedures, including the assessment and adjudication of incapacity benefits. In several countries, medical examinations were temporarily suspended or replaced by remote assessments, and the validity of existing incapacity decisions was automatically extended during pandemic waves (8). These institutional responses may have altered observed benefit inflows independently of health trends. Finally, excess mortality among vulnerable individuals, often referred to as mortality displacement or harvesting effect (9), could reduce the population at risk of subsequent work incapacity (12). The net effect of these mechanisms on temporary and permanent work incapacity remains uncertain.

A robust approach to quantify the impact of health shocks is the “excess” framework, originally developed for mortality analyses (10) and increasingly applied to morbidity (11), and work absence (5). In this framework, excess outcomes are defined as deviations of observed events from expected levels projected from pre-shock trends. Following this logic, we estimate excess work incapacity by comparing observed and expected RB and DP rates based on pre-pandemic data.

To our knowledge, no previous study has applied the excess framework to work incapacity beyond short-term sickness absence. Extending this framework to RBs and DPs allows a more comprehensive assessment of the functional and occupational consequences of the pandemic. Further, our cause- and sex-specific analysis enables identification of disease groups driving excess or reduced incapacity and provides insights relevant for occupational health practice, rehabilitation planning and disability adjudication. Understanding how temporary and permanent work incapacity responded to the COVID-19 pandemic is crucial for evaluating the resilience of social insurance systems and informing social policy design. Moreover, analysing data through 2024 captures not only the pandemic peak but also potential post-pandemic persistence or reversal of incapacity trends.

Therefore, this study aims to quantify excess work incapacity in Poland during the COVID-19 pandemic and post-pandemic periods (2020-2024) using quarterly, population-level social insurance data on RBs and DPs. Applying time-series models across cause- and sex-specific data from the Social Insurance Institution, we provide novel evidence on the functional and occupational consequences of COVID-19.

METHODS

Study design

This study is an observational analysis of administrative data and is reported in accordance with the STROBE guidelines and the RECORD extension for studies using routinely collected health data (the completed checklist is provided in Supplementary File 2).

Work incapacity certification in Poland

We define work incapacity using the medical evaluation system of the Social Insurance Institution (SII; *Zakład Ubezpieczeń Społecznych*), which provides social allowances to >90% of the insured population in Poland (excluding farmers, uniformed and justice services employees). SII administers three major allowances that authorise work incapacity. Sickness benefits cover short-term work absence spells and are limited to 182 days. RBs are granted after the sickness benefit period is exhausted, up to 12 months, and the capacity to work is expected to be restored after recovery. DPs are awarded as temporary or

permanent benefits for total or partial incapacity. Table A1 in Supplementary File 2 summarises key characteristics of the three benefits.

In a time-series perspective, sickness benefits reflect acute incapacity, RBs capture post-sickness cases with a recovery expectation, and DPs reflect long-term incapacity with stricter legal conditions. We focus on RBs and DPs, as excess sickness absence has already been analysed using SII data (5). All three benefit types have previously been used to assess work incapacity in Poland (12,13).

Data sources and characteristics

We used administrative SII data on quarterly counts of RBs and DPs, disaggregated by sex and disease category according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10). SII publicly provides annual data for 2013-2024 through its statistical portal (14); but the annual series offer only seven pre-pandemic observations, an insufficient baseline for forecasting years ahead. To obtain a longer baseline with adequate temporal resolution, we requested quarterly, chapter-aggregated data directly from SII. Quarterly data were available for a shorter 10-year period (2015-2024), but offered sufficient temporal resolution to support predictive modelling.

To ensure sufficient counts and interpretability, we analysed ICD-10 chapters rather than individual diagnostic codes. Because RB and DP counts are relatively low for many ICD-10 chapters, we retained the six most frequent diagnostic groups and combined the remaining chapters into an "Other" category. The analysed chapters were: neoplasms (C00-D48), mental and behavioural disorders (F00-F99), diseases of the nervous system (G00-G99), diseases of the circulatory system (I00-I99), diseases of the musculoskeletal system and connective tissue (M00-M99), and injury, poisoning and certain other consequences of external causes (S00-T98). These chapters accounted for 84.7% of all RBs and 89.5% of all DPs issued in 2015-2024. We also examined all-cause (A00-Z99) and the "Other" (all chapters combined but above six analysed separately) groups.

Missing information on the sex (0.1%-0.6%) and ICD-10 chapters (0.8%-1.4%) was proportionally redistributed across sexes and chapters, following previous work on sickness absence using SII data (5). Data on insured persons used to compute benefit rates were also sourced from the SII database (14). For descriptive purposes, we additionally tracked annual RB and DP counts from four COVID-19-related ICD-10 codes: U07-U10, although these codes were not central to the excess framework.

Estimation datasets are provided in Supplementary File 1.

Excess framework and measures

We used quarterly SII data for 2015-2024 to assess excess work incapacity during the pandemic (Q1-2020 to Q1-2022) (Q – quarter) and post-pandemic (Q2-2022 to Q4-2024) periods (based on the Minister of Health regulation that ended the COVID-19 pandemic state on May 16, 2022).

By analogy to excess mortality (10), excess work incapacity was defined as periods during 2020-2024 in which observed RB and DP rates deviated from expected non-pandemic levels projected from pre-pandemic (2015-2019) trends. Conversely, reduced incapacity denotes periods when observed incapacity falls below the expected.

Excess work incapacity, i.e. deviation between observed and expected rates, was examined using three complementary measures (5). First, the p-score captures relative (percentage) deviation and is defined as $p = \frac{O-E}{E}$, where *O* denotes the observed benefit (RB or DP) rate, and *E* the expected rate (15). Second, the z-score standardises deviations by baseline variability and is defined as $z = \frac{O-E}{sd(O)}$,

where *O* and *E* are defined as previously and *sd(O)* is the standard deviation of quarter-specific observations in the baseline period (2015-19) (16). Values between –2 and 2 indicate normal variation, while |z| > 2 reflects significant deviation and |z| > 4 substantial deviation (10). P-scores and z-scores are complementary: p-score summarises the magnitude of relative change, whereas z-score accounts for baseline dispersion, such that large relative deviations (p-scores) may coincide with non-significant z-scores when baseline variability is high. Third, the total number of excess benefits was calculated by multiplying the difference between observed and expected rates by the number of insured persons; net excess benefits is the cumulative sum of excess and reduced benefits across 2020-2024 (5).

Model specification

Given the short baseline (20 quarters), we opted for an ordinary least squares (OLS) approach with quarterly controls. For each sex and cause-specific RB and DP series, quarterly benefit rates (benefit counts divided by insured persons) were first inspected visually to identify trends, potential outliers and nonlinearities. Competing linear and log-linear specifications were compared using the Akaike Information Criterion (AIC), and the specification providing a better fit and plausible projections was retained.

For each series, the following model was fitted to pre-pandemic data and used to generate expected rates for the pandemic and post-pandemic periods.

$$y_t = \alpha + \beta t + \gamma_2 Q2_t + \gamma_3 Q3_t + \gamma_4 Q4_t + \varepsilon_t$$

where y_t – the observed benefit rate (RBs or DPs) in quarter t; used either in levels or in natural logarithms; t – time trend variable, used either in levels or in natural logarithms; $Q2_t$, $Q3_t$, $Q4_t$ – quarterly dummy variables ($Q1_t$ omitted as a reference); α – intercept; β – slope parameter capturing linear time trend; γ_2, γ_3, γ_4 – quarterly effects; ε_t – random error term.

The fitted baseline models (2015-2019) were used to generate forecasts of expected benefit rates for the period 2020-2024. These predicted values served as reference rates for calculating p-scores, z-scores, and total excess benefits.

Analyses were implemented in Python 3.10.11 (17) with pandas 2.2.3, (18), statsmodels 0.14.4 (19), matplotlib 3.10.0, (20) and seaborn 0.13.2, (21) packages.

RESULTS

Trends in all-cause and cause-specific work incapacity

Time trends in RB and DP rates differed markedly across benefit types and diagnostic groups (Fig. 1 & Fig. 2).

[Fig. 1 here]

[Fig. 2 here]

All-cause RB rates rose until Q4-2016, declined to Q1-2020, spiked between Q2 and Q4-2020, and remained elevated post-pandemic. This pattern was most pronounced for mental disorders and musculoskeletal diseases, which consistently exhibited the highest RB rates throughout the observation period. Neoplasm-related RB rates increased throughout the decade, whereas RB rates for nervous system diseases, injuries in men and the “Other” category in women showed declining trends, interrupted by temporary increases in 2020. Circulatory disease RB rates were stable with a transient 2020 rise. Period averages (Supplementary File 2, Table A2) confirm these trends.

DP rates showed a different dynamic. Across sexes and ICD-10 chapters, DP rates declined steadily throughout the pre-pandemic period, with all-cause rates approximately halving between 2015 and 2019. During 2020, DP rates increased temporarily, with marked quarter-to-quarter variability, then declined again and eventually stabilised at low levels with minimal seasonality.

As for COVID-19-related diagnoses (U07–U10), 4,245 RBs and 849 DPs were issued across 2020-2024, corresponding to 0.41% of all RBs and 0.10% of all DPs (Supplementary File 2, Table A3). These shares peaked in 2021 for RBs (1.10%) and in 2022 for DPs (0.18%). U09 (post-COVID-19 condition) generated the highest numbers. Overall, COVID-19-related diagnoses were a minor cause of work incapacity in Poland.

Descriptive patterns and models assessment

Visual inspection of rate trends revealed a pronounced decline in RB and DP rates in Q4-2019 across sexes and diagnostic groups. This quarter coincided with the introduction of a new social insurance benefit (the supplemental benefit for persons unable to live independently), drawing on the same adjudication capacity as RBs and DPs, plausibly creating a temporary administrative bottleneck. To account for this, we evaluated two baselines, including and excluding Q4-2019, and selected the

specification that minimised AIC and produced narrower prediction intervals. The AIC favoured models excluding Q4-2019 in 28 of 32 cases (Supplementary File 2, Table A4); also, these specifications had narrower confidence intervals; therefore, all baseline models were fitted with this outlier excluded.

For several DP series with steep pre-pandemic declines, linear-level specifications produced implausibly low or negative forecasts. Therefore, log-specifications were tested instead, and, in all time-series, they proved to be better fitted to empirical data according to AIC (Supplementary File 2, Table A4) and exhibited more realistic trajectories through the pandemic and post-pandemic periods.

Accordingly, all baseline models were fitted on Q1-2015 to Q3-2019 data using OLS in a log-log form, i.e., both the benefit rate and the time trend entered as natural logarithms, with quarterly dummy variables.

Excess temporary work incapacity – rehabilitation benefits

Figure 3 summarises excess temporary work incapacity measured by p-scores, z-scores and absolute excess RB counts; observed and expected series are shown in Supplementary File 2.

[Fig. 3 here]

For all-cause RBs, we identified significant excess temporary work incapacity. Among men, there were 17 quarters with significant (z>2) and 12 with substantial (z>4) excess; among women, twelve and five quarters, respectively. Substantial z-scores occurred in both sexes in Q2- and Q3-2020 and persisted post-pandemic, particularly in men, for whom substantial excess continued from Q3-2022 onwards. P-scores reached 19.1% in men (Q3-2023) and 19.4% in women (Q4-2024), exceeding 10% in 13 and 11 quarters, respectively. Overall, 104,392 excess all-cause RBs were issued (males: 58,574; females: 45,817), 68.5% post-pandemic (males: 70.8%; females: 65.7%). Cause-specific total (103,791 excess RBs) closely matched the above all-cause figure, indicating internal consistency.

Mental disorders generated the largest and most persistent excess RBs. Among men, z-scores were significant (z>2) or substantial (z>4) in all quarters and exceeded 18 in late 2024. Among women, z-scores peaked at 9.6 in Q3-2024, with eighteen quarters of z>2. P-scores exceeded 80% for both sexes in late 2024, implying RB rates almost double those expected in the pandemic absence. Despite larger relative deviations among men, absolute excess RBs were greater among women (36,865 vs. 20,074). Musculoskeletal disorders also showed substantial excess temporary incapacity, particularly among men. Men had 14 quarters with substantial (z > 4) and four with significant (z > 2) excess; women had five and seven, respectively. Maximum z-scores were 9.8 (Q4-2024) in men and 6.3 (Q3-2020) in women. Of 42,641 excess RBs, 64.3% were among men.

Other diagnostic groups exhibited smaller or mixed deviations. Neoplasm-related RBs showed moderate excess mainly among men, whereas nervous system and circulatory diseases showed limited or negative deviations, particularly among women. Injury-related RBs displayed minimal excess overall. The aggregated “Other” category was characterised by sizeable male excesses and predominantly negative deviations among women.

Excess permanent work incapacity – disability pensions

Figure 4 summarises excess permanent work incapacity measured by p-scores, z-scores and absolute excess DP counts; observed and expected series are shown in Supplementary File 2.

[Fig. 4 here]

Patterns for permanent incapacity differed from temporary incapacity. Considering z-scores, we found no significant (|z|>2) deviations for all-cause or cause-specific DPs, reflecting substantial pre-pandemic downward trends and large baseline variability. However, p-scores revealed notable (|p| > 20%), mostly negative deviations.

For all-cause DPs, p-scores indicated several post-pandemic quarters of notably reduced rates among men (approximately −13% to −15%), with smaller and less frequent reductions among women. Across

2020–2024, 49,281 fewer DPs were issued than expected, of which 85.3% occurred among men. Cause-specific totals closely matched the all-cause estimate (50,125 and 49,281), supporting the internal consistency of estimates.

The largest relative reductions were observed for circulatory diseases. P-scores reached −27.1% among men (Q2-2024) and −24.6% among women (Q4-2022). In absolute terms, reductions were much larger among men (−23,341 DPs) than women (−3,738). Neoplasm-related DPs also declined substantially among men (−8,877), whereas changes among women were smaller (–862). Mental disorders and nervous system conditions displayed sustained post-2021 reductions in both sexes, contributing to the overall post-pandemic contraction of DP inflows. For mental disorders, all p-scores are negative after 2021, yielding net reductions of –4,925 (males) and –6,469 (females). For nervous-system conditions, these declines were –4,875 (men) and –2,449 (women).

Musculoskeletal disorders diverged from this pattern and generated consistent excess DPs, particularly among women, whose p-scores exceeded 15% in eight quarters and peaked at 24.2% (Q3-2024); net excess amounted to 8,543 DPs. Injuries showed temporary early-pandemic expansions followed by near-zero deviations; net excess was 2,024 DPs (males: 1,122; females: 901).

DISCUSSION

Interpretation of findings

Using population-level social insurance data and an excess burden framework, this study quantified temporary and permanent work incapacity associated with the COVID-19 pandemic in Poland. It is, to our knowledge, the first study to document pandemic-related changes in rehabilitation benefits and disability pensions over the 2020-2024 period. We observed a clear divergence between benefit types; RBs showed sustained excess extending into the post-pandemic period, whereas DPs declined below expected levels. These patterns were diagnosis- and sex-specific and were associated with institutional and policy contexts.

We identified several common patterns in RBs and DPs that likely reflect administrative and policy factors rather than population health changes. The sharp decline in Q4-2019 coincided with the introduction of a new social insurance benefit competing for adjudication capacity (22), followed by a rebound as postponed cases were processed. During the pandemic, automatic extensions of incapacity certificates and benefit entitlements under the COVID-19 special act (23), combined with suspended or remote medical assessments, likely increased RB inflows and delayed transitions between benefit types. Similar automatic extensions of disability benefits were implemented in countries such as Greece, France and Bulgaria (24).

The similar temporal patterns across sexes, causes, and benefit types suggest that much of the short-term variability in RB and DP inflows reflects institutional responses to COVID-19 rather than immediate changes in population health. Because progression from sickness absence to RBs and DPs involves considerable lags, direct health effects should be expected to appear gradually rather than immediately after pandemic onset.

Excess temporary incapacity (RBs) was driven primarily by mental and musculoskeletal diseases. Mental disorders accounted for the largest and most persistent RBs excess, with relative deviations exceeding 80% in late 2024. This aligns with evidence of excess absenteeism from mental disorders in Poland (5) and British data showing increased incapacity and disability benefits driven by mental health (25), and broader evidence of persistent post-pandemic mental health deterioration (26). Musculoskeletal conditions also showed persistent excess RBs, especially among men, plausibly reflecting delayed treatment and rehabilitation, changes in work organisation, and prolonged exposure to adverse ergonomic conditions during and after the pandemic (27,28). Neoplasm-related RBs showed moderate excess mainly in men, possibly reflecting disrupted cancer care (29) and consequently worse functional outcomes and rehabilitation needs (30).

In contrast, permanent incapacity declined; DP inflows fell below expected levels across most diagnoses, especially among men, continuing a pre-pandemic downward trend. Pandemic-related disruptions occurred in a system where disability pension awards had already been declining for years due to structural changes, likely amplifying this downward trend rather than reversing it. This pattern is in line with evidence from high-income countries, where disability caseloads declined after 2020 (8).

Epidemiological mechanisms may also have contributed. Poland experienced exceptionally high excess mortality in 2020–2021 (31), disproportionately affecting working-aged men. Mortality displacement among the most vulnerable individuals plausibly reduced the pool at risk of progressing to permanent incapacity, particularly for circulatory diseases, which exhibited the largest DP reductions. Although some studies reported declines in recorded cardiovascular events during the pandemic (32,33), these patterns likely reflect altered care-seeking behaviour and healthcare disruption rather than true reductions in disease burden. Neoplasm-related DPs among men also declined significantly, possibly due to a combination of mortality displacement and disrupted oncological care. However, unlike cardiovascular disease, neoplasm mortality did not show pandemic-related increases (34), underscoring the complexity of the mechanisms involved. An important exception to the overall contraction of permanent incapacity was the increase in musculoskeletal DPs among women. This pattern is consistent with pre-pandemic evidence of higher musculoskeletal disability risk among women (35) and may reflect sex differences in occupational exposure, work-family constraints during the pandemic, and greater susceptibility to prolonged musculoskeletal and fatigue symptoms reported in post-COVID conditions (36).

COVID-19-related diagnoses themselves contributed little to temporary and permanent work incapacity; only 4,245 RBs and 849 DPs were issued for U07–U10 codes, compared to 2.7 million work absence spells across the same diagnoses (5). This indicates that COVID-19 predominantly generated short-term occupational disruptions rather than durable labour market exclusion, consistent with a Swedish study showing that a small proportion of white-collar workers had sickness spells longer than 14 days due to COVID-19-related diagnoses (37).

Policy implications

Our findings have the following implications for health and social insurance policies. First, the persistence of excess RBs indicates that post-acute recovery and pathways of returning to work did not entirely rebound after the pandemic. This suggests capacity constraints or coordination failures at the intersection between healthcare, rehabilitation services and social insurance, as evidenced previously in other settings (8,38). Policy responses should therefore prioritise access to mental health care, musculoskeletal rehabilitation, and vocational reintegration programmes, with a focus on reducing waiting times and ensuring continuity of care after work incapacity. Without such measures, temporary incapacity risks become prolonged and might translate to exclusion from labour, even without formal disability certification (12,39).

Second, the continued contraction of disability pension inflows regardless of increased morbidity, at least in some diagnoses, raises concerns about the sensitivity and resilience of disability adjudication system during health shocks. Pandemic-era administrative measures mentioned above, such as automatic extensions of entitlements and temporary suspension or remote medical assessments, appear to altered disability trajectories independently of population health changes. Policymakers should ensure that disability assessment systems sustain the capacity to process postponed cases once crisis-related disruptions diminish (8).

Third, prominent sex- and diagnosis-specific patterns were identified in both temporary and permanent work incapacity, highlighting the importance of targeted policy responses. The disproportionate excess of RBs for mental disorders and the contrasting patterns in musculoskeletal DPs between men and women suggest that gender-sensitive approaches to rehabilitation and occupational health are needed (40). This includes addressing psychosocial work exposures, caregiving burden and ergonomic risks that may put men and women at different risks, particularly during periods of extensive work reorganisation such as remote or hybrid working forced by health crises (41,42).

Finally, these study findings illustrate how pre-existing trends, such as long-term contraction of DP awards identified, might interact with crisis-related policies. This underscores the importance of situating crisis measures within a broader policy context and of assessing their long-term consequences. Comparative cross-country research with different disability and rehabilitation regimes may inform the design of resilient social insurance systems that balance flexibility in crises with equity, transparency and long-term labour market inclusion.

Study limitations

This study has several limitations. The pre-pandemic baseline was relatively short, although comparable baselines are widely used in excess burden research (43). There is no gold standard for excess burden estimation; choices regarding baseline, model specification, and handling of seasonality, ageing and

pre-pandemic shocks may influence results. Our framework identifies deviations from expected trends but cannot disentangle health, behavioural, and administrative mechanisms. Aggregated administrative data also preclude analysis of individual trajectories and time lags between health deterioration and benefit awards. Finally, findings reflect the Polish institutional context and may not generalise to systems with different disability adjudication rules..

CONCLUSIONS

In Poland, the COVID-19 pandemic was associated with a sustained excess of temporary work incapacity, driven mainly by mental and musculoskeletal disorders, alongside a contraction of permanent disability, particularly among men. These findings support post-pandemic policies that prioritise mental health care, timely rehabilitation and occupational reintegration, while maintaining transparent and responsive disability adjudication systems to prevent prolonged temporary incapacity from evolving into long-term labour market exclusion.

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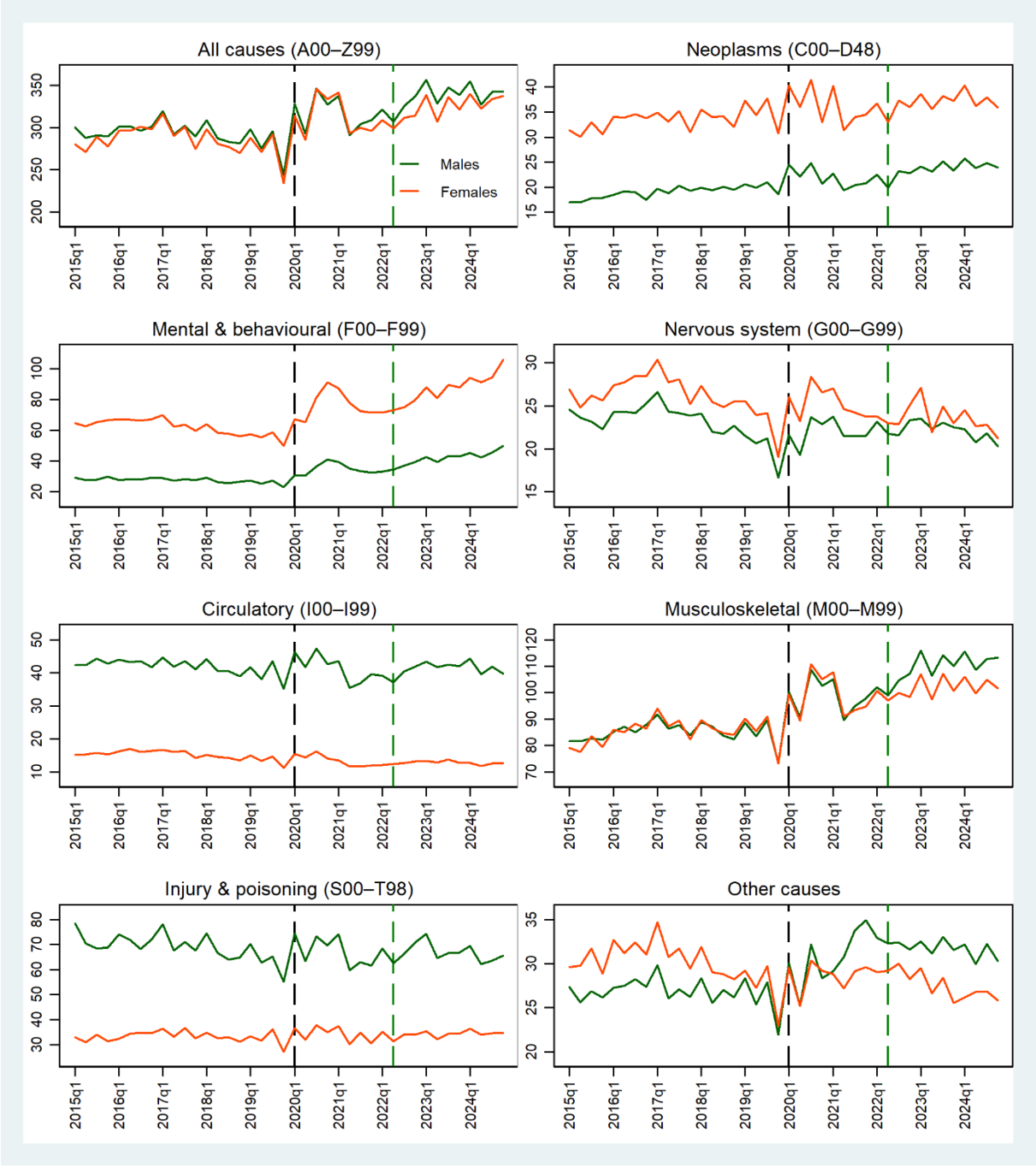
FIGURES

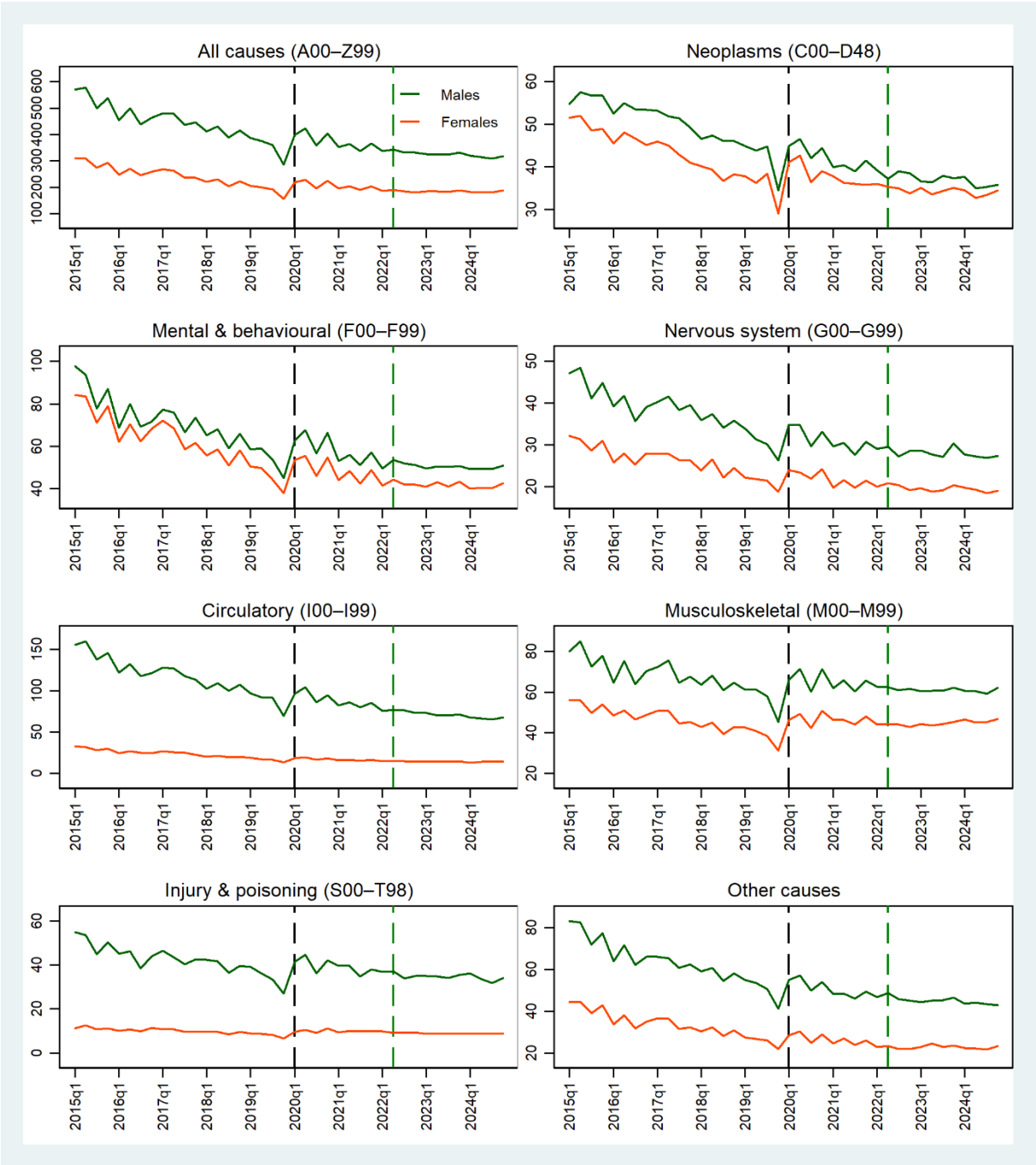
Fig. 1 Sex- and cause-specific rehabilitation benefit rates during 2015-2024



Source: own calculations based on the Social Insurance Institution data. Notes: the black dashed vertical line represents the first pandemic quarter (Q1-2020) – the area on the left of the black line represents the pre-pandemic period; the green dashed vertical line represents the first post-pandemic quarter (Q2-2022) – the area between the black and green lines represents the pandemic period, and the area on the right from the green line represents the post-pandemic period. C00-D98 – Neoplasms; F00-F99 – Mental and behavioural disorders; G00-G99 – Diseases of the nervous system; I00-I99 – Diseases of the circulatory system; M00-M99 – Diseases of the musculoskeletal system and

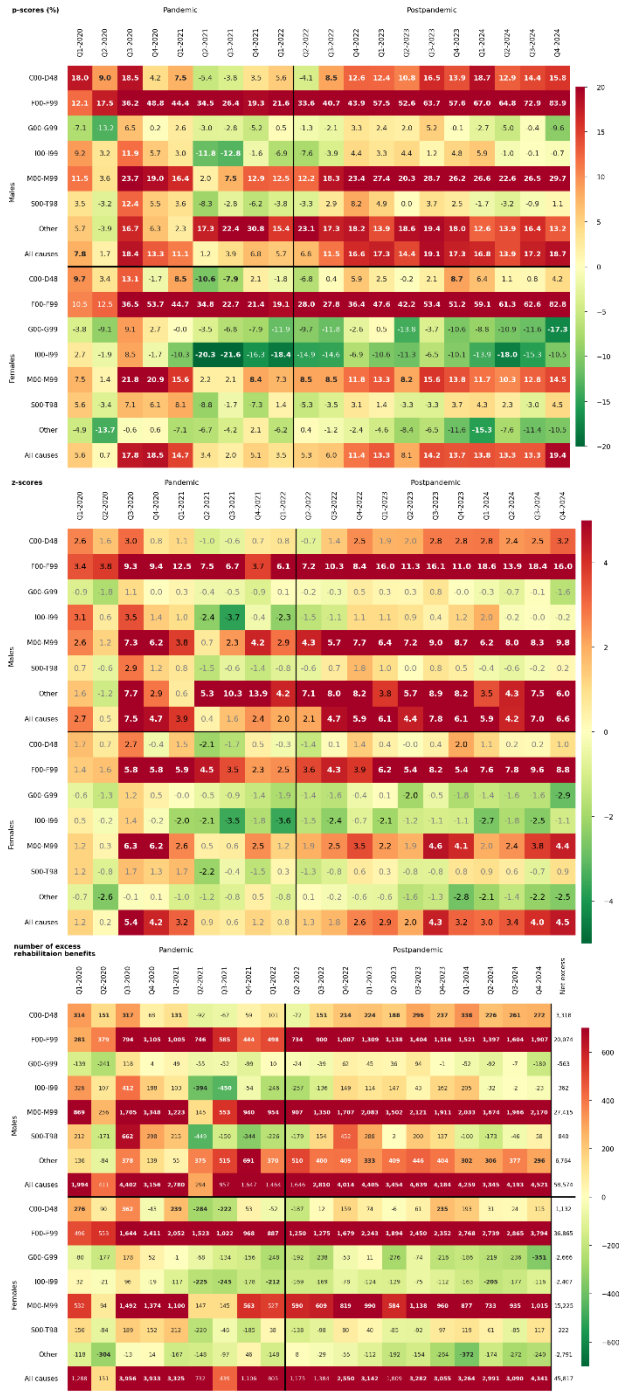
connective tissue; S00-T98 – Injury, poisoning and certain other consequences of external causes; Other causes – all the remaining ICD-10 chapters apart from the six listed above.

Fig. 2 Sex- and cause-specific disability pension rates during 2015-2024



Source: see Fig. 1.

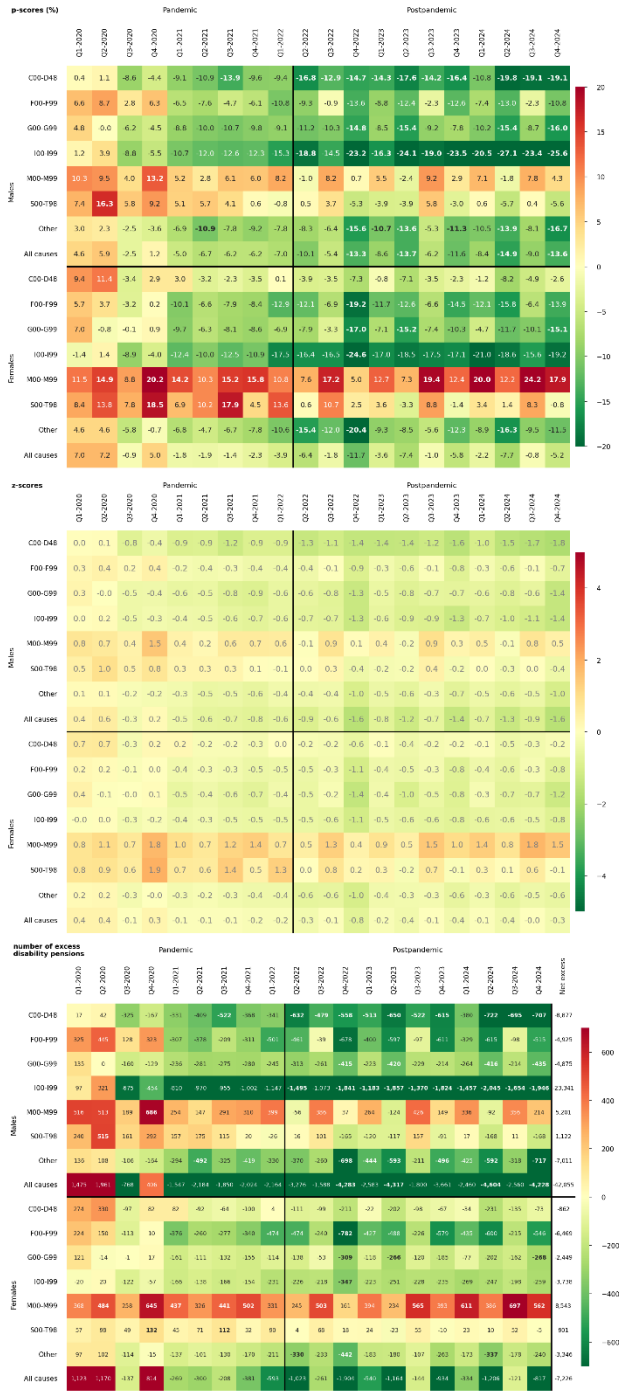
Fig. 3 Excess sex- and cause-specific temporary work incapacity (rehabilitation benefits, RBs) during the pandemic (Q1-2020 to Q1-2022) and post-pandemic period (Q2-2022 to Q4-2024) in Poland: p-scores, z-scores, and number of excess benefits.



Notes: The names of the ICD-10 chapters abbreviated in the figure are given in the Notes to Fig. 1. The p-score was calculated as a quotient of (1) the difference between the observed rate and the expected rate, and (2) the expected rate. The z-score was calculated as a quotient of (1) the difference between the observed rate and the expected rate, and (2) the standard deviation of the observed rate during the pre-pandemic period. The number of excess RBs was calculated as the difference between the observed and expected number of benefits. Positive values for all three measures represent excess work incapacity, while negative values represent reduced work incapacity compared to the rates expected in the absence of the pandemic. For p-scores and the number of excess RBs, significant deviations (based on model confidence intervals) from the expected work incapacity are shown with bold font, while insignificant deviations are shown with normal font. For z-

scores, significant deviations (|z| > 2) from the expected work incapacity are shown with black font; substantial deviations (|z| > 4) from the expected work incapacity are shown with white bold font; insignificant deviations (|z| ≤ 2) from the expected work incapacity are shown with grey font. Colour intensity reflects the magnitude of excess (red) or reduced (green) work incapacity. Qx– stands for xth quarter.

Fig. 4 Excess sex- and cause-specific permanent work incapacity (disability pensions, DPs) during the pandemic (Q1-2020 to Q1-2022) and post-pandemic period (Q2-2022 to Q4-2024) in Poland: p-scores, z-scores, and number of excess benefits.



Notes: The names of the ICD-10 chapters abbreviated in the figure are given in the Notes to Fig. 1. The p-score was calculated as a quotient of (1) the difference between the observed rate and the expected rate, and (2) the expected rate. The z-score was calculated as a quotient of (1) the difference between the observed rate and the expected rate, and (2) the standard deviation of the observed rate during the pre-pandemic period. The number of excess DPs was calculated as the difference between the observed and expected number of pensions. Positive values for all three measures represent excess work incapacity, while negative values represent reduced work incapacity compared to the rates expected in the absence of the pandemic. For p-scores and the number of excess DPs, significant deviations (based on model confidence intervals) from the expected work incapacity are shown with bold font, while insignificant deviations are shown with normal font. For z-

scores, insignificant deviations (|z| ≤ 2) from the expected work incapacity are shown with grey font. Colour intensity reflects the magnitude of excess (red) or reduced (green) work incapacity. Qx– stands for xth quarter.