

# Precarious Work and Poor Occupational Health: A Cross Sectional Study in Luxembourg

Nicole Majery<sup>1\*</sup>, Jemima Wangata Shadi<sup>1,2</sup>, Paula Camelia Trandafir<sup>3</sup>

<sup>1</sup>Service de Santé au Travail, Multisectoriel, Luxembourg, Luxembourg; <sup>2</sup>Centre de Recherche en Santé Environnementale et Santé au Travail de l'École de Santé Publique de l'Université Libre of Bruxelles, Brussels, Belgium; <sup>3</sup>Department of Statistics, Computer Science and Mathematics, Public University of Navarre, Pamplona, Spain

## ABSTRACT

**Background:** In the literature, an increase in precarious work in Luxembourg as well as in other countries has been associated to poor health. Therefore, the Occupational Health Physicians of the “Service de Santé au Travail Multisectoriel” (STM), taking into account the ample financial support given during unemployment in Luxembourg, compared the health and lifestyle data of precarious workers to those with stable work.

**Methods:** This cross-sectional study involved 1472 workers (910 in stable and 562 in precarious work), who were examined at the STM in 2019. Lifestyle and health were self-reported by the workers. The qualitative variables (frequencies and percentage) related to demographic, health, lifestyle and employment factors were analyzed in each group. Pearson’s chi-square test was used to compare both groups and multivariate logistic regression to evaluate the associations between health issues (cardiovascular, mental health, Musculoskeletal Disorders (MSD)) and employment contract type.

**Results:** As far as lifestyle is concerned, there were significant differences found in age, tobacco smoking, type of work, and mental health disorders between the two groups. Precarious workers had a higher prevalence of poor health throughout the entire sample. As for mental health disorders, the prevalence was significantly higher in precarious vs. stable work (8.5% vs. 4.1%,  $p < 0.0001$ ). On the other hand, the difference was not significant in both groups for cardiovascular (6.9% vs. 5.8%) and musculoskeletal (15.1% vs. 13.7%) disorders. Multivariate logistic regression for the total sample revealed a positive association between precarious work and poor health. The odds ratios were 2.36 (CI: 1.50-3.73) for mental health 1.37 (CI: 0.87-2.17) for cardiovascular, and 1.04 (CI: 0.76-1.43) for musculoskeletal disorders. The association was significant only for mental health disorders. The results by gender revealed a higher risk of mental health disorders for women in precarious work (OR=3.41, CI: 1.43-7.82) vs. men (OR=2.99, CI: 1.33-6.74). Men in precarious work had a positive association for cardio-vascular disorders (OR=1.84, CI: 1.03-3.29), and women a negative one (OR=0.88, CI: 0.40-1.95).

**Conclusion:** Our study revealed an association between precarious work and poor health. For mental health, this association was significant for both genders, but particularly so for women. Cardiovascular disorders were positively significantly associated only for men.

**Keywords:** Precarious work; Occupational health; Musculoskeletal disorders; Mental health; Cardiovascular diseases

**Abbreviations:** ADEM: Administration de l’Emploi (Agency for employment); BMI: Body Mass Index; CI: Confidence Interval; GDPR: General Data Protection Regulation; MSD: Musculoskeletal Disorders; OR: Odds Ratio; STM: Service De Santé Au Travail Multisectoriel

## INTRODUCTION

The concept of precarious work is not universally defined across Europe. The International Labour Union (ILO) defines it as an

employment situation where job security, considered one of the principal elements of any labor contract, is lacking. The term encompasses temporary and fixed term labor contracts, work at

**Correspondence to:** Nicole Majery, Service de Santé au Travail, Multisectoriel, Service de Santé au Travail, Multisectoriel, Luxembourg, Luxembourg, E-mail: nicole.majery@stm.lu

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home and sub-contracting [1]. Likewise, for Eurofound, lack of employment security is a central element of all forms of precarious work. This state of insecurity can take on many different qualitative forms. Precarious work includes a wide variety of different 'non-standard' employment practices [2]. Olsthoorn [3], discussing how to measure precarious employment, distinguished three components: insecure employment, unsupportive entitlements, and vulnerable employees in terms of financial means. The definition of precariousness refers to a state of insecurity, which can compromise a minimum standard of decent living. For an individual living in Luxembourg who is involuntarily unemployed, can apply for monetary compensation for up to 24 months. The conditions are: he or she is aged over 16 years, has worked for at least 6 months, and is able to work in the general labor market, even the kinds of precarious work analyzed in our study can provide for a decent standard of living. We have considered as precarious workers those who, after a period of unemployment, have a non-permanent working contract with a maximum of 24 months' duration. The Administration de l'Emploi (ADEM) has developed various proposals for reintegrating unemployed workers into the labor market. First, companies receive financial incentives (such as reduced social security fees and the opportunity to offer temporary contracts to unemployed individuals) if they hire unemployed workers. Second, the ADEM supports employment reintegration measures, such as specific vocational training for people who have been unemployed for >12 months. Individuals, who undergo this training, are offered temporary work contracts with the training company for a maximum of 24 months to improve their chances of being hired in the general labor market afterwards.

For Kaleberg, et al. [4], the prevalence of precarious work has made the availability as well as the quality of jobs riskier and more uncertain; the consequences of this are not restricted to work itself and the workplace, but also affect many other domains, including physical health and wellbeing. Over the last few decades, several epidemiologic studies [5-9] have focused on the negative impact of precarious work on the health of the working population. There is overwhelming evidence that unemployment is strongly associated with mortality and morbidity, harmful lifestyles and reduced quality of life, and job insecurity has been associated with ill health [10].

In Luxembourg, as in other western countries, the labor market has exhibited an increase in precarious work and unemployment. In this epidemiological study, the "Service de Santé au Travail Multisectoriel" (STM), given its role as a public occupational health service in Luxembourg, wishes to highlight the consequences of precarious work on health. The STM carries out regular medical assessments of workers in all sectors except banking, industry and hospitals, as well as on unemployed people reentering the labor market. The frequency of this examination is based on professional risk exposure and is offered every 1 to 5 years, depending on the risk assessment of the companies involved. The aim was to analyze the impact on physical and mental health of all precarious workers undergoing medical assessment at the STM. In view of this purpose, we have considered the importance of work in daily life, the resources each individual has for coping (such as personality, social support, financial resources, ability to structure daily life during unemployment), the cognitive appraisal of job loss, and other coping strategies. Individuals are likely to fare better during

unemployment if they have a higher sense of self-worth, perceived control and optimism, less financial strain, a less negative appraisal of being unemployed, and if they do not identify strongly with work [6]. Occupational health physicians aware of these impacts expressed their desire to have objective data available on the health and lifestyle of precarious workers, as far as the situation in Luxembourg is concerned. A person was considered to be in poor health if he or she presented symptoms and signs related to cardiovascular, musculoskeletal and mental health disorders.

Considering that being unemployed is financially less challenging in Luxembourg than in neighboring countries, one might expect that the effects of precarious work on health might be reduced. Thus, the aim of this study was to compare health and lifestyle issues for precarious workers as opposed to those in stable work.

## METHODOLOGY

### Design and study subjects

A cross-sectional study was conducted on the workers examined at the STM in 2019 by analyzing the medical records in its database. Out of a population of 49773 workers, with 95% confidence level, 2.5% precision and 80% power, the required sample size of 1472 workers was obtained (910 stable and 562 precarious workers). The sample size was computed using the epiDisplay library of the statistical software package R, version. 3.5.3. A double-blind randomized sampling was carried out to select the sample. The STM respected the good practices standards for data collection mandated by occupational health services laws and the requirements of the General Data Protection Regulation (GDPR). The data used were those that had been recorded at the medical examination stating labor-working capacity, and they were secondarily extracted for statistical purposes. Prior to initiating the study, doctors have attended a training course, which enables them to carry out the measuring process in an appropriate manner, thus ensuring that the data have the necessary quality on which a serious research project can be based. Health and lifestyle factors (at the time of the medical examination) were self-reported by workers to the occupational health physicians. The reported variables were categorized into three groups: Demographic factors (age, gender, and Body Mass Index (BMI)), health and lifestyle factors (Cardiovascular Disorders (CVD), mental health disorders, Musculoskeletal Disorders (MSD), and tobacco smoking), and employment factors (employment contract type (precarious or stable work) and type of work (physical work, mental work or mixed)).

### Demographic factors

Demographic factors comprised age, gender and BMI. Age was calculated in years at the time of the medical examination. Nurses measured height and body weight and the BMI was computed automatically in RAMSES, a tailor-made medical database of the STM.

### Health and lifestyle factors

At present, there are several studies focusing on the relationship between unemployment and CVD. Dupre, et al. [11] used data from the prospective Health and Retirement Study to analyze the relationship between unemployment and incident myocardial

infarction. The hazard ratio for myocardial infarction was highest in the first year of unemployment and increased with the number of job losses after adjustment for risk and sociodemographic factors. In our study we have considered as a cardiovascular disorder the presence of high hypertension, with measured value higher than 150/90 mmHg, and a previous medical history of heart attacks.

For mental health disorders, we included perceived symptoms such as anxiety, stress, sleep disorders, and signs of depression. For MSD, the doctors involved in the study recorded the presence or absence of the symptoms like backache (presence of pain in the lower back) and all musculoskeletal complaints (muscular pain or functional incapacities).

For lifestyle factors, we only included tobacco smoking. We excluded alcohol and drug consumption because workers often underreport them during occupational health examinations. We divided smokers into four categories: Non-smokers, former smokers (having smoked for more than 1 year and stopped since then for more than 3 months), light smokers (equivalent to 1–10 cigarettes per day), and heavy smokers (equivalent to >10 cigarettes per day).

### Employment factors

Regarding the dependent variable (employment contract type), we defined precarious workers as those who, after a period of unemployment, obtained a temporary job contract in a private company in any sector, except banking, industry and hospitals, or a limited job contract in those companies offering vocational training. The reference group included workers with stable working contracts. In 2013, experts divided the type of work in the STM database into three categories [12]: Physically demanding, mentally demanding, and mixed work.

### Statistical analysis

The dependent variable was employment contract type with two

categories: Precarious workers and stable workers. The independent variables are age, gender, BMI, cardiovascular disorder, mental health disorder, MSD and tobacco smoking. All variables were categorized as can be seen in the following in Table 1.

The demographic, health and lifestyle, and employment factors are presented as frequencies (and percentages) each group (precarious and stable groups). To compare precarious and stable work, univariate analyses of demographic factors (age, gender, and BMI), health and lifestyle factors (cardiovascular disorders, mental health disorders, MSD, and tobacco smoking), and an employment factor (type of work) were conducted using Pearson's chi-square test.

Additionally, logistic regression was used to assess the associations of health issues (cardiovascular disorders, mental health disorders, MSD) with precarious work based on odds ratios (ORs) and 95% confidence intervals (CIs). These analyses were adjusted for age, gender, BMI, tobacco smoking, and type of work. Additionally, we analyzed the relations between health issues and precarious work stratified by gender.

The statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. A  $p < 0.05$  was considered statistically significant.

## RESULTS

The study sample comprised 1472 individuals, with 910 in stable work and 562 in precarious work. There were twice as many men as women in both the stable and precarious groups, with no significant difference in gender ( $p$ -value=0.453). Likewise, there was no significant difference in BMI between the groups ( $p$ -value=0.326), and in both, almost 50% of the participants had a BMI  $< 25$  kg/m<sup>2</sup>. In both groups, we have significant differences in age, smoking habits, and type of work (Table 2). The highest percentage by age

**Table 1:** Contract type with two categories: Precarious workers and stable workers.

Affiliate	Cardiovascular disorder
1=Stable work	1=Mild hypertension=Stage 1
2=Precarious work	2=High hypertension=Stage 2
Tobacco smoking	Age
1=Non smoker	1 ≤ 30 Years
2=former smoker	2=31-40 Years
2=1-10 cigarettes	3=41-50 Years
3 ≥ 10 cigarettes	4 ≥ 50 Years
Contract Type	BMI
1=Mental	1 ≤ 25 kg/m <sup>2</sup>
2=Mixed	2=25-30 kg/m <sup>2</sup>
3=Physical	3 ≥ 30 kg/m <sup>2</sup>
Mental	MSD
1=Yes	1=Yes
2=No	2=No
SEX	
1=Male	
2=Female	

were workers under 30 years of age (42% in precarious versus 29% in stable work); 55% were under 40. In stable work, the smallest group comprised people over 50 (17.4%) and in precarious work those from 31 to 40 years of age (14.9%). In both groups, about 60% were light smokers and about 20% were heavy smokers. Most of the workers had mixed work (57.7% in stable work vs. 38.3% in

precarious work) and the percentage of physically demanding work is lower for those in stable work (20.7 % vs. 38.4%).

In both groups, less than 10% had cardiovascular disorders and about 15 % had MSD (Table 2). For mental health disorders, there are significant differences between stable and precarious workers (4.1 % vs. 8.5 %, p-value=0.000).

**Table 2:** Characteristics of the participants.

	Group		p value
	Stable work (n=910)	Precarious work (n=562)	
Age groups	n (%)	n (%)	0.000*
<30	264 (29.0%)	238 (42.3%)	
31-40	246 (27.0%)	84 (14.9%)	
41-50	242 (26.6%)	119 (21.2%)	
>50	158 (17.4%)	121 (21.5%)	
Gender			0.453
Female	312 (34.3%)	182 (32.4%)	
Male	598 (65.7%)	380 (67.6%)	
BMI (kg/m <sup>2</sup> )			0.326
<25	427 (46.9%)	276 (49.1%)	
25-30	319 (35.1%)	176 (31.3%)	
>30	164 (18.0%)	110 (19.6%)	
Tobacco smoking			0.014*
Non-smoker	65 (7.1%)	55 (9.8%)	
Former smoker	110 (12.1%)	52 (9.3%)	
1-10 cigarettes	581 (63.8%)	334 (59.4%)	
>10 cigarettes	154 (16.9%)	121 (21.5%)	
Type of work			0.000*
Physically demanding	188 (20.7%)	216 (38.4%)	
Mentally demanding	197 (21.6%)	131 (23.3%)	
Mixed	525 (57.7%)	215 (38.3%)	
Cardiovascular disorders			0.39
Yes	53 (5.8%)	39 (6.9%)	
No	857 (94.2%)	53 (93.1%)	
Mental health disorders			0.000*
Yes	37 (4.1%)	48 (8.5%)	
No	873 (95.9%)	514 (91.5%)	
Musculoskeletal Disorders (MSD)			0.459
Yes	125 (13.7%)	85 (15.1%)	
No	785 (86.3%)	477 (84.9%)	

**Note:** \*p<0.05 (based on Pearson's chi square test)

**Table 3:** Associations of health issues with precarious work.

	OR (95% CI)	p-value	Adjusted OR† (95% CI)	p-value
Whole sample				
Cardiovascular disorders	1.166 (0.757-1.798)	0.486	1.372 (0.869-2.168)	0.175
Mental health disorders	2.186 (1.394-3.430)	0.001*	2.363 (1.497-3.730)	0.000*
Musculoskeletal disorders (MSD)	1.003 (0.738-1.365)	0.983	1.041 (0.757-1.431)	0.804
Men				
Cardiovascular disorders	1.737 (0.998-3.022)	0.051	1.837 (1.026-3.290)	0.041*
Mental health disorders	1.942 (1.125-3.355)	0.017*	2.058 (1.185-3.575)	0.010*
Musculoskeletal disorders (MSD)	1.001 (0.695-1.442)	0.996	1.027 (0.704-1.499)	0.889
Women				
Cardiovascular disorders	0.609 (0.288-1.291)	0.196	0.881 (0.397-1.953)	0.755

Mental health disorders	2.994(1.330-6.740)	0.008*	3.416(1.492-7.823)	0.004*
Musculoskeletal disorders (MSD)	0.997 (0.556-1.785)	0.991	1.062 (0.584-1.930)	0.845

**Note:** †Adjusted for age, gender, BMI, tobacco smoking and type of work (or age, BMI, tobacco smoking and type of work for the stratified analyses by gender), \*p<0.05 (based on logistic regression)

We used multivariate logistic regression to assess the associations between health issues and employment contract type. The first column of Table 3 shows the crude ORs, and the third column shows the OR adjusted for age, gender, BMI, tobacco smoking, and type of work.

Considering the entire sample, cardiovascular disorders, mental health disorders and MSD were positively associated with precarious work. The association was significant only for mental health (p-value=0.000), for the crude ORs and for the ORs adjusted for age, BMI, tobacco smoking and type of work. Precarious workers had a 2.363-fold increased risk of having mental health disorders.

Precarious workers had a 1.372-fold increased risk of having cardio-vascular disorders and a 1.041-fold increased risk of having MSDs, but these associations were not significant. For men with precarious work, we found statistically significant associations for cardio-vascular diseases (p-value=0.041) and for mental health (p-value=0.010). Women with cardio-vascular disorders were negatively associated with precarious work, while mental health disorders and MSD were positively associated, with a significant association only for mental health (p-value=0.04). Women had a 3.416-fold increased risk for mental health disorders in precarious work, while for men it was a 2.058-fold risk.

## DISCUSSION

In this study we compared the lifestyle and health issues of precarious workers to those with stable work. The key findings were that precarious workers have significantly higher mental health disorders than those in stable work. There was a gender difference, with women having more mental health disorders than men. Cardio-vascular disorders were significantly positively associated with precarious work for men and negatively associated for women. BMI did not show any difference, but smoking habit does present a significant difference, with a higher percentage of people smoking more than 10 cigarettes per day among precarious workers.

As regards BMI [13], in a study on unemployment and health using multivariate analysis, found a significant association between being overweight and being unemployed. In our study, the finding that there was no difference in BMI according to employment status could potentially be explained by the subsidies and benefits available during precarious work. This agrees with the results of McLeod, et al. [14], who found that there are good reasons for thinking that some of the variations in inequality in population health found across countries are linked to the institutional structures of the political economy. Norte, et al. [15] also showed that, among all socio-economic factors studied (employment, unemployment, and household management) there was a clear association between the employment situation and the prevalence of overweight and obesity. According to Zagozdon, et al. [13] smoking habits are cardiovascular risk factors. In our study sample, the highest percentage of smokers consume more than 10 cigarettes a day. Although smoking

constitutes a cardiovascular risk, considering the adjusted OR by age, gender, BMI, tobacco smoking and type of work, we found that there was no significant association between cardiovascular disorders and precarious work overall, even though there is such an association among men. These results somewhat match those of Virtanen, et al. [16], who reported a modest association between job insecurity and incident cardiovascular disorders, partly attributable to lower socioeconomic status and increased risk factors among people with job insecurity. The results of Slopen, et al. [17] reporting that job insecurity was not associated with incident cardiovascular diseases, although job insecurity was significantly associated (in a cross-sectional analysis) with risk factors such as tobacco smoking, physical inactivity, hypertension, hypercholesterolemia, and BMI in univariate analyses, are in agreement with our overall results and those for women, but not for men.

For MSDs, Benavides, et al. [18] reported that fatigue, backache, and muscular pain were positively correlated with precarious work, which is confirmed by the results of our study, even though the association was not significant.

Several studies, including ours, have showed an association between mental health and precarious work. Indeed, we found that mental health disorders were consistently significantly associated with precarious work. After stratification by gender we obtained a higher OR for women, which is concordant with the findings of Strandh, et al. [19], who described the same gender difference in unemployed individuals in Sweden, where logistic regression was adjusted for the socioeconomic situation of the household, whereas in our study this was not taken into account. Our results are confirmed by Zagozdon, et al. [13], who found a positive association between mental ill health and unemployment, with a higher OR for women, but non-significant. Andreeva, et al. [20] revealed that women are in a more precarious position than men are because women are more often in temporary or part-time work with higher job insecurity. On the other hand, Olesen, et al. [21] concluded that poor mental health was both a consequence of and a risk factor for unemployment, with equal strength for both associations, over and above the simultaneous association observed between these two factors. Regarding the stratification by gender, in our research, the OR for mental health disorders was higher in women in precarious work (some of whom had previously been unemployed) than in men in precarious work, but we cannot determine whether mental health disorders were a cause or an effect of previous unemployment, as the type of study is cross-sectional.

## Strengths and limitations

The strength of this study is that all those individuals who have been unemployed and are applying for a precarious work contract are examined at the STM, so that the data on precarious work are national data. Unemployed workers receive 80% of their former income for 24 months. Our study is the first pilot project

in Luxembourg comparing precarious work to stable work, considering this great financial advantage. Nevertheless, some limitations must be considered. First, the data on health and lifestyle are self-reported, except for hypertension and myocardial infarction, based only on the presence or absence of symptoms, and could be biased. It is likely that precarious workers are more willing to report their difficulties, while stable workers might underreport health issues because they are afraid of the consequences this may have on the assessment of their ability to work by the occupational health physician. Furthermore, the occupational health physicians do not examine people on sick leave, which could influence the proportion of individuals with poor health issues. Another limitation is the exclusion of three activity sectors for stable work: Industrial, banking and hospitals.

In our study, we cannot state whether poor health was the cause of unemployment or if unemployment was conducive to poor health. Therefore, a longitudinal study with health data gathered from the moment of job loss until reemployment would be necessary.

## CONCLUSION

Precarious workers have more mental health disorders than workers with stable working contracts, and the impact of precarious work is higher for women than for men. Regarding cardio-vascular complaints and MSDs, precarious workers have an increased risk, but with a significant association only for cardio-vascular diseases in men. A longitudinal study should be conducted in order to define whether poor health issues are a cause or a consequence of unemployment or precarious work.

## AVAILABILITY OF DATA AND MATERIALS

The data has been provided by the STM, a public Occupational Health Service. The corresponding authors are in possession of the original data used in this research. Upon reasonable request, the corresponding author will make the datasets available.

## ETHICS AND CONSENT

The Occupational Health Services in Luxembourg (including STM) aim to analyze the health status of the working population as stipulated by the law on Occupational Health Services of 1994. Our collected data conform to good practices in occupational health; there is no obligation to have a signed informal consent since the medical exam is mandatory at STM for all workers. Consequently, no submission of the data collection to the National Ethics Committee is required in this case. Nevertheless, Occupational Health Services has to inform the workers verbally that their data can be used for scientific analysis and publication, as well as about their right to refuse to be included in scientific research data, as required by the GDPR (Regulation (EU) 2016/679). The STM informs each worker about their rights in advance of their examination. In the case of a worker denying the use of his clinical data for research, the physician would have recorded this in the medical file. The collected data were kept confidential in compliance with established Human Subject Protection guidelines.

## AUTHORS' CONTRIBUTIONS

NM led the design and conceptualization of the study and the

acquisition of the work data. JWS and PCT performed the statistical analysis and the interpretation of the results. All authors contributed to the writing and revision of the manuscript, read, and approved the submitted version.

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## CONFLICTS OF INTERESTS

The authors declare no potential conflict of interest with respect to the research, authorship, and/or publication of this paper.

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