*ORIGINAL ARTICLE*

Annals of Agricultural and Environmental Medicine 2022, Vol 29, No 3, 443–452
www.aaem.pl



# Sleep problems and related factors in rural and urban populations in Western Pomerania, Poland

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Wolińska W, Mroczek B. Sleep problems and related factors in rural and urban populations in Western Pomerania, Poland. Ann Agric Environ Med. 2022; 29(3): 443–452. doi: 10.26444/aaem/152740

## Abstract

**Introduction.** Insomnia is considered the most common sleep disorder. Sleep deprivation, regardless of its causes, leads to deterioration in the quality of life (QoL), poorer daytime functioning, and reduced professional productivity. It also contributes to an increase in the number of occupational and road accidents. Most research on sleep problems has been conducted on samples of urban residents, with few studies among people living in rural areas, where high rates of sleep problems have also been recorded.

**Objective.** The aim of the study was to determine sleep problems and their impact on the QoL of rural and urban residents of the West Pomeranian Province of Poland.

**Materials and method.** The study involved 597 people: 187 (31.32%) rural and 410 (68.68%) urban residents. The research instruments used in the study were standardized questionnaires, namely the Athens Insomnia Scale (AIS), Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), and the Short Form 36 Health Survey (SF-36), and the author's questionnaire concerning socio-demographic data.

**Results.** There was a statistically significant relationship between insomnia and gender, both among rural ($p < 0.050$) and urban ($p < 0.005$) residents. Diseases that turned out to be significantly related to insomnia in rural residents were diabetes ($p < 0.045$) and depression ($p < 0.015$). Women living in the city assessed their QoL worse than men ($p < 0.0005$). The lowest QoL was demonstrated in people with insomnia.

**Conclusions:** The results suggest that insomnia is often a permanent condition in the Polish population. Bearing in mind the prevalence of insomnia among Poles, especially in the 60–79 age group, it is necessary to introduce obligatory tests of sleep disorders and QoL into the practice of a family doctor, due to the long-term adverse effects of persistent insomnia.

## Key words

insomnia, sleep disorders, daytime sleepiness, rural population, urban population, quality of life

## INTRODUCTION

For humans, sleep and rest are basic biological needs of the body, essential for biological and mental renewal; hence, people sleep for about one-third of their lives [1]. Insomnia, considered the most common sleep disorder [2], is defined as difficulty falling asleep, difficulty staying asleep, premature awakening, and non-restorative sleep with associated daytime consequences. There is a wide range of etiologies and degrees of sleep disorders [3]. Unfavorable phenomena that impair functioning in many areas of life, which is especially visible in highly developed countries, include comorbidities. The occurrence of sleep disorders is significantly influenced by multimorbidity [4]. The modern lifestyle also has a detrimental effect on people's sleep and rest, no matter where they live [3]. Given the prevalence of insomnia and its potential health consequences, it is a significant social problem that requires multidimensional research, including epidemiological studies [5, 6, 7].

Sleep deprivation, regardless of its causes, leads to a deterioration in the quality of life (QoL), poorer daytime functioning, and reduced professional productivity. It also contributes to an increase in the number of occupational and road accidents [1]. From a medical perspective, sleep disorders – among them insomnia – negatively affect the development and course of many somatic diseases. Many authors indicate that insomnia is related to poor performance at work – people with sleep problems are overtired during the day and fall asleep while carrying out tasks [7].

Additionally, chronic insomnia exacerbates anxiety and causes physiological and emotional arousal and compensatory daytime sleepiness, thus worsening QoL. According to Yamamoto (2020), insomnia contributes to workforce and socio-economic losses by increasing long-term absenteeism and workplace injuries by lowering efficiency and productivity, and by increasing health care costs [8].

Insomnia is a widespread and serious disorder with far-reaching clinical and socio-economic consequences. The incidence of acute and chronic insomnia symptoms in the general population varies from study to study, depending on the definition used, it ranges from 6% – 30%, showing an upward trend [2, 9] and a tendency to become permanent [4, 10]. In Poland, sleep disorders, including insomnia, are estimated by various authors at about 51% (range 4.4 – 51%) [5], while in the USA the incidence of insomnia has been estimated at 25% – 30% of the adult population [11].

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Received: 11.05.2022; accepted: 11.07.2022; first published: 19.08.2022

The lowest prevalence of insomnia among European countries was recorded in Germany [1] where in a group of nearly 8,000 people, representative of the general population, insomnia was only found in 5.7% of the study participants. The highest percentage of insomnia was observed by Léger et al. [12] in a study of over 12,000 people in France – 19%. All studies have confirmed that insomnia is more common among women and that older age favours sleep problems [13].

Most research on sleep problems has been conducted on samples of urban residents, with few studies among people living in rural areas, where high rates of sleep problems have also been observed. In Japan and China, 25.5% and 49.5% of rural residents, respectively, had poor quality of sleep [14, 15, 16]. In a similar study of sleep problems among rural residents in Brazil, there was a significant increase in the incidence of short-term sleep between 2001 – 2011 (36.3% vs. 42.0%, respectively) [17]. Rates of insomnia higher in rural populations than in most studies in the USA and higher in the USA than elsewhere in urban populations were shown in a study by Hatrz A., et al. (2007) [18].

According to the results of the large Sleep Heart Health Study [19] on a group of people reporting excessive daytime sleepiness, difficulty falling asleep or staying asleep, in most cases reduced the health-related quality of life (HRQoL). In this study, QoL was assessed by the SF-36 questionnaire in over 5,800 people from the general USA population. It was found that low QoL scores were associated with subjective symptoms of sleep disorders, and were comparable to those related to sleep disorders caused by chronic diseases. Individuals reporting insomnia for at least three nights per week during a month had statistically lower scores on all SF-36 subscales, compared to those without sleep problems [20]. Similar results were obtained in a French study showing that even after excluding patients with anxiety and depression based on the DSM-IV criteria, insomnia was associated with a reduced QoL in the sphere of mental health [21]. In the above-mentioned analysis, lower SF-36 scores correlated with higher severity of insomnia. In a study by Yang et al., (2021), rural residents in China had significantly lower QoL when insomnia coexisted with depression [14].

While sleep disorders pose a significant health and economic burden, evidence suggests that they are under-reported and under-treated. A collective consumer survey conducted in France, Germany, Italy, and the UK found that 37% of respondents with insomnia had taken no action to address it, 10% were using over-the-counter remedies, and 13% were taking other medications. A study carried out in Western Europe, the USA and Japan by Leger D. et al. (2008), showed that insomnia is a significant burden for people suffering from it, although only 3% (Japan) to 22% (France) of people consulted a doctor about the symptoms [13].

## OBJECTIVE

The aim of this study was to determine sleep problems and their impact on the QoL of rural and urban residents of the West Pomeranian Province of Poland.

## MATERIALS AND METHODS

The study involved 597 people: 187 (31.32%) rural and 410 (68.68%) urban residents (Tab. 1). was carried out between April 2017 – January 2018. The inclusion criteria were: age 18–65 years, living in the West Pomeranian Province, and consent to participate in the study. The criteria for exclusion from the study were: age under 18 and over 65, living in an area other than the West Pomeranian Province.

**Table 1.** Characteristics of the study sample

| Variable | Total n (%) | Countryside n (%) | City n (%) |
|---|---|---|---|
| Sex | | | |
| female | 360 (60.3) | 120 (20.1) | 240 (40.2) |
| male | 237 (39.7) | 69 (11.56) | 168 (28.14) |
| Age | | | |
| up to 25 years | 171 (28.64) | 50 (8.38) | 121 (20.27) |
| 26-35 | 157 (26.3) | 38 (6.37) | 119 (19.93) |
| 36-45 | 80 (13.4) | 32 (5.36) | 48 (8.04) |
| 46-55 | 93 (15.58) | 38 (6.37) | 55 (9.21) |
| over 56 years | 96 (16.08) | 31 (5.19) | 65 (10.89) |
| Employment status | | | |
| employed | 396 (66.33) | 107 (17.92) | 289 (48.41) |
| unemployed | 201 (33.67) | 82 (13.74) | 119 (19.93) |

Selection of the group of test subjects was based on an amount selection based on gender, place of residence, and professional activity. Assuming a confidence level of 95%, the size of the 0.5 fraction, and the maximum error at the level of 5%, a total of 768 study participants was selected and invited to participate in the study. The questionnaires were delivered to the respondents' homes by trained interviewers. The response rate was 700 questionnaires, and after a preliminary analysis, 597 questionnaires were qualified for the study. The number of unreturned and incorrectly completed surveys was 171. The rate of return was 77.73%.

The study was approved by the Bioethics Committee of the Pomeranian Medical University in Szczecin (KB-0012/63/16).

The research instruments used in the study were standardized questionnaires, namely the Athens Insomnia Scale (AIS), Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), and the Short Form 36 Health Survey (SF-36), and the author's questionnaire concerning socio-demographic data.

**Athens Insomnia Scale (AIS).** Consists of eight questions concerning the frequency and severity of insomnia symptoms. The questions cover such aspects as the speed of falling asleep immediately after going to bed and turning off the light, waking up at night, waking up in the morning earlier than planned, sleep duration, sleep quality, well-being and psychophysical performance the next day, and feeling sleepy during the day. Each of the 8 questions was assigned 4 possible responses, scored from 0–3. The AIS results are interpreted as follows: 0–5 points – no insomnia, 6–10 points – borderline insomnia (cut-off score), and more than 10 points – insomnia (scale sensitivity – 93%, scale specificity – 85%). Analysis of the literature indicates that AIS is one of the most commonly used questionnaires, both in the diagnosis of insomnia and in studies on the effectiveness of the treatment used. In addition, it should be noted that the Athens Insomnia Scale is the first tool

allowing for the assessment of symptoms related to insomnia, which has Polish validation [22, 23, 24, 25].

**Insomnia Severity Index (ISI).** Enables assessment of the severity of insomnia. When answering the questions, the respondent should analyze the last 2 weeks of life. The Index contains 7 questions, each scored on a 5-point Likert scale from 0 – 4. Each item is rated on a 5-point Likert scale and the total score reflects the severity of insomnia. The score is the sum of the points assigned to the given answers, where a score of 7 points indicates no insomnia, 8–14 points mean subthreshold insomnia, 15–21 points – moderate insomnia, and 22–28 points – severe insomnia. Numerous studies confirm the reliability, accuracy and sensitivity of this tool [26, 27].

**Epworth Sleepiness Scale (ESS) scale.** Is used in the assessment of sleep disorders, including in the diagnosis of the syndrome sleep apnea – which indicates its wide application, by measuring the general level of daytime sleepiness. It consists of 8 questions, rated on a Likert scale from 0–3. The results are interpreted as follows: 0–10 points – normal results, excluding daytime sleepiness, 11–14 points – mild sleepiness, 15–18 points – moderate daytime sleepiness, and more than 18 points – severe daytime sleepiness [28, 29].

**Short-Form Health Survey (SF–36 v.2).** Measures QoL in people over 18 years of age. The questionnaire includes 36 items divided into 8 domains: *physical function* (PF), *role physical* (RP), *bodily pain* (BP), *general health* (GH), *vitality* (VT), *social functioning* (SF), *role emotional* (RE), and *mental health* (MH). Additionally, the questionnaire is divided into 2 sub-scales: *Mental Component Summary* (MCS), including the RE, SF, MH, VT domains, and *Physical Component Summary* (PCS), containing the PF, RP, BP, GH domains. The possible scores range from 0–100, where 0 is the lowest and 100 the highest result. The higher the score, the better the repsondent's QoL. By evaluating the quality of life using SF-36 v.2, it is possible to identify those categories that the respondent scores the lowest and develop a plan to achieve improvement and control progress [30, 31].

**Statistical analysis.** Statistical analysis was performed using Statistica 13. Elements of descriptive statistics (arithmetic mean, standard deviation, median, the range between the minimum and maximum values) and elements of statistical inference were used to process the results of the study. The normality of the data distribution was determined by the Shapiro-Wilk test. The chi-square test of independence, Student's t-test, ANOVA, and the Kruskal-Wallis test were used to compare the incidence of insomnia depending on the variables adopted in the study.

## RESULTS

**Analysis of sleep problems with regard to socio-demographic data.** There was a statistically significant relationship between insomnia and gender, both among rural ($p < 0.050$) and urban ($p < 0.005$) residents. In both groups, insomnia was more common among women.

There was a relationship between employment status and the severity of insomnia in rural residents ($p < 0.020$) – moderate and severe insomnia was more common among those who were unemployed (n = 15; 7.94%). A statistically significant association was found between the severity of insomnia (ISI) and gender ($p < 0.025$), age ($p < 0.005$), employment status ($p < 0.005$), and the form of employment ($p < 0.045$) in the group of urban residents (Tab. 3).

Daytime sleepiness had a significant impact on urban residents, irrespective of the form of employment ($p < 0.020$).

Diseases that turned out to be significantly related to insomnia in rural residents were diabetes ($p < 0.045$) and depression ($p < 0.015$). Among both rural and urban residents, a statistically significant relationship was found between depression, the perception of pain and insomnia

Among rural residents, statistically significant relationships were found between the severity of insomnia and hypertension ($p < 0.005$), depression ($p < 0.005$), hyperthyroidism ($p < 0.020$), and pain perception ($p < 0.0005$); in the group of people with the most severe insomnia, smokers accounted for the highest percentage (n = 10, 5.29%). In both rural and urban residents significant relationships were noted between the severity of insomnia and hypertension ($p < 0.010$), atherosclerosis ($p < 0.005$), and depression ($p < 0.005$). Feeling pain every day exacerbated insomnia in both rural ($p < 0.005$) and urban ($p < 0.005$) residents (Tab. 5).

Daytime sleepiness measured by the ESS was significantly more frequent in rural residents with diabetes ($p < 0.030$), hyperthyroidism ($p < 0.030$), gastrointestinal diseases ($p < 0.025$), and in cigarette smokers ($p < 0.005$). In the group of urban dwellers, daytime sleepiness coexisted only with atherosclerosis ($p < 0.005$).

**Analysis of QoL outcomes.** Women living in the city assessed their QoL worse than men ($p < 0.0005$). Among residents of rural areas, there were no statistically significant differences in the assessment of QoL between men and women ($p < 0.75$). QoL was assessed worse by people who were unemployed, regardless of place of residence ($p < 0.0005$). In the group of rural residents, the highest QoL was reported by people aged 26–35 years, and the lowest by people over the age of 56 ($p < 0.05$). In the group of city dwellers, the lowest QoL was demonstrated in the group of people aged 36–45 and over 56, while the highest QoL was indicated by those aged 26–35 ($p < 0.0005$). Both those with the highest and the lowest average QoL scores were found in the group of rural contract employees ($p < 0.030$). Urban residents employed under a contract for a specific task had the lowest QoL, and the highest QoL was demonstrated among contract workers ($p < 0.0005$). Job tenure differentiated the assessment of the QoL among urban residents – people with 5–15 years of work experience rated their QoL the highest, while those with job tenure of more than 30 years indicated the lowest QoL ($p < 0.0005$).

In the group of rural residents, QoL was related to the severity of insomnia – the more severe the insomnia according to the ISI, the lower the QoL ($p < 0.005$) (Fig. 1). A similar relationship was demonstrated between QoL and insomnia measured by the AIS among urban residents ($p < 0.005$). The lowest QoL was demonstrated in people with insomnia (Fig. 2).

A significant relationship was found between QoL and daytime sleepiness measured by the ESS in both rural and

**Table 2.** Relationship between the incidence of insomnia as measured by the AIS and sociodemographic data in rural and urban residents

| Variable | Athens Insomnia Scale (AIS) | | | Rural residents | Athens Insomnia Scale (AIS) | | | Urban residents |
|---|---|---|---|---|---|---|---|---|
| | No insomnia n (%) | Borderline insomnia n (%) | Insomnia n (%) | Chi2 P *V/ **R | No insomnia n (%) | Borderline insomnia n (%) | Insomnia n (%) | Chi2 P *V/ **R |
| Sex | | | | 6.124 | | | | 11.690 |
| female | 51 (27.0) | 47 (24.9) | 22 (11.64) | <0.050 | 113 (27.7) | 74 (18.14) | 53 (12.99) | <0.005 |
| male | 39 (20.63) | 15 (7.94) | 15 (7.94) | *0.180 | 98 (24.02) | 54 (13.24) | 16 (3.92) | *0.169 |
| Age | | | | | | | | |
| up to 25 years | 27 (14.29) | 18 (9.52) | 5 (2.65) | | 62 (15.2) | 39 (9.56) | 20 (4.9) | |
| 26–35 | 20 (10.58) | 12 (6.35) | 6 (3.17) | 9.390 | 74 (18.14) | 30 (7.35) | 15 (3.68) | 24.535 |
| 36–45 | 12 (6.35) | 12 (6.35) | 8 (4.23) | <0.310 | 15 (3.68) | 24 (5.88) | 9 (2.21) | <0.005 |
| 46–55 | 20 (10.58) | 8 (4.23) | 10 (5.29) | - | 35 (8.58) | 13 (3.19) | 7 (1.72) | *0.173 |
| over 56 years | 11 (5.82) | 12 (6.35) | 8 (4.23) | | 25 (6.13) | 22 (5.39) | 18 (4.41) | |
| Employment status | | | | 5.546 | | | | 23.243 |
| employed | 57 (30.16) | 35 (18.52) | 15 (7.94) | <0.065 | 171 (41.91) | 80 (19.61) | 38 (9.31) | <0.005 |
| unemployed | 33 (17.46) | 27 (14.29) | 22 (11.64) | - | 40 (9.8) | 48 (11.76) | 31 (7.6) | *0.238 |
| Occupation by the ***KZiS | | | | | | | | |
| technicians and associate professionals | 4 (4.08) | 6 (6.12) | 3 (3.06) | | 21 (7.61) | 11 (3.99) | 6 (2.17) | |
| industrial workers and craftsmen | 9 (9.18) | 4 (4.08) | 3 (3.06) | 10.438 | 17 (6.16) | 8 (2.9) | - | |
| operators and assemblers of machines and devices | 3 (3.06) | - | 2 (2.04) | <0.580 | 12 (4.35) | 6 (2.17) | 3 (1.09) | 13.813 |
| specialists | 18 (18.37) | 10 (10.2) | 2 (2.04) | - | 62 (22.46) | 27 (9.78) | 10 (3.62) | <0.315 |
| service and sales workers | 6 (6.12) | 4 (4.08) | 2 (2.04) | | 18 (6.52) | 10 (3.62) | 9 (3.26) | - |
| office workers | 6 (6.12) | 5 (5.1) | 3 (3.06) | | 28 (10.14) | 10 (3.62) | 8 (2.9) | |
| other | 5 (5.1) | 3 (3.06) | - | | 5 (1.81) | 5 (1.81) | - | |
| Shift work | | | | 4.987 | | | | 2.051 |
| yes | 21 (11.35) | 25 (13.51) | 12 (6.49) | <0.085 | 74 (18.45) | 41 (10.22) | 28 (6.98) | <0.360 |
| no | 67 (36.22) | 36 (19.46) | 24 (12.97) | - | 133 (33.17) | 87 (21.7) | 38 (9.48) | - |
| Form of employment | | | | | | | | |
| unemployed | 33 (17.46) | 27 (14.29) | 22 (11.64) | 15.065 | 40 (9.8) | 48 (11.76) | 31 (7.6) | |
| contract of employment | 45 (23.81) | 26 (13.76) | 12 (6.35) | <0.060 | 117 (28.68) | 54 (13.24) | 23 (5.64) | 31.866 |
| contract for a specific task | 4 (2.12) | 6 (3.17) | 2 (1.06) | *0.199 | 29 (7.11) | 16 (3.92) | 11 (2.7) | <0.005 |
| contract | - | 2 (1.06) | - | | 9 (2.21) | 3 (0.74) | 2 (0.49) | *0.197 |
| other forms of employment | 8 (4.23) | 1 (0.53) | 10 (5.29) | | 16 (3.92) | 5 (1.23) | 1 (0.25) | |
| Work experience | | | | | | | | |
| < 1 year | 13 (12.15) | 10 (9.35) | 1 (0.93) | | 44 (15.22) | 24 (8.3) | 11 (3.81) | |
| 1–3 years | 12 (11.21) | 6 (5.61) | - | 9.147 | 52 (17.99) | 14 (4.84) | 8 (2.77) | 6.603 |
| 3–8 years | 11 (10.28) | 5 (4.67) | 5 (4.67) | <0.330 | 35 (12.11) | 18 (6.23) | 10 (3.46) | <0.580 |
| 8–18 years | 12 (11.21) | 9 (8.41) | 5 (4.67) | - | 19 (6.57) | 14 (4.84) | 5 (1.73) | - |
| > 18 years | 9 (8.41) | 5 (4.67) | 4 (3.74) | | 21 (7.27) | 10 (3.46) | 4 (1.38) | |

*V–Cramer's V coefficient; **R–Spearman's R coefficient; ***KZiS–the Polish Classification of Occupations and Specializations (Klasyfikacja Zawodów i Specjalności)

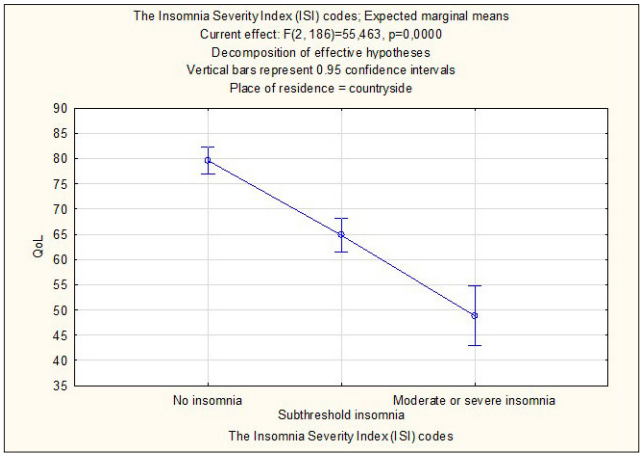


**Figure 1.** Relationship between QoL and the ISI results among rural and urban dwellers

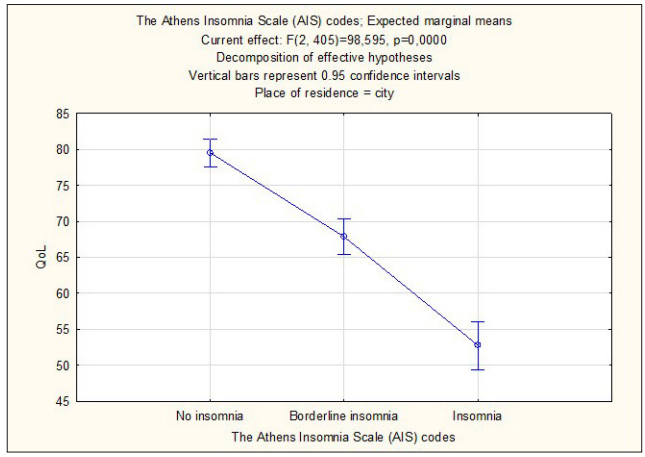


**Figure 2.** Relationship between QoL and the AIS results among rural and urban dwellers

urban residents (p <0.005). Severe daytime sleepiness as assessed by the ESS significantly reduced the QoL of the rural residents (30–57 points)

Cardiovascular diseases decreased the QoL of urban residents (p < 0.005), but had no effect on the QoL of rural residents (p < 0.75). Drinking alcohol after 6 p.m. differentiated

**Table 3.** Relationship between the severity of insomnia as measured by the ISI and sociodemographic and economic variables of rural and urban residents

| Variable | Insomnia Severity Index (ISI) | | | Rural residents | Insomnia Severity Index (ISI) | | | Urban residents |
|---|---|---|---|---|---|---|---|---|
| | No insomnia n (%) | Subthreshold insomnia n (%) | Moderate or severe insomnia n (%) | Chi2 P *V/ **R | No insomnia n (%) | Subthreshold insomnia n (%) | Moderate or severe insomnia n (%) | Chi2 P *V/ **R |
| Sex | | | | 2.081 | | | | 7.353 |
| female | 62 (32.8) | 43 (22.75) | 15 (7.94) | <0.355 | 130 (31.86) | 73 (17.89) | 37 (9.07) | <0.025 |
| male | 43 (22.75) | 20 (10.58) | 6 (3.17) | - | 110 (26.96) | 45 (11.03) | 13 (3.19) | *0.134 |
| Age | | | | | | | | |
| ≤ 25 years | 27 (14.29) | 18 (9.52) | 5 (2.65) | 8.960 | 76 (18.63) | 31 (7.6) | 14 (3.43) | 24.788 |
| 26–35 | 25 (13.23) | 10 (5.29) | 3 (1.59) | <0.345 | 81 (19.85) | 25 (6.13) | 13 (3.19) | <0.005 |
| 36–45 | 18 (9.52) | 10 (5.29) | 4 (2.12) | - | 18 (4.41) | 25 (6.13) | 5 (1.23) | *0.174 |
| 46–55 | 24 (12.7) | 9 (4.76) | 5 (2.65) | | 36 (8.82) | 13 (3.19) | 6 (1.47) | |
| > 56 years | 11 (5.82) | 16 (8.47) | 4 (2.12) | | 29 (7.11) | 24 (5.88) | 12 (2.94) | |
| Employment status | | | | 7.927 | | | | 12.089 |
| employed | 65 (34.39) | 36 (19.05) | 6 (3.17) | <0.020 | 184 (45.1) | 78 (19.12) | 27 (6.62) | <0.005 |
| unemployed | 40 (21.16) | 27 (14.29) | 15 (7.94) | *0.204 | 56 (13.73) | 40 (9.8) | 23 (5.64) | *0.172 |
| Occupation by the ***KZiS | | | | | | | | |
| technicians and associate professionals | 5 (5.10) | 7 (7.14) | 1 (1.02) | | 21 (7.61) | 14 (5.07) | 3 (1.09) | |
| industrial workers and craftsmen | 11 (11.22) | 4 (4.08) | 1 (1.02) | 7.759 | 17 (6.16) | 7 (2.54) | 1 (0.36) | 13.553 |
| operators and assemblers of machines and devices | 3 (3.06) | 2 (2.04) | - | <0.805 | 12 (4.35) | 5 (1.81) | 4 (1.45) | <0.330 |
| specialists | 18 (18.37) | 10 (10.20) | 2 (2.04) | - | 73 (26.45) | 19 (6.88) | 7 (2.54) | - |
| service and sales workers | 9 (9.18) | 3 (3.06) | - | | 20 (7.25) | 13 (4.71) | 4 (1.45) | |
| office workers | 7 (7.14) | 5 (5.10) | 2 (2.04) | | 26 (9.42) | 15 (5.43) | 5 (1.81) | |
| other | 6 (6.12) | 2 (2.04) | - | | 8 (2.9) | 1 (0.36) | 1 (0.36) | |
| Shift work | | | | 1.456 | | | | 1.087 |
| yes | 29 (15.68) | 23 (12.43) | 6 (3.24) | <0.485 | 89 (22.19) | 37 (9.23) | 17 (4.24) | <0.580 |
| no | 74 (40.0) | 39 (21.08) | 14 (7.57) | - | 148 (36.91) | 79 (19.7) | 31 (7.73) | - |
| Form of employment | | | | | | | | |
| unemployed | 40 (21.16) | 27 (21.16) | 15 (7.94) | 12.542 | 56 (13.73) | 40 (9.8) | 23 (13.73) | 18.830 |
| contract of employment | 49 (25.93) | 30 (15.87) | 4 (2.12) | <0.130 | 124 (30.39) | 51 (12.5) | 19 (4.66) | <0.045 |
| contract for a specific task | 6 (3.17) | 5 (2.65) | 1 (0.53) | - | 33 (8.09) | 15 (3.68) | 8 (1.96) | *0.151 |
| contract | 2 (1.06) | - | - | | 10 (2.45) | 4 (0.98) | - | |
| other forms of employment | 8 (4.23) | 1 (0.53) | 10 (5.29) | | 16 (3.92) | 6 (1.47) | - | |
| Work experience | | | | | | | | |
| < 1 year | 16 (14.95) | 8 (7.48) | - | 9.603 | 50 (17.3) | 21 (7.27) | 8 (2.77) | 8.026 |
| 1–3 years | 12 (11.21) | 6 (5.61) | - | <0.295 | 55 (19.03) | 13 (4.5) | 6 (2.08) | <0.430 |
| 3–8 years | 13 (12.15) | 6 (5.61) | 2 (1.87) | - | 33 (11.42) | 23 (7.96) | 7 (2.42) | - |
| 8–18 years | 17 (15.89) | 8 (7.48) | 1 (0.93) | | 23 (7.96) | 12 (4.15) | 3 (1.04) | |
| > 18 years | 7 (6.54) | 8 (7.48) | 3 (2.8) | | 23 (7.96) | 9 (3.11) | 3 (1.04) | |

*V–Cramer's V coefficient; **R–Spearman's R coefficient; ***KZiS–the Polish Classification of Occupations and Specializations (Klasyfikacja Zawodów i Specjalności)

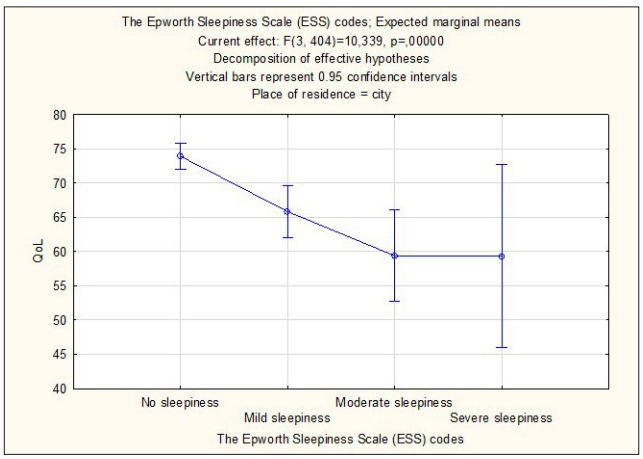


**Figure 3.** Relationship between QoL and the ESS outcomes in urban residents

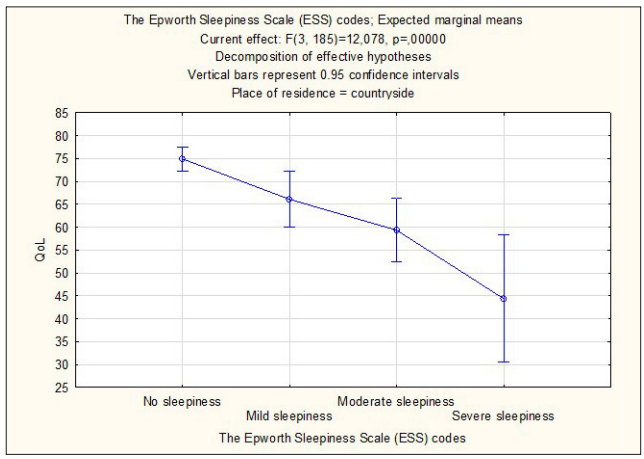


**Figure 4.** Relationship between QoL and the ESS outcomes in rural residents.

the group: rural residents drinking coffee after 6 p.m. had a lower mean QoL score than their urban counterparts. In both groups, drinking coffee after 6 p.m. significantly reduced the level of QoL, but they were rural residents who had a lower mean QoL score. People experiencing pain every day and 1–2 times a week had the lowest QoL scores ($p < 0.50$) (Tab. 6).

**Table 4.** Relationship between insomnia measured by the AIS and chronic diseases and health behaviors

| Variable | Athens Insomnia Scale (AIS) | | | Rural residents | Athens Insomnia Scale (AIS) | | | Urban residents |
|---|---|---|---|---|---|---|---|---|
| | No insomnia n (%) | Borderline insomnia n (%) | Insomnia n (%) | Chi2 P *V/ **R | No insomnia n (%) | Borderline insomnia n (%) | Insomnia n (%) | Chi2 P *V/ **R |
| Diabetes | | | | 6.251 | | | | 2.124 |
| yes | 3 (1.59) | 9 (4.76) | 4 (2.12) | <0.045 | 11 (2.7) | 8 (1.96) | 7 (1.72) | <0.345 |
| no | 87 (46.03) | 53 (28.04) | 33 (17.46) | *0.181 | 200 (49.02) | 120 (29.41) | 62 (15.2) | - |
| Hypertension | | | | 9.107 | | | | 11.970 |
| yes | 11(5.82) | 20 (10.58) | 9 (4.76) | <0.010 | 27 (6.62) | 28 (6.86) | 21 (5.15) | <0.005 |
| no | 79 (41.8) | 42 (22.22) | 28 (14.81) | *0.219 | 184 (45.1) | 100 (24.51) | 48 (11.76) | *0.171 |
| Asthma/COPD | | | | 0.439 | | | | 3.513 |
| yes | 5 (2.66) | 5 (2.66) | 2 (1.06) | <0.805 | 8 (1.96) | 10 (2.45) | 6 (1.47) | <0.175 |
| no | 84 (44.68) | 57 (30.32) | 35 (18.62) | - | 203 (49.75) | 118 (28.92) | 63 (15.44) | - |
| Atherosclerosis | | | | 1.146 | | | | 7.308 |
| yes | 3 (1.59) | 4 (2.12) | 1 (0.53) | <0.565 | 4 (0.98) | 4 (0.98) | 6 (1.47) | <0.025 |
| no | 87 (46.03) | 58 (30.69) | 36 (19.05) | - | 207 (50.74) | 124 (30.39) | 63 (15.44) | *0.133 |
| Depression | | | | 8.637 | | | | 11.218 |
| yes | - | 6 (3.17) | 2 (1.06) | <0.015 | 4 (0.98) | 8 (1.96) | 8 (1.96) | <0.005 |
| no | 90 (47.62) | 56 (29.63) | 35 (18.52) | *0.213 | 207 (50.74) | 120 (29.41) | 61 (14.95) | *0.165 |
| Hyperthyroidism | | | | 6.347 | | | | 5.102 |
| yes | 2 (1.06) | 6 (3.17) | 5 (2.65) | <0.045 | 9 (2.21) | 7 (1.72) | 8 (1.96) | <0.080 |
| no | 88 (46.56) | 56 (29.63) | 32 (16.93) | *0.183 | 202 (49.51) | 121 (29.66) | 61 (14.95) | - |
| Gastrointestinal diseases | | | | 0.868 | | | | 2.040 |
| yes | 6 (3.17) | 2 (1.06) | 2 (1.06) | <0.650 | 11 (2.7) | 11 (2.7) | 3 (0.74) | <0.360 |
| no | 84 (44.44) | 60 (31.75) | 35 (18.52) | - | 200 (49.02) | 117 (28.68) | 66 (16.18) | - |
| Feeling pain | | | | | | | | |
| never | 50 (26.46) | 21 (11.11) | 13 (6.88) | 25.303 | 98 (24.02) | 37 (9.07) | 16 (3.92) | 31.239 |
| everyday | 2 (1.06) | 16 (8.47) | 8 (4.23) | <0.005 | 18 (4.41) | 31 (7.6) | 15 (3.68) | <0.005 |
| 1–2 times a week | 7 (3.7) | 10 (5.29) | 4 (2.12) | *0.258 | 23 (5.64) | 11 (2.7) | 14 (3.43) | *0.195 |
| several times a month | 31 (16.4) | 12 (6.35) | 12 (6.35) | | 72 (17.65) | 49 (12.01) | 24 (5.88) | |
| Smoking | | | | | | | | |
| don't smoke | 61 (32.28) | 11 (5.82) | 15 (7.94) | 9.287 | 134 (32.84) | 82 (20.1) | 45 (11.03) | 0.562 |
| don't smoke any more | 11 (5.82) | 8 (4.23) | 7 (3.7) | <0.055 | 38 (9.31) | 23 (5.64) | 10 (2.45) | <0.970 |
| smoke | 18 (9.52) | 13 (6.88) | 15 (7.94) | - | 39 (9.56) | 23 (5.64) | 14 (3.43) | - |
| Alcohol consumption | | | | 2.633 | | | | 0.208 |
| yes | 51 (26.98) | 30 (15.87) | 24 (12.7) | <0.270 | 132 (32.35) | 83 (20.34) | 43 (10.54) | <0.900 |
| no | 39 (20.63) | 32 (16.93) | 13 (6.88) | - | 79 (19.36) | 45 (11.03) | 26 (6.37) | - |
| Drinking coffee | | | | 1.653 | | | | 0.262 |
| yes | 64 (33.86) | 48 (25.4) | 30 (15.87) | <0.440 | 160 (39.31) | 96 (23.59) | 54 (13.27) | <0.880 |
| no | 26 (13.76) | 14 (7.41) | 7 (3.7) | - | 50 (12.29) | 32 (7.86) | 15 (3.69) | - |
| Frequency of physical activity | | | | | | | | |
| never | 23 (12.17) | 24 (12.7) | 14 (7.41) | 14.886 | 43 (10.54) | 27 (6.62) | 13 (3.19) | |
| everyday | 20 (10.58) | 6 (3.17) | 4 (2.12) | <0.065 | 31 (7.6) | 14 (3.43) | 11 (2.7) | 9.696 |
| 1–2 times a week | 23 (12.17) | 9 (4.76) | 9 (4.76) | *0.198 | 59 (14.46) | 37 (9.07) | 19 (4.66) | <0.470 |
| 3–6 times a week | 14 (7.41) | 7 (3.7) | 3 (1.59) | | 45 (11.03) | 28 (6.86) | 8 (1.96) | - |
| several times a month | 10 (5.29) | 16 (8.47) | 7 (3.7) | | 33 (8.09) | 21 (5.15) | 18 (4.41) | |

* V–Cramer's V coefficient; ** R–Spearman's R coefficient

## DISCUSSION

The incidence of insomnia and other sleep disorders depends on various factors, including the diagnostic criteria for these disorders, place of residence, occupation, and coexistence of chronic diseases. In the current study, the prevalence of insomnia among rural and urban residents was analyzed. In Poland, most research on insomnia and other sleep disorders in relation to health problems, such as depression or somatic diseases, has been conducted in the general population, while studies concerning rural residents are far fewer. The results obtained in this study on the incidence of insomnia by place of residence with regard to gender, age, employment status, working conditions and health problems, correspond with those described by other authors [3]. In the current study, insomnia was more common in women than in men, regardless of place of residence. Women also more often obtained results indicating borderline insomnia, both in rural (24.9%) and urban (18.14%) areas. Other authors have reported similar results, showing a greater incidence of insomnia in women [3, 5, 32, 33, 34].

In this study, employment status was associated with insomnia only among urban residents ($p < 0.005$), which could suggest a heavier workload resulting from working in an urban environment and different type of work, consequently leading to sleep difficulties. The severity of insomnia measured by the ISI was significantly related to the occupational situation of rural ($p < 0.020$) and urban

**Table 5.** Relationship between the severity of insomnia as measured by the ISI and chronic diseases and health behaviors

| Variable | Insomnia Severity Index (ISI) | | | Rural residents | Insomnia Severity Index (ISI) | | | Urban residents |
|---|---|---|---|---|---|---|---|---|
| | No insomnia n (%) | Subthreshold insomnia n (%) | Moderate or severe n (%) | Chi2 P *V/ **R | No insomnia n (%) | Subthreshold insomnia n (%) | Moderate or severe n (%) | Chi2 P *V/ **R |
| Diabetes | | | | 1.037 | | | | 4.252 |
| yes | 8 (4.23) | 5 (2.65) | 3 (1.59) | <0.595 | 11 (2.7) | 9 (2.21) | 6 (1.47) | <0.120 |
| no | 97 (51.32) | 58 (30.69) | 18 (9.52) | - | 229 (56.13) | 109 (26.72) | 44 (10.78) | - |
| Hypertension | | | | 13.800 | | | | 10.058 |
| yes | 13 (6.88) | 23 (12.17) | 4 (2.12) | <0.005 | 33 (8.09) | 28 (6.86) | 15 (3.68) | <0.010 |
| no | 92 (48.68) | 40 (21.16) | 17 (8.99) | *0.270 | 207 (50.74) | 90 (22.06) | 35 (8.58) | *0.157 |
| Asthma/COPD | | | | 0.644 | | | | 1.785 |
| yes | 7 (3.72) | 3 (1.6) | 2 (1.06) | <0.725 | 11 (2.7) | 9 (2.21) | 4 (0.98) | <0.410 |
| no | 97 (51.6) | 60 (31.91) | 19 (10.11) | - | 229 (56.13) | 109 (26.72) | 46 (11.27) | - |
| Atherosclerosis | | | | 0.261 | | | | 12.676 |
| yes | 5 (2.65) | 2 (1.06) | 1 (0.53) | <0.880 | 5 (1.23) | 3 (0.74) | 6 (1.47) | <0.005 |
| no | 100 (52.91) | 61 (32.28) | 20 (10.58) | - | 235 (57.60) | 115 (28.19) | 44 (10.78) | *0.176 |
| Depression | | | | 16.707 | | | | 20.949 |
| yes | - | 4 (2.12) | 4 (2.12) | <0.005 | 2 (0.49) | 12 (2.94) | 6 (1.47) | <0.005 |
| no | 105 (55.56) | 59 (31.22) | 17 (8.99) | *0.297 | 238 (58.33) | 106 (25.98) | 44 (10.78) | *0.226 |
| Hyperthyroidism | | | | 8.194 | | | | 4.705 |
| yes | 3 (1.59) | 9 (4.76) | 1 (0.53) | <0.020 | 14 (3.43) | 4 (0.98) | 6 (1.47) | <0.095 |
| no | 102 (53.97) | 54 (28.57) | 20 (10.58) | *0.208 | 226 (55.39) | 114 (27.94) | 44 (10.78) | - |
| Gastrointestinal diseases | | | | 0.971 | | | | 5.393 |
| yes | 7 (3.7) | 2 (1.06) | 1 (0.53) | <0.615 | 14 (3.43) | 11 (2.7) | - | <0.070 |
| no | 98 (51.85) | 61 (32.28) | 20 (10.58) | - | 226 (55.39) | 107 (26.23) | 50 (12.25) | - |
| Feeling pain | | | | | | | | |
| never | 53 (28.04) | 26 (13.76) | 5 (2.65) | 26.345 | 102 (25.0) | 39 (9.56) | 10 (2.45) | 20.389 |
| everyday | 5 (2.65) | 13 (6.88) | 8 (4.23) | <0.005 | 26 (6.37) | 27 (6.62) | 11 (2.7) | <0.005 |
| 1-2 times a week | 11 (5.82) | 10 (5.29) | - | *0.264 | 26 (6.37) | 11 (2.7) | 11 (2.7) | *0.158 |
| several times a month | 36 (19.05) | 14 (7.41) | 8 (4.23) | | 86 (21.08) | 41 (10.05) | 18 (4.41) | |
| Smoking | | | | | | | | |
| don't smoke | 72 (38.1) | 37 (19.58) | 8 (4.23) | 9.321 | 147 (36.03) | 84 (20.59) | 30 (7.35) | 5.767 |
| don't smoke any more | 12 (6.35) | 11 (5.82) | 3 (1.59) | <0.055 | 43 (10.54) | 20 (4.9) | 8 (1.96) | <0.220 |
| smoke | 21 (11.11) | 15 (7.94) | 10 (5.29) | *0.157 | 50 (12.25) | 14 (3.43) | 12 (2.94) | - |
| Alcohol consumption | | | | 3.497 | | | | 2.251 |
| yes | 63 (33.33) | 29 (15.34) | 13 (6.88) | <0.175 | 157 (38.48) | 68 (16.67) | 33 (8.09) | <0.325 |
| no | 42 (22.22) | 34 (17.99) | 8 (4.23) | - | 83 (20.34) | 50 (12.25) | 17 (4.17) | - |
| Drinking coffee | | | | 1.449 | | | | 0.465 |
| yes | 78 (41.27) | 46 (24.34) | 18 (9.52) | <0.485 | 181 (44.47) | 89 (21.87) | 40 (9.83) | <0.795 |
| no | 27 (14.29) | 17 (8.99) | 3 (1.59) | - | 58 (14.25) | 29 (7.13) | 10 (2.46) | - |
| Frequency of physical activity | | | | | | | | |
| never | 30 (15.87) | 26 (13.76) | 5 (2.65) | 14.652 | 47 (11.52) | 27 (6.62) | 9 (2.21) | |
| everyday | 21 (11.11) | 6 (3.17) | 3 (1.59) | <0.055 | 35 (8.58) | 13 (3.19) | 8 (1.96) | 10.497 |
| 1–2 times a week | 27 (14.29) | 7 (3.7) | 7 (3.7) | *0.196 | 72 (17.65) | 30 (7.35) | 13 (3.19) | <0.400 |
| 3–6 times a week | 14 (7.41) | 8 (4.23) | 2 (1.06) | | 50 (12.25) | 25 (6.13) | 6 (1.47) | - |
| several times a month | 13 (6.88) | 16 (8.47) | 4 (2.12) | | 36 (8.82) | 22 (5.39) | 14 (3.43) | |

* V–Cramer's V coefficient; ** R–Spearman's R coefficient

($p < 0.005$) dwellers. Corresponding results were obtained by Adriana et al. (2018), who found that Brazilian women living in rural areas and having sleep problems were more likely to be unemployed and suffer from depressive symptoms, obesity, and diabetes [3].

The outcomes of the current study concerning the relationship between insomnia and occupation revealed that insomnia was more common among city dwellers, especially those belonging to the occupational group of specialists, including doctors, nurses, and teachers. The reason for these results may be a heavy workload, high responsibility at work, and a shift-work system. Doi et al. (2003) found that office workers had worse quality of sleep compared to people working in other positions. These authors established that some of the causes of this phenomenon were stress and job insecurity [35]. On the other hand, Benbir et al. (2015) informed that insomnia was least common among people receiving a regular salary [36]. A 2018 analysis in France of sleep problems with regard to occupation conducted showed that insomnia was more frequently reported by shopkeepers (32.8%) than cake makers (22.5%). This may have been due to the need for cake makers to work at night, which consequently led to a change in their circadian rhythm of sleep [37].

In this study, no relationship was found between shift work and insomnia or daytime sleepiness, but it was in the city that more people suffering from insomnia worked in shifts (n = 28). According to Kasperczyk et al. (2012), the more night shifts per month respondents had, the worse they rated their quality of sleep ($p \leq 0.005$) [38]. Similar results were obtained by Lecca et al. (2021) who noted that shift

**Table 6.** Relationship between QoL and chronic diseases as well as health behaviors with regard to place of residence

| | Countryside | | | City | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | X ± SD | t/*Chi² | p | X ± SD | t/*Chi² | p | X ± SD | t/*Chi² | p |
| Depression | 53.18 ± 11.08 | 4.58 | <0.005 | 51.45 ± 14.36 | 6.29 | <.0005 | 51.95± 13.33 | 6.31 | <.0005 |
| Anxiety disorders | 53.18 ± 14.17 | 2.39 | <0.05 | 51.25 ± | 3.25 | <0.005 | 56.63 ± 14.17 | 4.04 | < .0005 |
| Cardiovascular diseases | 68.53 ± 19.73 | 0.39 | <0.75 | 58.47 ± 17.77 | 3.18 | <0.005 | 61.10 ± 18.4 | 2.93 | < .0005 |
| Gastrointestinal diseases | 72.26 ± 16.77 | 0.333 | <0.565 | 70.07 ± 15.45 | 7.87 | <0.005 | 70.69 ± 15.62 | 0.218 | <0.85 |
| Hyperthyroidism | 72.03 ± | -3.59 | <0.005 | ± | 2.94 | <0.15 | ± | 3.73 | <0.0005 |
| Pain complaints | | *7.92 | <0.050 | | *1.91 | <0.60 | | *1.09 | <0.80 |
| Coffee after 6 p.m. | 62.50 ± 19.56 | 2.23 | <0.030 | 76.57 ± 16.81 | -2.06 | <0.05 | 72.45 ± | -0.53 | <0.60 |
| Alcohol after 6 p.m. | 70.46 ± 16.94 | 0.62 | <0.55 | 73.530 ± 17.55 | -2.88 | <0.005 | 72.93 ± 16.70 | -2.72 | <0.010 |

work reduced quality of sleep [39]. Babiarczyk et al. (2019) in their study analyzing the incidence of sleep disorders among shift nurses, found that as many as 95 out of 100 surveyed people complained of sleepiness after night duty. What is more, nurses who had more than 8 night shifts per month had lower quality of sleep, and suffered from insomnia more often than their counterparts working a maximum of 5 night shifts per month [40]. The results of the study cited above are similar to those presented by Szymańska-Czechór et al. (2017). These authors also noted a relationship between the number of night shifts per month and subjective quality of slee – the more night shifts, the lower the quality of sleep [41]. Night workers must regenerate during the day, however, studies show that sleep during the day is of lower quality, due in part to interfering factors, such as the natural increase in the activity of the body's physiological processes and the intensity of daylight [42].

In the current study, analysis revealed a significant relationship between insomnia measured by the AIS and the form of employment in both rural ($p < 0.060$) and urban ($p < 0.005$) residents. The association between daytime sleepiness and the form of employment was only proven among city residents ($p < 0.020$). Żołnierczyk-Zreda (2015), in their review of research on the type of employment contract and its impact on the health and occupational functioning of employees, demonstrated that the lack of tenure contributes to a decline in mental and physical health and, consequently, the deterioration of sleep [43].

In the case of the rural population, insomnia was associated with diabetes and depression, while in urban residents such a relationship was found with hypertension, atherosclerosis, and depression. In the current study, the severity of insomnia measured by the ISI was associated with hypertension, depression, hyperthyroidism and smoking in rural dwellers, and with hypertension, atherosclerosis, and depression in urban dwellers. The coexistence of sleep disorders with other diseases was noted by Bjorvatn et al. (2021), who emphasized that it is difficult to determine whether sleep disorders (including insomnia) are spontaneous or caused by comorbidities, e.g. obstructive pulmonary disease, mental disorders, and somatic diseases [7]. Siemiński et al. (2019) claim that sleep disorders (e.g. insomnia) exacerbate symptoms of certain diseases or increase the risk of their development. Health conditions that may be caused by insomnia include cardiovascular disease, as well as mood and cognitive disorders [6]. In a study of over 9,000 people, poor sleep quality and insomnia were risk factors for the development of cardiovascular disease and hypertension [44]. Similarly, Zhuang et al. noted that subjective insomnia was a risk factor for the development of coronary artery disease in the elderly [45].

Ulmer et al. (2015) observed increased cardiovascular risk associated with higher prevalence of nicotinism, increased incidence of hypertension, and elevated blood pressure in military veterans reporting problems with the initiation and maintenance of sleep [46]. In their study of 183 patients with type 2 diabetes, Kołpa et al. (2018) found that more than half (57.9%) of the respondents had sleep problems or insomnia [47]. An insomnia-related problem is daytime sleepiness, which was found in the current study on rural residents suffering from diabetes, hyperthyroidism, and gastrointestinal diseases, and smoking cigarettes. Lopes et al. (2021), who analyzed a cohort of the urban population in Brazil, showed that excessive daytime sleepiness is a factor predisposing the elderly to cardiovascular episodes [48]. It is also the cause of obesity and insulin resistance [49,50]. While studying factory and shipyard workers, Lecca et al. (2021) noticed that daytime sleepiness was more common among shift workers, while no association was found between daytime sleepiness and smoking or alcohol consumption [39].

Insomnia and other sleep disorders significantly decrease QoL, especially in the elderly. Waguih et al. (2012) performed a systematic review of studies describing the relationship between insomnia and QoL, and found that people with insomnia and additional health problems reported poor QoL [51]. The current study highlighted the link between QoL and insomnia and other sleep disorders. Women living in urban areas rated their QoL significantly lower than men ($p < 0.005$), but in the case of rural residents, the differences in the assessment of QoL between men and women were not so significant. Nevertheless, Liao et al. (2021) found that women in rural populations had lower QoL. They also described a relationship between depressive symptoms and reduced QoL. These authors explained this by the fact that people with depressive and anxiety symptoms showed fatigue and loss of energy, feelings of slowness or agitation and anxiety, poor attention and concentration, impaired memory, and indecisiveness, which could ultimately lead to a low QoL [52].

Unemployed people living both in the countryside and in the city more often assessed their QoL worse ($p < 0.005$). In the group of rural residents, the highest QoL was reported by people aged 26–35 years, and the lowest by people over 56 years of age—the differences were statistically significant ($p < 0.030$). Among city dwellers, the lowest QoL was found in the group of people aged 36–45 and over 56, while the best QoL was reported for people aged 26–35 ($p < 0.005$).

Similar results were also obtained by Adriana et al. (2018), who observed that female rural residents aged 40–59 years had lower QoL than men in the same age group [3].

We obtained interesting results by comparing the respondents' QoL with regard to the form of employment. Residents of rural areas employed under the contract obtained both the highest and the lowest mean QoL scores ($p < 0.030$). Another variable affecting QoL in our study was daytime sleepiness, which significantly reduced the respondents' QoL regardless of their place of residence, which may have been related to decreased energy, impaired concentration, and cognitive decline. As stated by Leger et al. (2001), the more severe the insomnia, the worse the QoL [21]. A study conducted by Scalo et al. (2015) on a representative sample of over 100,000 people, showed that insomnia was associated with a lower QoL in all domains [53]. Darchia et al. (2018), who analyzed a group of 395 Georgian respondents aged 20–60 years, found that poor quality of sleep significantly reduced QoL [54]. In the current study, QoL was significantly related to depression and anxiety disorders in both rural and urban residents. Similar findings were reported by Liao et al. (2021), who studied almost 24,000 rural residents in China, where both depressive symptoms and anxiety disorders significantly decreased QoL and affected both men and women [52]. Kang et al. (2021) presented results confirming that comorbid chronic diseases and unhealthy lifestyle negatively influence QoL. The authors noticed a significant connection between the lifestyle and QoL of diabetics living in the countryside. Moreover, they found that a high socio-economic status corresponded to high QoL among rural diabetics. Adequate physical activity and prevention of comorbidities can improve QoL [55].

Kiejna et al. (2003) demonstrated a higher prevalence of sleep problems in people with a lower level of education and in city dwellers [56], but the current study failed to confirm these relationships. It can be assumed that this is related to an increase in the total prevalence of subjective insomnia and the higher representation of elderly people among rural residents. Further population studies could help understand the causes of this phenomenon.

**Limitations of the study.** A lower percentage of rural residents – predominance of women – more employed people.

## CONCLUSIONS

The results suggest that insomnia is often a permanent condition in the Polish population. Bearing in mind the prevalence of insomnia among Poles, especially in the 60–79 age group, it may be necessary to introduce obligatory tests for sleep disorders and QoL into the practice of a family doctor, due to the long-term adverse effects of persistent insomnia.

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