# Association of long working hours and depression among healthcare workers in Armenia during COVID-19 pandemic

Master of Public Health Integrating Experience Project

Professional Publication Framework

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**List of abbreviations**

| | |
|---|---|
| **CCA** | Complete Case Analysis |
| **DAG** | Direct Acyclic Graph |
| **HEROS** | COVID-19 Health Care Workers Study |
| **GHQ-12** | General Health Questionnaire-12 |
| **MCAR** | Missing Completely at Random |
| **NIH** | National Institute of Health named After Academician S. Avdalbekyan |
| **PAHO** | Pan American Health Organization |
| **PHQ-9** | Patient Health Questionnaire-9 |
| **RA** | Republic of Armenia |
| **WHO** | World Health Organization |

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## Abstract

**Background**. The beginning of the COVID-19 pandemic shook the global health system, which led to mental health problems among healthcare personnel possibly due in part to long working hours. Considering the importance of mental well-being, this study sought to explore the association between working hours and the odds of depression. Additionally, considering that data collection had coincided with the 44-day Artsakh war in 2020, I hypothesized that the possible association between working hours and depression could be modified by exposure to war.

**Methods**. To perform a secondary data analysis, I used the cross-sectional data collected within the scope of "The impact of the COVID-19 pandemic on the mental health of healthcare workers: COVID-19 Healthcare workers (HEROES)" prospective cohort study. Data were collected in 2020 and 2021 from healthcare facilities in Armenia. The 44-day war in Artsakh interrupted data collection for 5 months (October of 2020-March of 2021). PHQ-9 was used to assess depression among healthcare workers. Descriptive statistics were followed by multiple logistic regression analysis to find the association between working hours and depression. I used a Direct Acyclic Graph (DAG) to identify confounders.

**Results.** Of the 639 observations, after omitting observations with missing values, 355 were included in the final analysis. The mean working hours among participants was 9.84 (SD=5.65). Among 280 (78.9%) respondents PHQ-9 score was less than 10, and 75 (21.7%) reported a score of equal and more than 10. The regression model adjusted by confounders did not show a significant association between working hours and depression, for both the analyses performed. In an additional analysis, I found that the association between working hours and depression was significantly modified by being exposed to war (OR 0.14, 95% CI 0.02-0.75).

**Conclusion**. As a result of the study, no independent association was found between long working hours and depression among healthcare workers. Nonetheless, the association may be modified by being exposed to war. This finding indicates that the association is different during the before and after war periods. Further research is needed to explore how other natural or man-made disasters may affect the association between long working hours and mental health of healthcare personnel.

## Introduction

The COVID-19 pandemic is one of the most catastrophic events that the global population has faced in the 21st century.[1] It started in December 2019 with the outbreak of coronavirus in China (Wuhan and Hubei cities), and rapidly spread globally. As of May 9th, 2023, over 687 million reported cases and more than 6.8 million deaths had been documented globally.[2] Moreover, the COVID-19 pandemic not only impacted the global population but also took a toll on healthcare workers. According to the World Health Organization (WHO) estimates, in 2020 alone, approximately 23,000 healthcare workers were infected.[3]

Healthcare providers play an important role in saving human lives and supporting the delivery of medical services during times of the pandemic. Healthcare workers are at a higher risk of contracting COVID-19.[4] Direct exposure to confirmed cases or with none confirmed asymptomatic cases makes healthcare providers particularly vulnerable to infection. Supporting staff (administrative and logistics personnel) of hospitals are also likely to be infected.[5]

Due to the nature and complexity of their profession, healthcare workers may respond differently to stressful events compared to others.[6] Given the significance of the burden of stressful events on mental health, it is essential to prepare and control the mental well-being of healthcare providers to ensure the professionalism, quality, and efficiency of the services they provide.[7]

The prevalence of mental health problems during the pandemic were assessed across different locations. According to a survey conducted by the National Institution of Healthcare Management in the USA, 69.0% of physicians reported having colloquial depression (feeling down and sad), 20.0% reported the presence of clinical depression (severe depression not due to normal grief), and 11.0% reported other mental health problems.[8] A meta-analysis of 65 studies by Li (2021), found that the pooled prevalence of depression across 21 countries among healthcare workers was 21.7%, from which countries from Middle-East had the highest proportions (34.6%).[9]

Unfortunately, less is known about the prevalence of depression among healthcare workers in Armenia.

Amidst the global pandemic, Armenia also faced a myriad of challenges, as outlined in the study by Ghazaryan (2021).[10] One of the significant obstacles encountered was the healthcare staff having to work long hours, adding to their existing burdens and responsibility for human lives.[10] Moreover, the healthcare system in Armenia has experienced a more complicated situation as COVID-19 also coincided with the 44-days long war in Artsakh in September-November 2020 with all long-lasting consequences.[11,12] However, amidst these formidable challenges, the concerns related to the mental health of healthcare providers in Armenia have not received adequate investigation. Thus, this study sought to fill this important research gap by exploring the effect of the pandemic on mental health by focusing on the association between long working hours and depression among healthcare workers and supporting staff in Armenia.

Recent studies found several factors associated with mental health problems among healthcare workers: the possibility of contracting the virus, fear of transmitting it to family members, insufficient sleep, frustration, increased workload, and long working hours.[13–15]

The aforementioned factors also contribute to a stressful environment and increase the risk of healthcare workers and supporting staff getting mental well-being problems,[16–18] where healthcare workers have a higher prevalence of anxiety symptoms compared to supporting staff.[19]

Some of the factors are discussed below.

**Insufficient sleep**

Disturbed sleep is associated with mental health problems including anxiety and depression.[20] A meta-analysis of several studies found a significant association between disturbed sleep and mental health among healthcare personnel.[21] In a study conducted in Kuwait, 78.8% of healthcare workers reported (from 963 completed surveys) poor sleep quality.[22] According to

Huang & Zhao, (2020) in China healthcare workers had a higher prevalence of poor sleep quality compared with other occupations (teachers, freelancers, social workers, etc.).[23]

**Increased workload**

With the increasing number of infected patients, the workload was growing and healthcare workers had to address unusual number of patients and perform specific tasks.[24] During the beginning of the pandemic, a nationwide survey from South Korea demonstrated that healthcare providers had to assume new responsibilities.[25] As a result of the above-mentioned circumstances healthcare workers in many cases even resigned and left the hospitals unattended.[26] For example, from February 2020 and in November 2021 healthcare sector of the United States lost 460 000 employees of which 18.0% reported pandemic as a reason.[26] Similar situation was observed in Singapore where resignation rates among healthcare workers were high in 2021, and a reason was job related burnout.[26]

**Long working hours**

Long working hours have been associated with developing physical and mental problems across different occupations, such as healthcare.[27–30] International studies have demonstrated that long working hours can lead to insufficient rest, poor self-care, and in addition a high likelihood of developing unhealthy behaviors.[30] In healthcare, long working hours have been linked to decreased quality of life, leading to sleeping problems and changes in social roles.[27] Moreover, working hours are considered as one of the common job-related stressors that can adversely affect mental well-being and be a risk factor for depression.[27]

Long working hours induced by the overloaded situation of healthcare systems resulted in obstacles to focus and concentrate on their duties, thus creating a more stressful environment.[24] A cross-sectional study (1288 participants) conducted in Tokyo demonstrated that during March and April 2020, when Japan had a higher number of cases (incidence rate was 28.23 per 100 000

population during mentioned two months), the long working hours had a significant association with high a prevalence of depressive symptoms (≥11 hours/day: prevalence ratio (PR)=1.45, 95% CI=1.06 to 1.99, compared with ≤8 hours/day).[31] A similar study conducted in China (including Wuhan, Chengdu, Shanghai, and Qingdao) assessed the association between long working hours and depressive symptoms among health professionals during COVID-19.[32] This study revealed that around 51.0% of the 291 study participants experienced depressive symptoms related to long working hours (more than 5 hours a day).[32] An association between long working hours and mental health problems was found in the study conducted in New York by researchers from Columbia University. In that study long working hours (more than 40 hours per week) during the pandemic were associated with developing depression among healthcare personnel (2.293 completed surveys) (at baseline aOR=1.26, 95% CI= 0.95, 1.68 and at follow-up aOR=1.16, 95% CI=0.91, 1.51).[33]

**War**

With the start of the 44-day War, the healthcare systems in Armenia and Artsakh has been under extreme pressure.[34] Since the number of people requiring urgent medical care was increasing, many COVID-19 centers have been forced to shift and focus on wounded patients.[34] Due to the intersection of pandemic and war, possible synergistic effects on mental well-being can be observed.[12] Additionally, a study conducted after the war found high a prevalence of anxiety, depression and PTSD among the general population of Armenia, Artsakh, and diaspora Armenians.[35]

**Sociodemographic characteristics**

Variances in association between long working hours and mental health can vary depending on sociodemographic characteristics such as gender, age, living situation, educational level, and occupation since those are factors which can alter the severity of mental problems.[36] Recent studies demonstrated that gender and age were important predictors of depression.[27,32,37] A

study conducted in Turkey demonstrated that healthcare workers living with elderly people or those who are at higher risk of infection have a higher risk of developing anxiety.[38] Depending on the specialty of healthcare workers, the prevalence of mental problems among occupations can also be different.[39] A study conducted in Singapore indicated a significant association between occupation and mental issues attributed to long working hours.[40] Nurses were more likely to have stress, among healthcare workers anxiety was more prevalent, and managerial or supervisorial occupations were more prone to low stress compared to physicians.[40] A study in China supports the finding that among nurses' mental health problems are more prevalent considering that they have more interaction with infected patients.[41] Another predictor for mental health problems including depression is education.[42] An international study conducted in 2020 found that individuals with low educational attainment have a higher prevalence of depressive symptoms. These findings are consistent with research conducted in Iran.[42,43] Moreover, higher level of education among healthcare workers can serve as a factor which protects against the development of depression. This is because personnel with extensive education experience increased confidence and professionalism in their field.[41]

Considering the aforementioned factors and the complex interplay of challenges faced by healthcare workers and supporting staff, there is a compelling rationale to investigate the association between long working hours and depression during the COVID-19 pandemic in Armenia. The aim of this thesis project is to understand the association between long working hours and depression during COVID-19 among healthcare workers and supporting staff in Armenia. We hypothesized that the long working hours were associated with higher odds of depression scores. We additionally explored if the association between long working hours and depression was modified by exposure to the Artsakh war in 2020.

## Methods

### Study design

This study used cross-sectional data collected within the scope of "The impact of the COVID-19 pandemic on the mental health of healthcare workers: COVID-19 Healthcare workers (HEROES)" prospective cohort study.[15] HEROES study is an international, large-scale initiative led by a collaboration between the University of Chile and Columbia University, Mailman School of Public Health. Additionally, the study was supported by Pan American Health Organization (PAHO) and World Health Organization (WHO). The general aim of the HEROES is to assess the impact of COVID-19 on the mental health of healthcare workers across 26 locations.[15]

National Institute of Health (NIH) Named After Academician S. Avdalbekyan facilitated the data collection. Study participants provided written consent to be included in the study. Eligibility criteria included working in health care facilities, providing care to COVID-19 patients and being a resident of the RA.

### Sampling and data collection

In Armenia, data was collected through convenience sampling from different health care facilities. The data collection activities started in July 2020 and continued until September 27$^{th}$. The data collection was suspended temporarily in October 2020 due to Azerbaijan's attack on Artsakh and was resumed from the end of March 2021 till May 2021, a few months after the ceasefire agreement on November 9$^{th}$, 2020. To begin recruitment, the co-investigator identified a contact person in the participating organization; afterward, details and the aim of the study were explained. After approval to help with data collection by the contact person, all possible participants were identified. An invitation to participate in a survey was sent via email or text message. Data were collected through self-administered online surveys on a secure server hosted by the University of Chile.

**Measurements and variables**

The data on depression among healthcare workers was collected with General Health Questionnaire (GHQ-12) and the Patient Health Questionnaire (PHQ-9) instruments. The PHQ-9-item instrument was used to measure depression only and GHQ-12 was used to measure both anxiety and depression. According to meta-analyses of 14 studies, PHQ-9 has a higher sensitivity (81.0%) and specificity (92.0%) in assessing depressive syndromes.[44] Whereas GHQ-12 has a specificity of 79.0% and a sensitivity of 64.0%.[45] This study used the data collected with the PHQ-9 instrument only.

The PHQ-9 is a 9-item instrument designed to identify major depression and understand the severity of depression.[46] Even though, the questionnaire has been translated into many languages and tested for validity in different communities globally, it was only pre-tested on a limited number of participants in Armenia.

**Outcome variable**

This study has one outcome variable (binary – yes, no) which is depression among healthcare workers in Armenia.

**Exposure variable**

Exposure of interest is the working hours during COVID-19, which was measured by the question related to the working environment (average hours worked in the past week in days and hours).[15] According to the labor code of the Republic of Armenia normal duration of working hours should not exceed 40 hours per week, additionally for "healthcare organizations working on uninterrupted shift bases" the duration of working hours must not exceed 48 hours per week.[47]

**Covariates**

The survey included questions related to sociodemographic characteristics such as gender (categorical), age (categorical), and education (categorical). In addition, information on occupation (categorical) was collected to assess the working environment. I performed a literature review to

identify possible confounders of the study. Furthermore, to illustrate the hypothesized causal pathways, Direct Acyclic Graphs (DAGs) were created using an online tool.[48]

Based on the literature review and DAG, I considered the following covariates as potential confounders: gender, age, occupation, and education (Figure 1).

**Occupation**: It has been demonstrated that with increased workload nurses and physicians were working for long hours to ensure uninterrupted services.[49,50] Different levels and severity of depressive syndromes were observed among healthcare workers, nurses, and public health workers.[41] Moreover, international studies found that nurses have reported higher severity of depression.[7]

**Gender**: Healthcare workers both males and females were exposed to long working hours.[51] Various studies showed that female healthcare workers are more prone to develop depressive syndromes.[32,37,39]

**Age**: Older staff have reported a high prevalence of stress due to long working hours in a study conducted in China.[52] In another study, prevalence of the depressive syndromes among younger age healthcare workers was higher compared to older.[53]

**Living situation:** Healthcare workers who had a child or lived with older family members reported to have high depression severity.[38,39]

**Data management**

The data was imported to IBM SPSS 21 software. For data cleaning purposes, range and consistency checks were performed. Data was saved in an encrypted folder in a password-secured computer that only the student investigator had access to. Data was shared with the advising team for verification of findings.

## Data analyses

### Handling of variables

### Outcome

The selection of cut-off points for PHQ-9 score varies across high-, low-, and middle-income countries.[53] Manea (2012) suggested that the optimal cut-off for PHQ-9 lies between 8 and 11, particularly in middle-income countries (including upper-middle category). [54] On the other hand, according to the authors of the PHQ-9, the suggested cut-off score is 10, which demonstrates a sensitivity and specificity of 88.0% for major depression.[46] This cut-off score has been consistently utilized in studies conducted among middle-income countries. [55] Therefore, in this study participants with a PHQ-9 score of 10 or higher were classified as positive for depression.

### Exposure

Working hours were categorized based on full-time employment schedules in Armenia. The exposure variable had the following categories: from 0 through 8 hours of work and working more than 8 hours.

### Covariates

The categories with less than 10 observations, were combined with other groups to minimize sparse data bias. The gender variable had two categories female and male. For education variable some of the categories were collapsed to ≤12 years of education and 12 > years of education groups. I created four categories for age (18-34; 35-44; 45-59; more than 60). I collapsed categories of occupation variable to physicians (includes all specialties of medical doctors), nursing staff (nurse, nursing assistant, midwife) and administration (all non-medical staff).[13,15,56]

Additionally, based on dates of survey completion I created binary war variable. The respondents that had participated in the study before September 27th 2020 were considered not exposed to war. The variable comprised survey results collected before and after war.

**Statistical analyses**

I implemented Little's Missing Completely at Random (MCAR) test to explore the type of missingness. Thus, I performed a complete case analysis (CCA) excluding the observations with missing values.[57]

Since the PHQ-9 data was not normally distributed, I performed the Wilcoxon rank-sum test[58], to assess the difference in medians of PHQ-9 score among before and after war groups. Odds ratio and 95% confidence intervals (CI) were reported for each category of exposure variable.

For both primary and additional analysis I conducted multiple logistic regression, at a 0.05 level of significance.[59] To obtain crude OR logistic regression was performed without confounders in primary analysis.

**Ethical considerations**

The survey protocol for the HEROS study has been approved by the Institutional Ethics Committee at the Institute of Molecular Biology of National Academy of Sciences of Armenia (Armenia), the Faculty of Medicine, the University of Chile (Chile), and Columbia University (USA). The study does not include primary data collection with a human subject. The dataset is partial according to the needs of the study and does not contain identifiable information and the identity of the study participants cannot be revealed from the dataset.

The study received an exempt status from the Institutional Review Board of AUA.

## Results

### Characteristics of the study population

The Little's MCAR test indicated that data is not missing at random. Thus, observations with missing values on covariates, exposure and outcome were removed, and overall, 355 participants were included in the final analysis (Figure 2). The descriptive characteristics of the study population is presented in Table 1. The mean working hours among participants was 9.84 per day (SD = 5.65). Among respondents, 78.9% were not depressed and 21.1% were depressed. Among the participants, 66.8% reported working at least 8 hours per day, and the remaining 33.2% worked for more than 8 hours per day (Table 1).

About 1 in 10 of the responses (n=32, 9.0%) were collected after the 44-day war in Artsakh, and 90.9% (n=323) were collected before the war. The median PHQ score was significantly higher among the participants who participated after the war ($p<0.05$).

### Primary analysis

Before adjusting for confounders, the odds of depression among those who work for more than 8 hours was 56.0% higher compared to those who worked at least 8 hours a day (OR 1.56, 95% CI 0.92,2.64) . Nonetheless, the 95% CI was wide including the null value (Table 2).

After adjusting for confounders (age, gender, education, occupation), the odds ratio was attenuated from 1.56 to 1.35, indicating that the odds of depression among personnel who worked for more than 8 hours per day is 1.35 times the odds of depression among those who worked at least 8 hours a day (OR 1.35, 95% CI 0.77,2.38) (Table 2). Nonetheless, the width of 95% CI increased including the null value of 1.

### Additional analysis

I also explored if the effect of working hours on depression could have been different before and after the war. I found that the association between working hours and depression was modified by exposure to war (after war) (OR 0.14, 95% CI 0.02,0.76). This finding indicates that

the odds of depression among workers who work for more than 8 hours after war is 75.0% lower than those who worked at least 8 hours per day while adjusting for other confounders (Table 3). The same association for the before the war period was 1.76 (95% CI 0.97,3.20) indicating that the odds of depression among workers who work for more than 8 hours before the war is 76.0% higher than those who worked at least 8 hours per day.

The OR and 95% CI of the confounders included in the model for additional analysis are provided in Table 4. Confounders in the model are fit to reduce the bias in the association between working hours and depression and they do not directly answer the research question of this study (Table 4).

**Discussion**

This study did not identify an independent association between long working hours and depression, which overall contradicts findings from other settings.[19,32,61] Explanations for the findings can be different. The sample size was small increasing the possibility of Type II error. The inclusion of categorical variables and interaction terms reduced the power and precision to detect associations. Additionally, considering the fact of fatigue and exhaustion, the healthcare personnel would not be so motivated to participate in the survey or provide accurate answers. Another possible explanation of the no independent association between long working hours and depression could be the monetary incentives and bonuses which healthcare workers were paid during pandemic. The incentives can encourage the healthcare workers to be more motivated and provide high-quality services, thus somehow improving quality of life.[62,63]

Interestingly, working hours and war interacted in a way that the development of depression was less likely among those who worked more than 8 hours per day and after the war period. Unfortunately, the studies focusing on mental health problems related to a combination of war and pandemic are limited.[12] Nonetheless, a study among civilians in Balkan countries (e.g. Bosnia-Herzegovina, Croatia, Kosovo, Republic of Macedonia, and Serbia), found a high

probability of developing mental health problems due to war after a certain period.[64] In Armenia, during the war period (September-November 2020) the healthcare personnel primarily focused on providing medical services to injured soldiers, and COVID-19 was less prioritized. Moreover, healthcare personnel would not participate in the survey, because of new responsibilities assigned after the war period.

**Limitations and strengths**

As a convenient approach for dealing with missing values, I implemented complete case analysis (CCA), even though it has several drawbacks. The CCA reduces the sample size which reduces the statistical power. This method leads to decreased precision, therefore increasing the uncertainty of estimates. Additionally, since the data is not MCAR, it indicates that the complete observations are not a random sample of the total observations. Moreover, because of missingness and loss of information selection bias can be a limitation. Since only observations with complete answers were selected for analysis, the analytical sample is not representative of the intended sample.[65]

Another source of selection bias could be due to the convenience sampling method. For example, permanent staff of the mental health clinics (such as psychosocial rehabilitation centers), participants who have experienced mental health problems in the past or due to the pandemic, or people who have worked prolonged hours during those times might have preferred to participate in the study. We found that 16.9% (60) of the analytic sample were staff members of mental health clinics. The overrepresentation of mental health clinics' staff in the sample may have limited the external validity of the findings. Because the sample is not selected randomly, the results obtained from the study sample may not be generalizable in other settings, thus also leading to limitations in external validity.[66] Additionally, due to the cross-sectional nature of the data collection, which excludes the temporal sequence between exposure and outcome, the causal relationship between working hours and depression could not be investigated.[67]

Additionally, recall bias and reporting bias are limitations of this study. For example, healthcare workers who were depressed might remember the number of hours they worked during the week preceding the survey differently.

Finally, PHQ-9 instrument is mainly used for classifying the depression severity and identifying major depressive disorder, rather than detecting depression itself. Nonetheless, PHQ-9 is considered a convenient approach for mental health research, especially for the detection of major depressive disorder.

To my knowledge, this is the first study assessing the association of long working hours and depression during COVID-19, among healthcare workers in Armenia, which makes this study unique. Furthermore, the study investigated the impact of war to modify the association between working hours and depression, which adds a distinctive dimension to the research. Despite the small sample size, I was able to identify indications of interaction between long working hours and war. Thus, providing insights for future research focusing on healthcare workers' mental health. The questionnaire was pre-tested and translated with the involvement of clinical psychologist experts. Additionally, the survey was administered online which reduces the possibility of interviewer bias and confirmation bias.

**Conclusions**

Secondary data analysis of the data obtained from the multicenter "HEROS" study, demonstrated no independent association between long working hours and depression among healthcare workers and supporting staff in Armenia, during COVID-19. However, in the additional analysis, I found that the association between working hours and depression was modified by exposure to war. These findings provide information about the situation of mental health among healthcare personnel in Armenia. A future study should be conducted to assess if the associations revealed in the cross-sectional analysis would be corroborated by the follow-up surveys among the participants of HEROES cohort. Further studies should explore how certain natural and human-

caused disasters affect mental health or affect associations between long working hours and mental health conditions.

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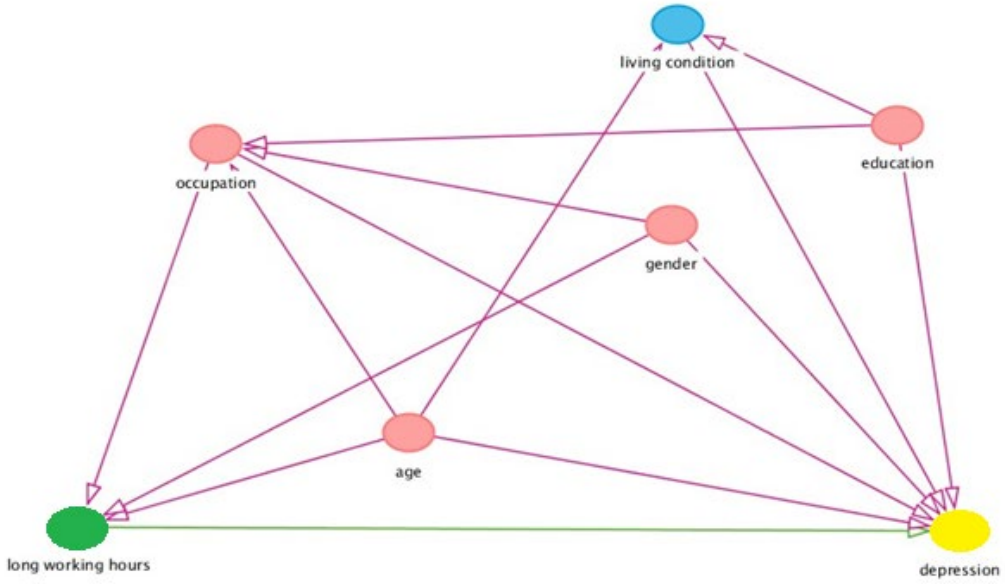
## Appendix

**Figure 1. Direct Acyclic Graph (DAG) for possible confounders**




Green- long working hours (exposure variable), yellow- depression (outcome variable), pink- occupation, gender, age, education (identified confounders), blue- living condition (excluded confounder).

**Figure 2. Data cleaning process**

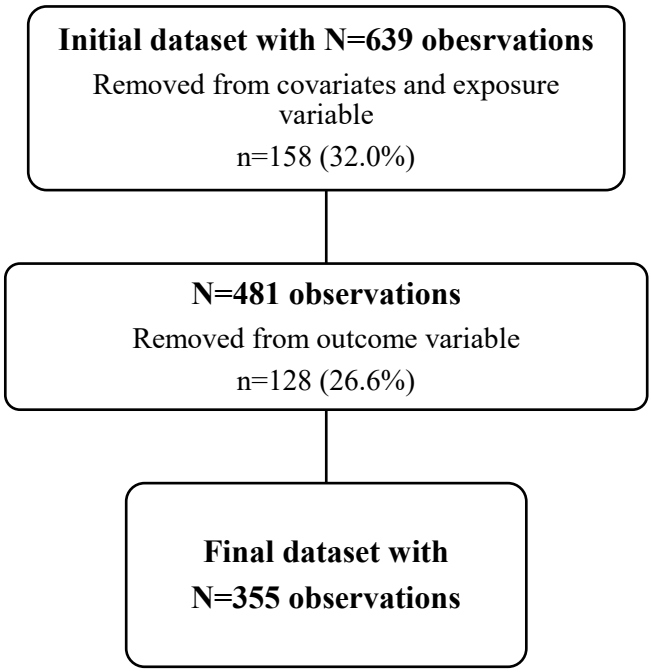


**Table 1. Sociodemographic characteristics of the study population (descriptive statistic)**

| **Variable N= 355** | **n(%)** |
|---|---|
| ***Age*** | |
| 18-34 | 96 (27.0) |
| 35-44 | 88 (24.8) |
| 45-59 | 139 (39.2) |
| 60+ | 32 (9.0) |
| ***Gender*** | |
| Female | 297 (83.7) |
| Male | 58 (16.3) |
| ***Education*** | |
| 12≤ years of education | 151 (42.5) |
| 12> years of education | 203 (57.2) |
| ***Living situation*** | |
| Household member <65 | 240 (67.6) |
| Household member ≥65 | 115 (32.4) |
| ***Type of healthcare center*** | |
| Non-hospital | 108 (30.4) |
| Hospital | 172 (48.5) |
| Other care units | 75 (21.1) |
| ***Occupation*** | |
| Physicians | 185 (52.1) |
| Nursing staff | 106 (29.9) |
| Administration | 64 (18.0) |
| ***Depression Yes/No(PHQ-9 score)*** | |

| | |
|---|---|
| No (score <10) | 280 (78.9) |
| Yes (score≥10) | 75 (21.1) |
| ***Working hours*** | |
| ≤8 hours per day | 237 (66.8) |
| >8 hours per day | 118 (33.2) |

**Table 2. Crude and multivariable logistic regression of association between working hours and depression**

| Variables | OR | 95% CI | | p-value | aOR [a] | 95% CI | | p-value |
|---|---|---|---|---|---|---|---|---|
| | | Lower | Upper | | | Lower | Upper | |
| **Hours worked per day** | | | | | | | | |
| *0-8 hours per day* | *1.00* | *Reference* | | | *1.00* | *Reference* | | |
| 8+ hours per day | 1.56 | 0.92 | 2.64 | 0.09 | 1.35 | 0.77 | 2.37 | 0.29 |

*a) adjusted by age, gender, occupation, and education*

**Table 3. Logistic regression of association between working hours and depression, war and interaction term between war and working hours (additional analysis)**

| Variables | aOR [a] | 95% CI | | p-value |
|---|---|---|---|---|
| | | Lower | Upper | |
| **Hours worked per day** | | | | |
| *0-8 hours per day* | *1.00* | | *Reference* | |
| 8+ hours per day | 1.76 | 0.96 | 3.20 | 0.06 |
| **War** | | | | |
| *Before* | *1.00* | | *Reference* | |
| After | 5.31 | 1.70 | 16.61 | 0.00 |
| **Interaction** | | | | |
| 8+ hours and after war | 0.14 | 0.02 | 0.75 | 0.02 |

*a) adjusted by age, gender, occupation, and education*

**Table 4. OR and 95% CI for covariates included in the additional analysis of the association between working hours and depression**

| Variables | OR | 95% CI | | p-value |
|---|---|---|---|---|
| | | Lower | Upper | |
| **Age** | | | | |
| *18-34* | *1.00* | | *Reference* | |
| 35-44 | 0.39 | 0.18 | 0.83 | 0.01 |
| 45-59 | 0.45 | 0.24 | 0.87 | 0.01 |
| 60+ | 0.31 | 0.10 | 0.94 | 0.03 |
| **Gender** | | | | |
| *Female* | *1.00* | | *Reference* | |
| Male | 0.58 | 0.27 | 1.26 | 0.17 |
| **Education** | | | | |
| *≤12 years of education* | *1.00* | | *Reference* | |
| 12 > years of education | 1.66 | 0.747 | 3.68 | 0.21 |
| **Occupation** | | | | |
| *Physician* | *1.00* | | *Reference* | |
| Nursing staff | 0.92 | 0.36 | 2.30 | 0.86 |
| Administrative staff | 0.96 | 0.45 | 2.04 | 0.93 |