ORIGINAL ARTICLE

Burden of Headache Disorders among Health Workers: YLD Estimations and Comorbidity-Adjusted Modeling Using GBD Methods

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Abstract

Background: Headache disorders significantly affect over half of the global population, notably healthcare workers through YLD and productivity loss. This study aimed to identify demographic and job-related disability disparities among health workers.
Methods: This cross-sectional study analyzed baseline cohort data from 5,924 health workers at Shiraz University of Medical Sciences (2018). YLD calculations used GBD disability weights and comorbidity adjustments via multiplicative models. Nonparametric tests, including Kruskal–Wallis H and post hoc Mann–Whitney U tests with Bonferroni correction, were used for group comparisons.
Results: Our findings revealed a substantially higher prevalence-based YLD for headache disorders (mean: 9,460±26,300 per 100,000) compared to the global age-standardized estimate of 588.4 per 100,000 reported by the GBD study. Women (0.135±0.31) had a higher mean YLD than men (0.042±0.18) though it was not statistically significant ($p=0.84$). Younger workers (0.102±0.30, $p<0.001$), university-educated (0.102±0.27), upper-middle-class (0.1195±0.293), and clinical/medical staff (0.113±0.29, $p=0.002$) showed the highest YLD. Depression (58.6%) was the most frequent comorbidity; adjusted models confirmed comorbidity impact.
Conclusion: Headache disorders create significant disparities among health workers by age, education, socioeconomic status, and job type. Depression is a prevalent comorbidity. Adjusted YLD models improved burden estimation, underscoring the need for targeted occupational health interventions.

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Keywords: Headache Disorders, Years Lived with Disability, Comorbidity, Prevalence, Incidence

Introduction

Globally, 52.0% of the population is struggling with headache disorders, including migraine, tension-type headache, and cluster headache.[1] The prevalence is 44.4% for males and 57.8% for females in terms of gender[1]. Headache disorders are responsible for almost 48 million Years Lived with Disability worldwide, and are major issues on all continents.[2, 3] Global Health Estimates 2019 identified headache disorders as the third-highest cause of YLDs in all age groups and sexes combined.[3] Headaches are widespread among workers and often lead to productivity losses due to their health impact.[4, 5] The burden for employees becomes more significant due to absenteeism and economic burden, as well as diagnostic and treatment costs.[5] Thus, headaches should be recognized not only as individual health problems but also as significant socio-economic issues.[5] Healthcare workers, who experience high occupational stress and irregular work schedules, are a high-risk group for headache disability.[6, 7] Prior research has been unable to differentiate headache experiences across job categories, making it difficult to identify occupation-specific risk factors.[8] Additionally, previous studies mostly rely on aggregated or self-reported data, lacking individualized baseline health assessments.[2, 9, 10] Since studies addressing the burden of headache disorders in Iran—particularly among occupational groups—are scarce, this study fills a critical data gap. This research uniquely applies three distinct methodological approaches for YLD calculation: prevalence-based, incidence-based, and comorbidity-adjusted models. The prevalence-based approach offers insights into the current burden of disease by considering the average patient age at assessment,[11] providing a 'snapshot' of disability within the population. Conversely, the incidence-based approach, which uses the age at diagnosis as the onset age,[11] provides a retrospective view of the total years lost from diagnosis, allowing for an understanding of the cumulative impact over time. Crucially, both approaches are further refined through comorbidity adjustments, specifically using multiplicative models.[11] This is essential because health workers often suffer from multiple simultaneous diseases, and failure to account for these coexisting conditions can significantly overestimate YLD.[12] This study offers a more thorough assessment of headache-related disability by integrating prevalence-based, incidence-based, and comorbidity-adjusted YLD calculations. This comprehensive approach leverages cohort baseline data to address prior research limitations and accurately identify affected demographic and job-related groups among health workers, recognizing the impact of comorbidities on disability burden.

Methods

This study used the 2018 baseline data of the Shiraz University of Medical Sciences employees' health cohort. A total of 5,924 health workers aged 20 to 70 were included. Information was gathered using structured questionnaires and medical assessments, covering demographic data including age, sex, education, Job categories, and socioeconomic status. Baseline cohort data provide physician-confirmed diagnoses for conditions including headache disorders, fatty liver, depression, diabetes, pulmonary diseases, ischemic heart diseases, multiple sclerosis, epilepsy, breast cancer, and stroke.

Years Lived with Disability (YLD) Calculation

The basic YLD formula is calculated as follows in equation (1):[11]

$$YLD=I\times DW\times L \qquad (1)$$

Where I represents the number of cases, DW denotes the disability weight (ranging from 0 to 1), and L refers to either the average duration of disability in years or the standard life expectancy at a given age. Discount rate and age-weighting reflect societal health preferences, with early Global Burden of Disease (GBD) studies assigning lower weight to early and late-life years. Age weighting balanced these differences, leading to discounting in Equation (2):

$$\mathrm{YLD} = \mathrm{DW}\frac{\mathrm{KCe^{ra}}}{(\mathrm{r}+\beta)^2}\begin{bmatrix} \mathrm{e}^{-(\mathrm{r}+\beta)(\mathrm{L}+\mathrm{a})}[-(\mathrm{r}+\beta)(\mathrm{L}+\mathrm{a})-1] \\ -\mathrm{e}^{-(\mathrm{r}+\beta)\mathrm{a}}[-(\mathrm{r}+\beta)\mathrm{a}-1] \end{bmatrix} + \frac{1-\mathrm{K}}{\mathrm{r}}(1-\mathrm{e}^{-\mathrm{rL}}) \qquad (2)$$

Where K represents the age-weighting factor (set at 1), C is the age-adjustment constant (0.1658), r denotes the discount rate (0.03), β is the age-weight constant (0.04), a refers to the age at onset, and L signifies the difference between the onset age and life expectancy. Life expectancy represents the expected remaining years of life at a given age. In this study, age- and sex-specific life tables were obtained from the WHO database for calculations. Disability weight (DW), a key component in YLD estimation, quantifies disease severity on a scale from 0 (perfect health) to 1 (death). We used GBD study disability weights, which typically incorporate stage-specific prevalence data. However, since the employee health cohort data were collected in a binary format (presence/absence of disease) without severity details, DW_mean was determined using prevalence data for non-communicable diseases (ages 20–70, both sexes) in Fars province, extracted from the GBD database. YLD was calculated by dividing the disease burden (YLD) by prevalence, as expressed in Equation (3):[13]

$$\mathrm{DW_{mean}} = \frac{\mathrm{YLD}_{(\text{number,age group,Both sexes,Fars province})}}{\mathrm{Prevalence}_{(\text{number,age groups,Both sexes,Fars province})}} \qquad (3)$$

The 20–70 age range was chosen because of its similarity to the employees' cohort's demographic distribution.

Prevalence vs. Incidence-Based Approaches

Two common approaches exist for determining disability onset age: the incidence-based approach (uses age at diagnosis as disability onset age) and the prevalence-based approach (uses average patient age at assessment as onset age). Our study incorporated both approaches since our dataset includes diagnosis ages, allowing a robust assessment of disease burden.

Comorbidity Adjustment

Since health workers may have multiple diseases simultaneously, YLD calculations must account for comorbidity to prevent overestimation.[14] We applied a multiplicative comorbidity model, minimizing overestimation as shown in Equation (4):[14]

$$PYLD=1-II(1-PYLD_i) \qquad (4)$$

Where PYLD represents the total prevalence-based YLD, incorporating adjustments for comorbidity, while PYLDi denotes the individual YLD calculated for each specific disease. For independent disease interactions, the multiplicative model accounts for combined burdens, while the synergistic model addresses interactions that amplify disability burden, as shown in Equation (5):[14]

$$f = \frac{P_{1+2}}{P_1 \times P_2} \quad (5)$$

where f represents the comorbidity factor, which can range from 0 to +∞, indicating the degree of interaction between coexisting diseases. P_{1+2} denotes the prevalence of overlapping diseases, while P_1 and P_2 refer to the prevalence of each disease individually. The comorbidity factor (f) was applied sequentially, allowing comparison of both models to quantify disease burden. This formula extends to more than two diseases, as shown in Equation (6):[14]

$$PYLD_{1+\cdots+(j+1)} = PYLD_{1+\cdots+j} + \left(1 - f_{(1+\cdots+j)+(1+j)} \times PYLD_{1+\cdots+j}\right) \times PYLD_{j+1} \quad (6)$$

The final YLD estimates were determined across demographic factors (age, sex, socioeconomic status) and occupational categories, incorporating both prevalence-based and incidence-based approaches with multiplicative comorbidity adjustments.

Sensitivity Analysis

To evaluate the impact of different methodologies on YLD estimates, we performed a sensitivity analysis using 12 calculation variations. These included incidence-based (age at diagnosis) and prevalence-based (average age at assessment) approaches, each applied with and without discount rates and age weighting. Additionally, comorbidity was either excluded, adjusted independently using a multiplicative model, or adjusted dependently via a synergistic model. By integrating these variations, the analysis ensures robust and accurate disability burden assessments.

Statistical Analysis

IBM SPSS Statistics 23 was used for data analysis. Study groups were compared using the Kruskal–Wallis H test. When the Kruskal–Wallis test indicated a statistically significant difference ($p \leq 0.05$), post hoc pairwise comparisons were performed using the Mann–Whitney U test to identify the specific groups that differed. To adjust for multiple comparisons in these post hoc analyses, we applied the Bonferroni correction , where the significance threshold (alpha) was adjusted by dividing the nominal alpha (0.05) by the number of comparisons made, ensuring an appropriate family-wise error rate.

Ethical Consideration

The study protocol was reviewed and approved by the institutional ethics committee in accordance with the Declaration of Helsinki. The ethical approval code is IR.SUMS.SCHEANUT.REC.1403.097[15].

Results

This study comprised 5,924 health workers from Shiraz University of Medical Sciences (Table 1), with a mean age of 41.16±7.00 years. Of the participants, 3,343 (56.4%) were women. The overall mean prevalence-based Years Lived with Disability (YLD) for the cohort was 0.0946±0.263 per person (approximately 9,460 YLD per 100,000), with significant variations observed across demographic and occupational groups (Table 1). Women had a higher mean YLD (0.135±0.31) compared to men (0.042±0.18) though this difference was not statistically significant (p=0.84). Age differences were notable, with younger individuals (20–34 years) exhibiting the highest mean YLD (0.102±0.30, p<0.001), followed by the 35–49 age group (0.101±0.27). Health workers aged 50 and above had the lowest mean YLD (0.08±0.22), suggesting a decline in disability burden with age progression. Educational status influenced YLD values, with the lowest disability burden seen among individuals with primary education (0.052±0.19, p=0.004). University-educated health workers had a higher mean YLD (0.102±0.27), likely reflecting different occupational exposures or health behaviors. Socioeconomic factors also played a role, with upper-middle-class health workers showing the highest YLD (0.1195±0.293), while those in the lower class recorded the lowest burden (0.073±0.23, p=0.035). Among job categories, clinical and medical services showed the highest mean YLD (0.113±0.29, p=0.002), while technical services had the lowest burden (0.05±0.20).

Comorbidity

Depression emerged as the most frequently observed comorbidity, affecting 407 patients, accounting for 58.6% of the total cases. It often appeared in combination with diabetes (DM), fatty liver, ischemia, epilepsy, and COPD. Fatty liverwas recorded among 976 patients, making up 79.6% of cases, frequently overlapping with COPD, ischemia, and diabetes. COPD appeared in 31 cases, representing 2.5% of patients, commonly coexisting with depression, fatty liver, ischemia, and stroke. Diabetes (DM) was a significant comorbidity, present in 251 cases (20.5%), particularly alongside fatty liver, ischemia, and stroke. Additionally, less frequent conditions such as ischemia, epilepsy, breast cancer, multiple sclerosis (MS), and stroke are seen in smaller proportions. The most frequent single comorbidity pairing

Table 1: Comparison of Prevalence-Based YLD Across Demographic and Occupational Groups

Variables	Total population	No. headaches(%)	Prevalence-Based Approach YLD				P
			Mean	SD	Mean per patient	SD	
All	5924	695(11.7)	.0946	.263	.8061	.126	
Sex							
Men	3581 (43.6)	136(19.6)	.0424	.182	.8024	.139	.841
Women	3343(56.4)	559(80.4)	.1350	.305	.8070	.123	
Age (Years)*							
20-34	1038(17.5)	105(15.1)	.1015	.302	.9995	.031	<.001
35-49	3078 (52.0)	371(53.4)	.1013	.274	.8395	.045	
>50	1808 (30.5)	219(31.5)	.0795	.216	.6573	.066	
Education**							
Primary or Less	237(4.0)	17(2.4)	.0522	.194	.7271	.178	.004
Middle School	302(5.1)	42(6.0)	.1063	.268	.7619	.117	
High School Diploma	1104(18.6)	99(14.2)	.0726	.236	.8156	.132	
University Education	4280(72.3)	537(77.3)	.1019	.272	.8109	.122	
Socioeconomic status***							
Upper Class	3305(55.8)	405(58.3)	.0974	.265	.7962	.126	.035
Upper Middle Class	394(6.7)	58(8.3)	.1195	.293	.8121	.145	
Middle Class	1727(29.2)	194(27.9)	.0924	.262	.8208	.116	
Lower Middle Class	441(7.5)	33(4.7)	.0634	.226	.8467	.128	
Lower Class	52(0.9)	5(0.7)	.0731	.228	.7600	.107	
Job Category****							
Administrative-Clerical	1966(33.2)	241(34.7)	.0959	.260	.7816	.123	.002
Clinical and Medical Services	2105(35.6)	289(41.6)	.1126	.286	.8202	.123	
General Services	824(13.9)	78(11.2)	.0765	.241	.8082	.143	
Technical Services	223(3.8)	13(1.9)	.0495	.203	.8492	.152	
Diagnostic and Chemical Laboratory Staff	225(3.8)	30(4.3)	.1122	.289	.8413	.092	
Guarding and Security	323(5.5)	20(2.9)	.0531	.209	.09220	.855	
Other	247(4.2)	23(3.3)	.0724	.229	.7774	.109	

Pairwise comparisons using the Mann-Whitney U test were conducted for each categorical variable, with Bonferroni correction applied to adjust for multiple comparisons.*20–34 vs. 35–49, p<.001; 20–34 vs. >50, p<.001; 35–49 vs. >50, p<.001. ** The Primary or Less group exhibited significantly different YLD values compared to those with a High School Diploma (p=0.011) and University Education (p=0.006). Individuals with Middle School education showed significant differences in YLD compared to those with a University Education (p=0.017) and High School Diplomas (p=0.017). *** The Upper Class exhibited significantly different YLD values compared to the Middle Class (p=0.016) and the Lower Middle Class (p=0.028). ****The Administrative-Clerical group showed significantly different YLD values compared to Clinical and Medical Services (p<.001) and Guarding and Security (p=0.007)

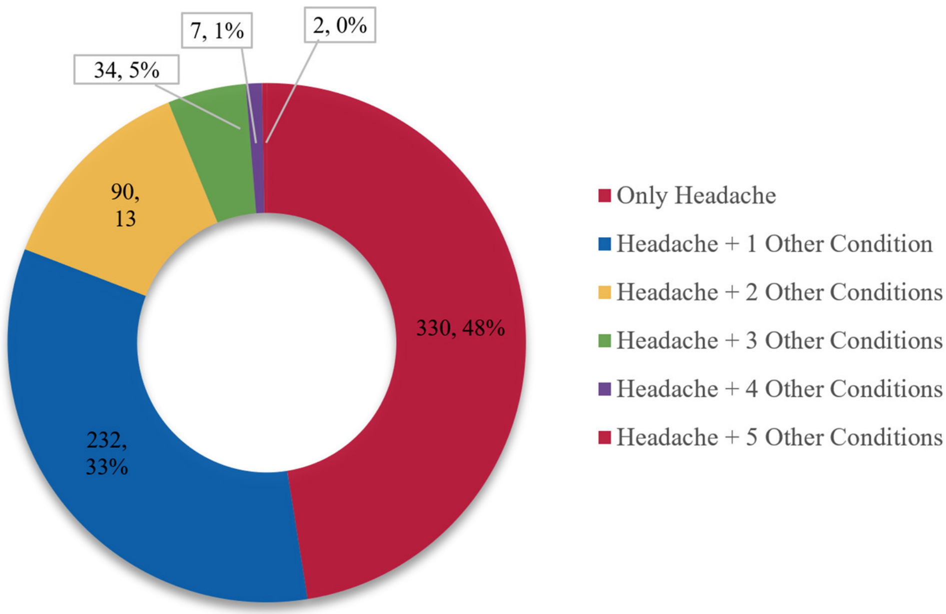

Figure 1: Frequency of comorbid conditions among individuals diagnosed with headache

recorded was headache + depression (70 cases, 10.1%), reinforcing the strong link between headaches and mental health conditions. Figure 1 illustrates the frequency of comorbid conditions among individuals diagnosed with headache. These results demonstrate that more than half of headache patients experience at least one comorbid condition. Figure 2 reinforces the most prevalent comorbid conditions. Overlapping areas show how these conditions interconnect, with specific counts assigned to each combination.

Sensitivity Analysis of YLD Estimation Methods

The sensitivity analysis compared incidence- and prevalence-based YLD calculations, with and without comorbidity adjustments. Ignoring comorbidities inflated YLD estimates, while adjusted models showed lower disability burdens. The dependent comorbidity model produced the lowest YLD values, revealing strong interactions between coexisting conditions. However, prevalence-based dependent modeling prevents reporting SD, discount rates, and age-weighting, as it relies on aggregate prevalence data rather than individual patient records. Table 2 summarizes YLD calculation approaches, highlighting the impact of comorbidities, discounting, and age weighting.

Discussion

The findings of this study highlight the burden of headache disorders among health workers of Shiraz University of Medical Sciences, with an overall prevalence of 11.7%. The prevalence-based YLD analysis reveals significant disparities across demographic and occupational groups. Perhaps one of the most important findings of this study is the strong comorbidity link, with more than half (365 cases) of headache patients presenting at least one additional condition. Another key result that stands out is the high prevalence of depression, affecting 58.6% of headache patients. This reinforces the well-documented connection between mental health disorders and chronic pain. Women exhibited a higher prevalence of headache

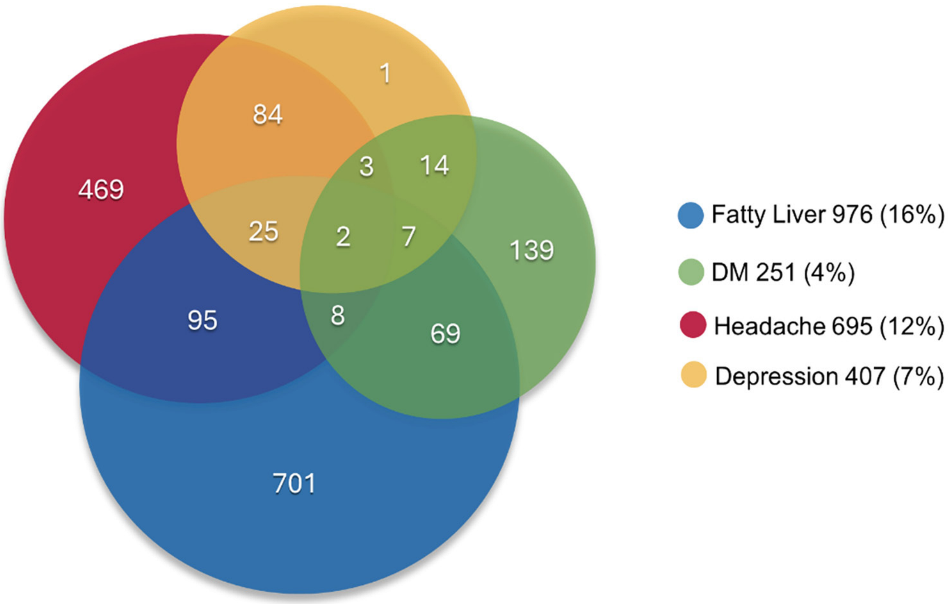

Figure 2: Overlap of the most prevalent comorbid conditions, illustrating their interconnections and specific counts for each combination

Table 2: Sensitivity Analysis of YLD Calculation Methods

Calculation Type			Without Discount Rate and Age Weighting			With Discount Rate and Age Weighting		
			Headache only	Headache and other conditions	Total*	Headache only	Headache and other conditions	Total*
			Mean±SD	Mean±SD		Mean±SD	Mean ±SD	
Incidence-Based Approach	Independent Diseases		6.02±6.52	10.49±6.27	4187	3.52±3.83	6.10±3.69	2449
	Comorbidity Adjusted	Independent Model	6.11±6.45	10.58±6.01	4246	3.57±3.76	6.19±3.48	2481
		dependent Model	2.58	4.92	1790	NA	NA	NA
Prevalence-Based Approach	Independent Diseases		5.32±6.04	9.31±5.92	3696	2.96±3.36	5.17±3.31	2056
	Comorbidity Adjusted	Independent Model	5.04±5.49	8.79±5.21	3506	2.81±3.06	4.88±2.92	1950
		dependent Model	2.17	4.15	1510	NA	NA	NA

disorders and a higher average YLD compared to men although this difference was not statistically significant. Previous studies have consistently reported a higher prevalence of headache disorders among women, reinforcing this trend across various populations.[1, 16, 17] Hormonal fluctuations, particularly those associated with menstruation and menopause, have been identified as potential triggers for headache episodes.[18] A similar female predominance in disability burden has also been reported for musculoskeletal disorders in Iran, with women bearing significantly higher YLDs across all age groups due to demographic and occupational risk patterns.[19] Also, this observation is supported by Vali et al. (2016), who found that the implementation of the Productivity Improvement Act (PIA)—which restricted rest during night shifts and led to human resource imbalances—was associated with decreased nurses' well-being and performance, potentially compounding stress-related disorders, like chronic headaches.[20] Age-based differences suggest a declining disability burden with increasing age, with the highest YLD observed among younger health workers (20–34 years). These results are in line with those of previous studies,[2, 16] and this trend may reflect differences in occupational stress, lifestyle factors, and healthcare-seeking behaviours. Education level also plays a role, with higher disability burden reported among university-educated health workers, potentially due to differences in job-related exposures. While our study found a higher disability burden among university-educated health workers, some of the previous research has reported greater disability burden among individuals with lower education levels (≤12 years).[9] These discrepancies may stem from differences in job demands, healthcare access, and occupational risk factors between the two study populations. This study reveals significant YLD disparities, with clinical and medical staff bearing the highest burden, highlighting occupational health risks. In line with Kuo et al. (2015), healthcare professionals face higher migraine risks due to workload, stress, shift work, and sleep disturbances.[7] Our study found higher YLD values in the upper-income groups, likely due to differences in lifestyle and healthcare access. This contrasts with Katsarava et al., who linked lower socioeconomic status to higher migraine prevalence[21] but aligns with Bahrami's findings that secondary headaches, often tied to underlying diseases like cerebrovascular events, are more common in wealthier individuals.[22] These patterns highlight the complex relationship between socioeconomic status and headache burden, emphasizing the need for targeted interventions.

The high prevalence of comorbidities among headache patients underscores the complex link between chronic pain and other health disorders. Depression, the most common comorbidity (58.6%), reinforces its strong association with headache burden, consistent with prior research.[4, 23, 24] The frequent headache-depression pairing (10.1%) underscores the need for integrated mental health interventions in occupational settings. Additionally, metabolic disorders like diabetes, fatty liver, and ischemia likely contribute to disability burden in health workers through systemic inflammation or shared mechanisms, reflecting findings that link metabolic conditions to headache disorders and workplace performance.[4] In our study, the YLD for headache disorders was notably higher (9,460±26,300 per 100,000) compared to the global age-standardized GBD estimate (588.4 per 100,000).[25] This difference is likely due to several factors. Our primary focus was on healthcare workers—a high-stress demographic—whose elevated headache burden likely reflects the specific occupational pressures that distinguish them from the general global population represented in GBD estimates. Methodologically, despite using GBD-derived disability weights, our reliance on binary disease data and thus an average disability weight likely contrasts with GBD's more granular severity-based calculations. Differences in data collection (e.g., self-report) and unique regional/socio-demographic specificities of Shiraz, Iran, may also contribute. These findings provide crucial occupation-specific insights into headache burden, complementing broader global estimates and highlighting the need for targeted occupational health interventions.

Methodologically, prevalence-based YLD estimation improved comorbidity adjustments, allowing forward-looking burden assessments, while incidence-based methods provided a retrospective view of disease impact.[11] The dependent comorbidity model produced lower YLD values, highlighting strong interactions between coexisting conditions that prevalence-based methods may overlook. This is consistent with the findings of Mathers et al. (2006), who found that accounting for dependent comorbidity significantly impacted HALE estimates.[14] Our sensitivity analysis highlights the importance of comorbidity adjustments in YLD estimations, as ignoring coexisting conditions can inflate disability burden. Our study applied discounting and age weighting to YLD estimations for a balanced assessment of long-term disability burden. While WHO removed these adjustments post-2010, earlier methods recognized their role in health intervention planning and economic evaluations.[26] Age weighting reflects variations in occupational health priorities, helping align YLD calculations with real-world workplace trends. However, critics argue that age at disease onset should not influence health calculations, indicating that identical conditions should be assessed equally, regardless of age. This raises concerns about fairness and accuracy in weighted assessments.[27]

GBD studies favor prevalence-based approaches for simplicity and data accessibility, as noted by Murray and Lopez, who emphasized their clarity in assessing current disease burden. GBD 2010 adopted prevalence-based calculations, using the mean patient age as onset age for forward-looking analyses, whereas incidence-based approaches estimate total years lost from diagnosis. Given that our dataset includes disease diagnosis ages, we applied both methods for a comprehensive YLD assessment.[11]

Our analysis highlights job stress and healthcare exposures as key contributors to disease burden, beyond headache diagnoses. Occupational adjustments in epidemiology are crucial, and interventions should focus on health workers with comorbidities, especially those with mental health conditions. The key strength of this study is its large, diverse sample of 5,924 university health workers, providing strong disability estimates and occupation-specific insights. Additionally, using comorbidity-adjusted calculations and both incidence- and prevalence-based methods improves burden assessment and strengthens comparative analyses. However, this study has several limitations. Its use of binary disease data (recording only the presence or absence of conditions) limits severity assessments. To mitigate this, we applied Global Burden of Disease (GBD) derived disability weights, ensuring more precise YLD estimations despite this constraint. Furthermore, the study did not differentiate between specific headache types (e.g., migraine, tension-type headache), which could influence disability estimates. Lastly, the findings are primarily generalizable to health workers within university settings and may not be fully representative of the broader working population or other healthcare sectors, limiting the direct transferability of these results.

Conclusion

This study highlights significant headache-related disability disparities, with depression (58.6%) being a major comorbidity. Younger individuals (20–34 years) showed the highest YLD, while education, socioeconomic status, and job type, particularly clinical staff, influenced disability levels. Our use of comorbidity-adjusted, incidence- and prevalence-based YLD calculations, along with GBD-derived disability weights, enhanced accuracy despite limitations in the binary disease data. These findings underscore the need for targeted interventions to improve workplace health and healthcare accessibility. Future research should include longitudinal studies to track disability progression and utilize more detailed data on headache types and severity, potentially incorporating qualitative approaches for deeper insights.

Author Contribution

All authors have read and agreed to the published version of the manuscript.

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List of Abbreviations

DM: Diabetes Mellitus
DW: Disability Weight
GBD: Global Burden of Disease
MS: Multiple Sclerosis
SD: Standard Deviation
WHO: World Health Organization
YLD: Years Lived with Disability

Conflict of Interest

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

References

1 Stovner LJ, Hagen K, Linde M, Steiner TJ. The global prevalence of headache: an update, with analysis of the influences of methodological factors on prevalence estimates. The Journal of Headache and Pain. 2022;23(1):34. doi: 10.1186/s10194-022-01402-2. PubMed PMID: 35410119; PubMed Central PMCID: PMC9004186.

2 Stovner L, Hagen K, Jensen R, Katsarava Z, Lipton R, Scher A, et al. The global burden of headache: a documentation of headache prevalence and disability worldwide. Cephalalgia. 2007;27(3):193-210. doi: 10.1111/j.1468-2982.2007.01288.x. PubMed PMID: 17381554.

3 Global incidence, prevalence, years lived with disability (YLDs), disability-adjusted life-years (DALYs), and healthy life expectancy (HALE) for 371 diseases and injuries in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. Lancet. 2024;403(10440):2133-61. doi: 10.1016/S0140-6736(24)00757-8. PubMed PMID: 38642570; PubMed

Central PMCID: PMC11122111.

4 Magnavita N. Headache in the Workplace: Analysis of Factors Influencing Headaches in Terms of Productivity and Health. Int J Environ Res Public Health. 2022;19(6). doi: 10.3390/ijerph19063712. PubMed PMID: 35329399; PubMed Central PMCID: PMC8953285.

5 Simić S, Rabi-Žikić T, Villar JR, Calvo-Rolle JL, Simić D, Simić SD. Impact of Individual Headache Types on the Work and Work Efficiency of Headache Sufferers. International Journal of Environmental Research and Public Health. 2020;17(18):6918. doi: 10.3390/ijerph17186918. PubMed PMID: 32971860; PubMed Central PMCID: PMC7560060.

6 Seyyed Mohammad Taghi A, Leyla S, Afshin Borhani H. Epidemiologic and Clinical Characteristics of Migraine and Tension-Type Headaches among Hospitals Staffs of Shiraz (Iran). Acta Medica Iranica. 1970;47(2).

7 Kuo W-Y, Huang C-C, Weng S-F, Lin H-J, Su S-B, Wang J-J, et al. Higher migraine risk in healthcare professionals than in general population: a nationwide population-based cohort study in Taiwan. The Journal of Headache and Pain. 2015;16(1):102. doi: 10.1186/s10194-015-0585-6. PubMed PMID: 26631235; PubMed Central PMCID: PMC4668247.

8 Onwuekwe I, Onyeka T, Aguwa E, Ezeala-Adikaibe B, Ekenze O, Onuora E. Headache prevalence and its characterization amongst hospital workers in Enugu, South East Nigeria. Head Face Med. 2014;10:48. doi: 10.1186/1746-160X-10-48. PubMed PMID: 25423879; PubMed Central PMCID: PMC4289241.

9 Stewart WF, Wood GC, Manack A, Varon SF, Buse DC, Lipton RB. Employment and work impact of chronic migraine and episodic migraine. J Occup Environ Med. 2010;52(1):8-14. doi: 10.1111/head.12069. PubMed PMID: 23463958.

10 Hughes MD, Wu J, Williams TC, Loberger JM, Hudson MF, Burdine JR, et al. The experience of headaches in health care workers: opportunity for care improvement. Headache. 2013;53(6):962-9. doi: 10.1111/head.12069. PubMed PMID: 23463958.

11 Christopher J. L. Murray ADL. Global Burden of Disease and Injury Series. 1st ed: Harvard School of Public Health; 1996, ISBN / ISSN:0674354486

12 McDonald SA, Haagsma JA, Cassini A, Devleesschauwer B. Adjusting for comorbidity in incidence-based DALY calculations: an individual-based modeling approach. BMC Medical Research Methodology. 2020;20(1):100. PubMed PMID: 32375653; PubMed Central PMCID: PMC7201540.

13 Mansourian M, Ghasemi KA-O, Haghdoost A, Kopec JA-O, Sarrafzadegan NA-O, Islam SA-O. Measuring the burden of comorbidity for ischaemic heart disease and four common non-communicable diseases in Iran, 1990-2017: a modelling study based on global burden of diseases data. 2022(2044-6055 (Electronic)). doi: 10.1136/bmjopen-2021-054441. PubMed PMID: 36396302; PubMed Central PMCID: PMC9677042.

14 Mathers CD, Iburg Km Fau - Begg S, Begg S. Adjusting for dependent comorbidity in the calculation of healthy life expectancy. 2006(1478-7954 (Electronic)). doi: 10.1186/1478-7954-4-4. PubMed PMID: 16620383; PubMed Central PMCID: PMC1484491.

15 Mohaghegh S, Kangari H, Masoumi SJ, Bamdad S, Rahmani S, Abdi S, et al. Prevalence and risk factors of keratoconus (including oxidative stress biomarkers) in a cohort study of Shiraz university of medical science employees in Iran. BMC Ophthalmol. 2023;23(1):188. doi: 10.1186/s12886-023-02934-0. PubMed PMID: 37106365; PubMed Central PMCID: PMC10142163.

16 Liu -Z, Hu -X, Yang -L, Qi -J, Liu -J, Wang -L, et al. - Burden of Headache Disorders in China and its Provinces, 1990–2021. - Biomedical and Environmental Sciences. 2025;- 38(-):- 1. doi: 10.3967/bes2025.019. PubMed PMID: 40506377.

17 Kissani N, Adarmouch L, Sidibe AS, Garmane A, Founoun R, Chraa M, et al. The burden of headache disorders in the adult population of Morocco: estimates, and a health-care needs assessment, from a cross-sectional population-based door-to-door survey. J Headache Pain. 2024;25(1):227. doi: 10.1186/s10194-024-01942-9. PubMed PMID: 39736514; PubMed Central PMCID: PMC11687139.

18 Chowdhury D. Tension type headache. Ann Indian Acad Neurol. 2012;15(Suppl 1):S83-8. doi: 10.4103/0972-2327.100023. PubMed PMID: 23024570; PubMed Central PMCID: PMC3444224.

19 Shahrezaee M, Keshtkari S, Moradi-Lakeh M, Abbasifard M, Alipour V, Amini S, et al. Burden of musculoskeletal disorders in Iran during 1990-2017: estimates from the Global Burden of Disease Study 2017. Arch Osteoporos. 2020;15(1):103. doi: 10.1007/s11657-020-00767-8. PubMed PMID: 32651719.

20 Vali L, Tabatabaee SS, Kalhor R, Amini S, Kiaei MZ. Analysis of Productivity Improvement Act for Clinical Staff Working in the Health System: A Qualitative Study. Glob J Health Sci. 2015;8(2):106-16. doi:10.5539/gjhs.v8n2p106.

21 Katsarava Z, Dzagnidze A, Kukava M, Mirvelashvili E, Djibuti M, Janelidze M, et al. Primary headache disorders in the Republic of Georgia: prevalence and risk factors. Neurology. 2009;73(21):1796-803.

22 Bahrami P, Zebardast H, Zibaei M, Mohammadzadeh M, Zabandan N. Prevalence and characteristics of headache in Khoramabad, Iran. Pain Physician. 2012;15(4):327-32. PubMed PMID: 22828686.

23 Caponnetto V, Deodato M, Robotti M, Koutsokera M, Pozzilli V, Galati C, et al. Comorbidities of primary headache disorders: a literature review with meta-analysis. J Headache Pain. 2021;22(1):71. doi: 10.1186/s10194-021-01281-z. PubMed PMID: 34261435; PubMed Central PMCID: PMC8278743.

24 Saunders K, Merikangas K, Low NC, Von Korff M, Kessler RC. Impact of comorbidity on headache-related disability. Neurology. 2008;70(7):538-47. doi: 10.1212/01.wnl.0000297192.84581.21. PubMed PMID: 18268246.

25 Ferrari AJ, Santomauro DF, Aali A, Abate YH, Abbafati C, Abbastabar H, et al. Global incidence, prevalence, years lived with disability (YLDs), disability-adjusted life-years (DALYs), and healthy life expectancy (HALE) for 371 diseases and injuries in 204 countries and territories and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. The Lancet. 2024;403(10440):2133-61. doi: 10.1016/S0140-6736(24)00757-8. PubMed PMID: 38642570; PubMed Central PMCID: PMC11122111.

26 Methods and Data Sources for Global Burden of Disease Estimates 2000-2019. Geneva, Switzerland; 2020. https://share.google/QdN7tPIQXGcJswSfn.

27 Murray CJL, Salomon JA, Mathers CD, Lopez AD, World Health O. Summary measures of population health : concepts, ethics, measurement and applications / edited by Christopher J. L. Murray ... [et al.]. Geneva: World Health Organization; 2002. p. 658-62. https://iris.who.int/handle/10665/42439.