Original Article

Association between burnout and job-quitting intentions among public health center staff during the COVID-19 pandemic: A nationwide survey in Japan

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Objective The coronavirus disease 2019 pandemic has imposed considerable stress on public health centers (PHCs) in Japan, raising concerns over staff burnout and intention to quit. Therefore, this study aimed to examine the relationship between burnout and job-quitting intention among PHC staff members and estimated the prevalence of burnout and job-quitting intentions among these staff members.

Methods This study employed a cross-sectional design. Survey requests were sent to all 468 PHCs in Japan. For the centers that agreed to participate, we confirmed the number of distributed surveys and conducted them via mail. The prevalence of burnout and job-quitting intentions was calculated after adjusting for age, sex, department, and occupation. The Burnout Scale includes three subscales; exhaustion, cynicism, and efficacy. We calculated descriptive statistics for each burnout subscale and assessed the relationship between burnout and job-quitting intentions using generalized estimating equations.

Results We received responses from 23.9% of PHCs (112/468) and 29.3% of staff (1754/5990). Adjusted prevalence was 48.0% (95% confidence interval [CI]; 45.8–50.2%) and 62.2% (95% CI; 59.4–64.9%) for burnout and job-quitting intentions, respectively. Notably, public health nurses demonstrated a pronounced adjusted prevalence of 51.7 (95% CI; 47.2–56.2) and 65.8 (95% CI; 61.7–69.9) for burnout and job-quitting intention, respectively. Of the three burnout domains, only exhaustion (median; 4.40 [interquartile range [IQR]; 3.00–5.80]) had a median score higher than the cut-off value, whereas cynicism (median; 3.40 [IQR; 2.20–5.00]) and efficacy (median; 3.17 [IQR; 2.33–4.33]) had moderate scores. Burnout was a significant predictor of high job-quitting intentions (adjusted relative risk; 1.54, 95% CI; 1.40–1.70).

Conclusion The high prevalence of job-quitting intentions among PHC staff highlights the need for interventions to prevent or reduce burnout. Addressing burnout is essential to reduce job-quitting intentions among Japanese PHC staff members.

Key words：burnout, intention, turnover, pandemics, public health, prevalence

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I. INTRODUCTION

The global COVID-19 pandemic has intensified the working conditions of healthcare professionals in many countries including the United States, the United Kingdom, China, and Japan, leading to an increase in reported incidents of burnout[1~4]. Prevalence estimates are conflicting due to differing definitions of burnout and the assessment methods applied[5]; however, burnout has been reported to be more prevalent in women[1,3,5]. Other associated burnout-related factors include age, COVID-19-related long working hours, high-risk work environments, and a shortage of human resources[4]. Additionally, burnout can significantly impact an individual's health, potentially overlap with depression[6], and is reported to have associations with cardiovascular disease and other health conditions[7]. Moreover, burnout has also been reported to be associated with poor job performance[8] and job-quitting[9].

Japan has a comprehensive healthcare system and

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maintains high public health standards, which is reflected in its population having the longest life expectancy in the world[10,11]. The nation's public health efforts are supported by a network of public health centers (PHCs) known as *Hokenjo* that play a critical role in delivering public health services to local communities. PHCs are facilities that serve as a wide-area, specialized and technical center of excellence for the health of the local residents. These PHCs are established by local governments and are currently present in 47 prefectures, 74 designated cities, and 23 special wards. PHC provide a wide range of health services for local residents from personal to environmental health services, such as community health promotion, food sanitation, environmental sanitation, dental health, mental health, maternal and child health and infectious diseases control[12,13]. In accordance with the Act on the Prevention of Infectious Diseases and Medical Care for Patients with Infectious Diseases (the Infectious Diseases Control Law)[14], PHCs have traditionally managed the spread of infectious diseases.

The role of PHCs became particularly critical during the COVID-19 pandemic, as they were instrumental in managing and mitigating its impact. PHCs undertook key responsibilities such as contact tracing and case management and coordinated efforts to identify and track individuals in close contact with patients confirmed to have a COVID-19 infection, ensuring that they were suitably isolated and monitored to prevent further transmission[15]. These centers also supported the early detection and reporting of cases, which facilitated swift intervention and containment measures. Furthermore, PHCs were instrumental in coordinating with local governments, healthcare providers, and other stakeholders to ensure a unified response to the pandemic[16].

Despite their vital role, the working conditions for PHC staff, particularly public health nurses, became increasingly challenging during the pandemic in Japan. The number of full-time staff among public health nurses, who comprise the largest number of medical professionals in PHCs, did not increase during the COVID-19 pandemic[17]. In times of crisis, PHC staffs, including public health nurses, may be subjected to very challenging working environments. Several studies of hospital staffs during the COVID-19 pandemic have reported a high risk of burnout and retirement[1~5]. Hospitals can decline to accept patients based on the number of beds they have; however, PHCs were not permitted to refuse patients who tested positive for COVID-19, which could result in challenging situations (potential PHC dysfunction) and could have significantly reduced the quality of the public health system in Japan. This type of issue, in which the demand for resources is potentially overwhelming, is not limited to Japan and affects professionals working within government or municipal organisations responsible for coordination between medical institutions and the general public. In such situations, the working environment of PHC staff is likely to experience burnout and, in turn, have an intention to quit their job. However, burnout among PHC staffs has not yet been fully investigated.

Therefore, the main objective of this study was to examine the association between burnout and job-quitting intentions among PHC staff who played a central role in Japan's COVID-19 countermeasures. In addition, we also assessed the prevalence of burnout and job-quitting intentions among these staff members.

II. METHODS

1. Survey respondents

This web-based nationwide cross-sectional survey of PHC staffs was conducted between 26 January and 6 March 2022. We contacted the directors of all 468 PHCs in Japan through fax or email, requesting their cooperation in participating in a survey and providing information on the number of staff members. We conducted this study using a web form and obtained informed consent electronically from the PHC staffs. The participants comprised various occupational categories within PHCs including public health nurses, pharmacists, veterinarians, nutritionists, and physicians. This study was approved by the Ethics Committee, Kyoto University Graduate School and Faculty of Medicine (R3800, Approved December 19, 2022).

2. Measures

The main outcome variable was the job-quitting intention defined as the binary variable: Intention to quit the job or No intention to quit the job. We asked the following question: Are you intending to quit your current job? Participants were instructed to respond using one of the following five options: no intention to quit the job at all; intention to quit the job, but no concrete plan; planning to quit the job but not sure when; planning to quit the job within six months; and retire by retirement age at the end of March 2023. Participants who responded: retire by retirement age at the end of March 2023 were excluded; the response "no intention to quit the job at all" was recorded as no intention to quit the job, and the other options were recoded as intention to quit the job.

The main exposure in this study was burnout, which was measured using a validated Japanese version of the Maslach Burnout Inventory–General Survey (MBI-GS)[18~20]. The MBI-GS is a 16-item, 7-point scale containing three subscales that evaluate the three major domains of burnout, namely, emotional exhaustion, cynicism, and professional efficacy. Since the average of the question items included in each domain is calculated, the score for each domain is also out of 7 points. Using scores from the three domains, high levels of exhaustion (>3.5) plus either high cynicism (>3.5) or low professional efficacy (<2.5) were selected as the primary criteria for assessing burnout.

The adjusted variables were sex, age, occupation category, employment position, department, seniority, working days per week, sleep hours per day, holidays per month, and health-related quality of life (QoL) using the

Table 1 Criteria for categorizing continuous variables

	n	Criteria
Age		
18–29 years	368	Classified per every 10 years of age. However, since the number of teenagers is extremely small, they are included in the 20–29 years age group.
30–39 years	407	
40–49 years	404	
50–59 years	433	
≥60 years	142	
Seniority		
≤5 years	624	Classified according to the following criteria for training of in-service public health nurses. Newcomer phase: 1–5 years Early mid-career: 6–10 years Late mid-career: 11– years
6–10 years	229	
11–20 years	312	
21–30 years	319	
≥31 years	270	
Working hours per week		
<40 h	345	Classification based on the mode of 40 hours (5-day work week, 8 hours per day)
40 h	397	
41–49 h	427	
50–59 h	341	
≥60 h	244	
Sleep duration per night		
≤4 h	59	Classified based on 7 h of sleep, which was considered healthy in two previous studies[a,b]
5–6 h	1,038	
7 h	516	
≥8 h	141	
Holidays per month		
≤7 days	433	Classified based on 8 days per month (two days per week, four weeks per month) since Japanese public servants generally have two holidays per week.
8 days	510	
≥9 days	811	

[a]Cappuccio FP, D'Elia L, Strazzullo P, Miller MA. Sleep duration and all-cause mortality: a systematic review and meta-analysis of prospective studies. Sleep 2010; 33: 585–592. doi: 10.1093/sleep/33.5.585. PMID: 20469800; PMCID: PMC2864873.
[b]Svensson T, Inoue M, Saito E, Sawada N, Iso H, Mizoue T, Goto A, Yamaji T, Shimazu T, Iwasaki M, Tsugane S. The association between habitual sleep duration and mortality according to sex and age: The Japan Public Health Center-based prospective study. J Epidemiol 2021 Feb 5; 31: 109–118. doi: 10.2188/jea.JE20190210. Epub 2020 Feb 1. PMID: 32009104; PMCID: PMC7813766.

12-item Short-Form Health Survey (SF-12)[21]. The occupation category variable included clerical workers, public health nurses, physicians, pharmacists, veterinarians, nutritionists, clinical technicians, nurses, and others. The employment position variable included general staff, middle manager, and manager/director. The department variable included the health and welfare department and others. The health and welfare department was responsible for infectious disease control prior to COVID-19. Age, seniority, working hours per week, sleep duration per night, and holidays per month were continuous variables but were treated as categorical variables using the criteria listed in Table 1. The SF-12 uses a three-component summary score for physical, mental, and role/social dimensions. Each score carries a value ranging from 0 to 100, with higher values indicating better QoL. Norm-based scoring was used, and these scores were standardised to a 2017 Japanese national standard of 50 and a standard deviation of 10. Burnout is not a medical condition, but an occupational phenomenon that should not be applied to describe experiences in other areas of life[22]. However, because mental health represents a broader construct that encompasses general QoL beyond the work-related stress captured by burnout, adjusting for both allows us to isolate the specific effects of burnout on job-quitting intentions while controlling for the potential confounding influence of overall mental health status.

3. Statistical analysis

We compared the characteristics of the participants who did and did not have burnout and the median scores in the three domains of burnout; participant characteristics included sex, age, department, and occupation cate-

gory. We calculated the prevalence of burnout and intention to quit the job after adjusting for age, sex, department, and occupation category, using generalised linear mixed models (GLMM) for public health center ID for random effects. We calculated average predictive margins from this analysis to estimate the average prevalence by participant characteristics. Poisson regression analysis with robust variance estimation was performed using generalized estimating equations (GEE), with job quitting intention as the outcome; burnout as the main exposure; and age, sex, occupation category, employment position, department, seniority, working hours per week, sleep duration per night, and three domains (physical, mental, and role/social) as control variables. In this study, we prioritized the robustness of the estimates and selected GEE over GLMM to ensure more reliable and stable estimates, especially given our primary interest in average effects rather than the random effects specific to individual PHCs. Adjusted prevalence was calculated using STATA, and other analyses were performed using SPSS Statistics ver. 27 (IBM) software.

III. RESULTS

1. Participant characteristics

Informed consent was obtained from 112 (23.9%) directors of 468 PHCs with 5,990 staff members, of whom 1,754 staff members responded (response rate, 29.3%). The study staff comprised 1,044 (59.5%) females (median age, 42.8 [range, 31.5–53.4] years). The two most common occupations were clerical workers (n = 612, 34.9%) and public health nurses (n = 548, 31.2%), and other occupations such as pharmacists, veterinarians, nutritionists, and physicians were also included. In terms of job positions, 173 (9.9%) were managers/directors, 509 (29.0%) were middle managers, and 1,072 (61.1%) were general staff. The number of health and welfare department staff members in the infectious disease department was 979 (55.8%). Among PHC staffs, 842 (48.0%) reported experiencing burnout and 1,047 (62.2%) had job-quitting intentions. Additionally, 667 (38.0%) had both burnout and job-quitting intentions. A comparison of burnout rates among PHC staffs with job-quitting intentions showed that staffs experiencing burnout had high job-quitting intentions (burnout, n = 667, 81.4%; non-burnout, n = 380, 43.9%) (Table 2).

2. Prevalence and Distribution of Burnout and Job-Quitting Intentions

After adjusting for age, sex, department, and occupation category, the prevalence rate for burnout was 48.0% (95% confidence interval [CI] 45.8–50.2%), and the prevalence rate for job-quitting intentions was 62.2% (95% CI 59.4–64.9%). The adjusted prevalence rates for burnout in men and women were 43.5% (95% CI 38.7–48.2%) and 50.7% (95% CI 47.5–53.8%), respectively. The adjusted prevalence rates for job-quitting intentions in men and women were 53.3% (95% CI 48.3–58.3%) and 67.6% (95% CI 64.0–71.2%), respectively. The adjusted prevalence according to age tended to be higher in the younger age group: 18–29 years age group (54.3, 95% CI 49.2–59.4 for burnout; 61.7, 95% CI 56.9–66.6 for job-quitting intentions). The Department of Health and Welfare staff (50.9, 95% CI 47.5–54.3 for burnout; 65.1, 95% CI 61.6–68.5 for job quitting intentions, respectively) had a higher prevalence rate than others (44.0, 95% CI 40.6–47.5 for burnout; 58.3, 95% CI 53.8–62.8, for job-quitting intentions, respectively) (Table 3).

The median scores for the three domains of burnout were 4.40 (interquartile range: IQR 3.00–5.80) for exhaustion, 3.40 (IQR 2.20–5.00) for cynicism, and 3.17 (IQR 2.33–4.33) for efficacy. The domains in which the differences were most pronounced according to the participants' characteristics were exhaustion, particularly for sex (median, 3.80; IQR 2.40–5.40 for men vs. median 4.60; IQR 3.40–6.00 for women), department (median, 4.00; IQR 2.40–5.40 for others vs. median, 4.80; IQR 3.20–6.00 for health and welfare), and occupation category. In the occupation category, public health nurses (median, 5.00; IQR 3.60–6.20) and nutritionists (median, 4.40; IQR 3.60–5.80) had higher exhaustion domain scores (Table 4).

3. Association between burnout and job-quitting intentions

The results of univariate regression analysis using GEE for all staffs showed that burnout (Relative Risk [RR]1.85, 95% CI 1.69–2.03) was the factor most associated with high job-quitting intentions. Women (RR 1.37, 95% CI 1.24–1.51), the occupation category of public health nurses (RR 1.40, 95% CI 1.24–1.56), veterinarians (RR 1.26, 95% CI 1.05–1.51) and veterinarians (RR 1.29, 95% CI 1.05–1.60) were significantly associated with high job-quitting intentions. Department was also significantly associated with increased job-quitting intentions, with Health and Welfare (RR 1.18, 95% CI 1.09–1.28) compared to Others as the reference. However, mental (RR 0.97, 95% CI 0.97–0.98) and social/role (RR 0.98, 95% CI 0.98–0.99) domains in terms of QoL were significantly associated with lower job-quitting intentions. In the multivariable model, burnout was also associated with high job-quitting intentions; adjusted relative risk[aRR] of 1.54 (95% CI 1.40–1.70) (Table 5).

IV. DISCUSSION

Among PHC staff, the prevalence rates adjusted for age, sex, department, and occupation category were 48.0% for burnout and 62.2% for job-quitting intentions, indicating that most PHC staffs had workplace challenges. Burnout was significantly associated with job-quitting intentions after multivariate adjustment. Of the three burnout domains, exhaustion tended to score worse than cynicism and efficiency. Exhaustion scores were particularly high for females, health and welfare departments in charge of infection control, and public health nurses and nutritionists.

Table 2 Participant characteristics

Characteristics	Total *n* = 1,754	Burnout (*n* = 842, 48.0%)	No burnout (*n* = 912, 52.0%)
Women, *n* (%)	1,044 (59.5)	558 (66.3)	486 (53.3)
Age, median (IQR), years	42.8 (31.5–53.4)	39.2 (29.9–50.4)	46.1 (33.9–55.0)
18–29 years	368 (21.0)	213 (25.3)	155 (17.0)
30–39 years	407 (23.2)	218 (25.9)	189 (20.7)
40–49 years	404 (23.0)	190 (22.6)	214 (23.5)
50–59 years	433 (24.7)	189 (22.4)	244 (26.8)
≥60 years	142 (8.1)	32 (3.8)	110 (12.1)
Occupation category, *n* (%)			
Clerical worker	612 (34.9)	255 (30.3)	357 (39.1)
Public health nurse	548 (31.2)	321 (38.1)	227 (24.9)
Pharmacist	154 (8.8)	71 (8.4)	83 (9.1)
Veterinarian	118 (6.7)	50 (5.9)	68 (7.5)
Nutritionist	69 (3.9)	39 (4.6)	30 (3.3)
Physician	49 (2.8)	18 (2.1)	31 (3.4)
Clinical technologist	48 (2.7)	24 (2.9)	24 (2.6)
Nurses	39 (2.2)	11 (1.3)	28 (3.1)
Others	117 (6.7)	53 (6.3)	64 (7.0)
Employment position, *n* (%)			
Manager/Director	173 (9.9)	64 (7.6)	109 (12.0)
Middle manager	509 (29.0)	234 (27.8)	275 (30.2)
General staff	1,072 (61.1)	544 (64.6)	528 (57.9)
Department			
Health and Welfare	979 (55.8)	516 (61.3)	463 (50.8)
Others[a]	775 (44.2)	326 (38.7)	449 (49.2)
Seniority, median (IQR), years	11.0 (3.0–26.0)	10.0 (3.0–25.0)	12.5 (3.0–27.75)
≤5 years	624 (35.6)	303 (36.0)	321 (35.2)
6–10 years	229 (13.1)	130 (15.4)	99 (10.9)
11–20 years	312 (17.8)	147 (17.5)	165 (18.1)
21–30 years	319 (18.2)	160 (19.0)	159 (17.4)
≥31 years	270 (15.4)	102 (12.1)	168 (18.4)
Working hours per week, median (IQR), h	43.5 (40.0–50.0)	45.0 (40.0–53.0)	40.0 (40.0–50.0)
≤39 h	345 (19.7)	139 (16.5)	206 (22.6)
40 h	397 (22.6)	140 (16.6)	257 (28.2)
41–49 h	427 (24.3)	210 (24.9)	217 (23.8)
50–59 h	341 (19.4)	194 (23.0)	147 (16.1)
≥60 h	244 (13.9)	159 (18.9)	85 (9.3)
Sleep hours per day (IQR), h	6.0 (6.0–7.0)	6.0 (5.0–7.0)	6.0 (6.0–7.0)
≤4 h	59 (3.4)	36 (4.3)	23 (2.5)
5–6 h	1,038 (59.2)	534 (63.4)	504 (55.3)
7 h	516 (29.4)	218 (25.9)	298 (32.7)
>8 h	141 (8.0)	54 (6.4)	87 (9.5)
Holidays per month, median (IQR), days	8.0 (8.0–10.0)	8.0 (7.0–9.0)	9.0 (8.0–10.0)
<7 days	433 (24.7)	259 (30.8)	174 (19.1)
8 days	510 (29.1)	270 (32.1)	240 (26.3)
>9 days	811 (46.2)	313 (37.2)	498 (54.6)
QoL, median (IQR)			
Physical	52.9 (45.6–57.5)	52.8 (43.4–58.8)	53.0 (47.4–56.6)
Mental	51.0 (44.4–56.5)	46.6 (40.1–52.0)	54.8 (49.7–58.8)
Role/social	44.2 (34.8–51.5)	38.2 (30.1–46.2)	48.6 (41.6–53.5)
Quitting intentions, *n* (%)			
No intention to quit	637 (37.8)	152 (18.6)	485 (56.1)
Intention to quit	1,047 (62.2)	667 (81.4)	380 (43.9)

COVID-19, coronavirus disease 2019; IQR, interquartile range; *n*, number; QoL, quality of life

[a]Other departments included planning and coordination departments that performed administration and accounting, long-term care and welfare departments, food and environmental hygiene departments, and directors. The Health and Welfare Department played a central role in managing COVID-19 measures in PHCs.

Table 3 Adjusted prevalence of burnout and intention to quit the job

	n	Burnout		Intention to quit the job	
		Adjusted prevalence	95% CI	Adjusted prevalence	95% CI
Total	1,754	48.0	(45.8–50.2)	62.2	(59.4–64.9)
Sex					
Men	710	43.5	(38.7–48.2)	53.3	(48.3–58.3)
Women	1,044	50.7	(47.5–53.8)	67.6	(64.0–71.2)
Age					
18–29 years	368	54.3	(49.2–59.4)	61.7	(56.9–66.6)
30–39 years	407	53.9	(49.0–58.9)	60.5	(55.5–65.4)
40–49 years	404	46.8	(42.0–51.6)	59.8	(54.5–65.0)
50–59 years	433	45.2	(40.8–49.6)	67.5	(62.9–72.0)
60– years	142	24.1	(16.7–31.6)	58.5	(50.8–66.3)
Department					
Others	775	44.0	(40.6–47.5)	58.3	(53.8–62.8)
Health and Welfare	979	50.9	(47.5–54.3)	65.1	(61.6–68.5)
Occupation category					
Clerical worker	612	44.5	(39.8–49.1)	56.0	(50.4–61.5)
Public health nurses	548	51.7	(47.2–56.2)	65.8	(61.7–69.9)
Pharmacist	154	44.8	(27.5–62.1)	60.6	(45.4–75.8)
Veterinarian	118	49.0	(40.1–57.8)	66.0	(58.2–73.8)
Nutritionist	69	47.4	(36.3–58.5)	71.4	(59.8–83.0)
Physician	49	50.6	(40.0–61.1)	61.4	(49.1–73.7)
Clinical technologist	48	50.9	(37.6–64.2)	62.1	(49.7–74.6)
Nurse	39	29.7	(11.1–48.3)	50.7	(35.7–65.6)
Others	117	49.3	(40.4–58.2)	65.9	(56.3–75.5)

Prevalences are adjusted for age, sex, department, and occupation category, using generalised linear mixed models for public health center ID for random effects.
Abbreviations: CI, confidence interval

Table 4 The scores for three domains of burnout by participant characteristics

	n	Exhaustion		Cynicism		Efficacy	
		Median	IQR	Median	IQR	Median	IQR
Total	1,754	4.40	(3.00–5.80)	3.40	(2.20–5.00)	3.17	(2.33–4.33)
Sex							
Men	710	3.80	(2.40–5.40)	3.20	(2.00–4.80)	3.50	(2.50–4.67)
Women	1,044	4.60	(3.40–6.00)	3.60	(2.20–5.20)	3.17	(2.33–4.17)
Age							
18–29 years	368	4.80	(3.60–6.00)	3.80	(2.40–5.20)	3.17	(2.33–4.33)
30–39 years	407	4.60	(2.80–6.00)	3.80	(2.40–5.60)	3.17	(2.33–4.17)
40–49 years	404	4.40	(3.00–5.80)	3.40	(2.20–4.80)	3.17	(2.33–4.33)
50–59 years	433	4.20	(2.80–5.80)	3.20	(2.20–4.80)	3.17	(2.33–4.17)
≥60 years	142	3.00	(2.20–4.60)	2.20	(1.60–3.60)	3.83	(2.63–5.04)
Department							
Others	775	4.00	(2.40–5.40)	3.20	(2.20–4.60)	3.17	(2.33–4.33)
Health and Welfare	979	4.80	(3.20–6.00)	3.60	(2.20–5.20)	3.17	(2.33–4.33)
Occupation category							
Clerical worker	612	4.00	(2.60–5.60)	3.10	(2.00–4.60)	3.33	(2.33–4.46)
Public health nurse	548	5.00	(3.60–6.20)	3.80	(2.40–5.40)	3.17	(2.33–4.17)
Pharmacist	154	4.20	(2.40–5.60)	3.30	(2.20–5.40)	3.17	(2.17–4.17)
Veterinarian	118	3.90	(2.60–5.25)	3.20	(2.00–4.85)	3.42	(2.50–4.50)
Nutritionist	69	4.40	(3.60–5.80)	4.00	(2.50–5.50)	3.33	(2.42–4.00)
Physician	49	3.40	(2.40–4.70)	3.40	(2.30–4.60)	4.00	(2.42–5.17)
Clinical technologist	48	4.40	(2.80–6.00)	3.60	(2.20–5.70)	3.08	(2.21–4.29)
Nurse	39	3.40	(2.20–4.60)	2.40	(1.60–4.20)	3.83	(2.67–4.67)
Others	117	4.40	(2.80–5.60)	3.40	(2.20–4.40)	3.17	(2.50–4.25)

CI, confidence interval

Table 5 The relationship between burnout and job-quitting intention

	Univariable model		Multivariable model	
	RR (95% CI)	***P*-value**	**RR (95% CI)**	***P*-value**
Burnout				
No burnout	Reference		Reference	
Burnout	1.85 (1.69–2.03)	<0.001	1.54 (1.40–1.70)	<0.001
Sex				
Men	Reference		Reference	
Women	1.37 (1.24–1.51)	<0.001	1.21 (1.10–1.33)	<0.001
Age				
18–29 years	Reference		Reference	
30–39 years	0.92 (0.83–1.02)	0.114	0.87 (0.77–0.97)	0.011
40–49 years	0.93 (0.83–1.04)	0.193	0.87 (0.76–1.01)	0.058
50–59 years	1.00 (0.91–1.11)	0.933	0.98 (0.82–1.17)	0.835
≥60 years	0.84 (0.71–0.98)	0.026	1.06 (0.88–1.28)	0.530
Occupation category				
Clerical work	Reference		Reference	
Public health nurse	1.40 (1.24–1.56)	<0.001	1.12 (1.01–1.24)	0.033
Physician	1.11 (0.84–1.46)	0.480	1.04 (0.76–1.42)	0.819
Pharmacist	1.17 (0.99–1.33)	0.071	1.15 (1.00–1.32)	0.055
Veterinarian	1.26 (1.05–1.51)	0.013	1.27 (1.08–1.49)	0.003
Nutritionist	1.29 (1.05–1.60)	0.016	1.10 (0.91–1.33)	0.311
Clinical technologist	1.23 (0.97–1.56)	0.082	1.05 (0.87–1.27)	0.616
Nurse	1.09 (0.84–1.41)	0.537	1.08 (0.84–1.40)	0.541
Others	1.15 (0.96–1.37)	0.119	1.15 (0.99–1.33)	0.067
Employment position				
General staff	Reference		Reference	
Middle manager	1.01 (0.93–1.09)	0.895	0.98 (0.89–1.09)	0.768
Director and Manager	1.03 (0.90–1.17)	0.692	1.11 (0.93–1.32)	0.264
Department				
Others	Reference		Reference	
Health and Welfare	1.18 (1.09–1.28)	<0.001	1.07 (0.98–1.17)	0.116
Seniority				
≤5 years	Reference		Reference	
6–10 years	1.09 (0.97–1.23)	0.131	1.11 (1.01–1.23)	0.037
11–20 years	1.12 (1.01–1.24)	0.040	1.24 (1.09–1.41)	0.001
21–30 years	1.11 (1.00–1.22)	0.0047	1.13 (0.97–1.32)	0.128
≥31 years	1.07 (0.94–1.21)	0.304	1.13 (0.94–1.36)	0.197
Working hours per week				
<39 h	1.07 (0.95–1.21)	0.248	1.00 (0.90–1.11)	0.988
40 h	Reference		Reference	
41–49 h	1.08 (0.96–1.21)	0.201	0.97 (0.88–1.08)	0.592
50–59 h	1.18 (1.03–1.34)	0.013	0.98 (0.87–1.10)	0.694
≥60 h	1.23 (1.05–1.43)	0.008	0.96 (0.84–1.09)	0.503
Sleep duration per night				
<4 h	1.33 (1.13–1.57)	0.001	1.05 (0.89–1.25)	0.555
5–6 h	1.16 (1.06–1.26)	0.001	1.03 (0.95–1.12)	0.412
7 h	Reference		Reference	
≥8 h	1.02 (0.89–1.18)	0.736	1.10 (0.96–1.27)	0.166
Holidays per month				
<7 days	1.10 (1.00–1.20)	0.057	1.02 (0.94–1.10)	0.693
8 days	Reference		Reference	
≥9 days	0.89 (0.82–0.98)	0.012	1.02 (0.95–1.09)	0.633
QoL				
Physical	1.00 (1.00–1.00)	0.350	1.00 (1.00–1.00)	0.176
Mental	0.97 (0.97–0.98)	<0.001	0.99 (0.98–0.99)	<0.001
Social/role	0.98 (0.98–0.99)	<0.001	0.99 (0.99–1.00)	<0.001

The regression model used job-quitting intention as an outcome, including PHC identification as a cluster term. The multivariable model include Burnout, sex, age, Occupation category, Employment position, Department, Seniority, working hours per week, sleep duration per night, holidays per month and QoL as adjusted variables.

Abbreviations: COVID-19, coronavirus disease 2019; RR, relative risk; PHC, public health center; QoL, quality of life; 95% CI, 95% confidence interval

Burnout is defined in the International Classification of Diseases 11th Edition as a syndrome resulting from chronic workplace stress that has not been successfully managed, and burnout and depression have complex associations and should be treated with caution because they are sometimes associated with serious, life-threatening mental disorders[23]. We analysed the relationship between burnout and job-quitting intentions, controlling for QoL, including the mental health domain, and found a strong relationship. The percentage of PHC staffs experiencing burnout was high compared with previous reports on burnout among healthcare workers during the COVID-19 pandemic[3,24]. For educationalists working as public servants, as well as PHC staffs, a meta-analysis showed that burnout affected intention to quit the job, with the relationship increasing over time[25]. Therefore, measures that attempt to prevent or reduce burnout are likely to be effective in reducing the job-quitting intentions of PHC staffs.

The MBI scale used to measure burnout has three domains, all of which were significantly associated with job-quitting intentions. Maslach et al. suggested a method of profiling the type of burnout using the values for the three MBI domains[20,26]. According to this method, the condition with a high exhaustion score and low to moderate cynicism and efficacy scores was classified as "overextended." The "overextended" profile is applicable to professionals, such as physicians, who are dedicated to their work and derive a strong sense of professional efficacy from their work but feel fatigued due to long working hours and disrupted recovery. PHC staffs might also feel professional and motivated by their COVID-19-related work but exhausted by the long working hours and disrupted recovery. In the exhaustion domains with poor burnout results, women, health and welfare department, and public health nurses were particularly prominent. These were the departments and occupations central to the management of COVID-19. The high prevalence of burnout among women is consistent with that reported in previous studies[1,3,5]. The Japanese Association of Public Health Center Directors made recommendations to the government regarding the operational pressures and challenges facing PHCs[27], owing to the rapid increase in patient numbers[28] and the demand for a rebalance between legal restrictions on the behaviours of patients with COVID-19 and respect for individual human rights[29]. Therefore, burnout might be attributable to the type and volume of duties in relation to COVID-19. In support of this result, a press release from the Japan Nurses Association reported that the job-quitting rate among nurses in 2022 had increased, especially among new graduates (>10%), exhibiting a record high increase[30]. While no studies have investigated burnout among PHC staffs in Japan, it is possible that many PHC staffs have already quit their jobs or intend to quit their jobs in the future.

Burnout among PHC staffs, or an increase in job-quitting intentions can create problems within the workplace and in public health. Regarding the workplace, burnout and low morale in the workplace can lead to a negative spiral, as job performance declines and internal and external evaluations of the workplace worsen, making it difficult to attract new, talented personnel. Exhaustion of PHC staff also causes work-related accidents and mental illness[6,23] and increases administrative workload, including mental health support and occupational accident prevention. For public health issues, this can lead to a decline in the quality of health and welfare services, leading to higher healthcare costs and lower national productivity. In addition, PHC plays an important role in supporting vulnerable populations, such as those living with disabilities, mental illness, and incurable diseases, which could lead to increased social disparities. Therefore, policymakers and local governments operating PHCs should formulate and implement measures to prevent burnout and job-quitting among public health staff. Specifically, it is essential to ensure rigorous management of working hours for PHC staffs. There may have been gaps between the evolving characteristics of the virus due to mutations and the policies in place, or a lack of public understanding of these policies. Implementing an information sharing system on government policies so that the PHC staffs receive up-to-date guidelines and other information would be valuable for the PHC staffs working on the front lines[31]. Additionally, it is important to review whether the deployment of healthcare professionals, such as IHEAT[15], was effective, and to assess whether the redistribution of workload and human resources among local government officials, who are responsible for duties beyond COVID-19 measures, was conducted appropriately[31]. These reflections are crucial for improving systems and policies moving forward.

A major strength of this study is that the national survey covered all occupational groups working in PHCs throughout Japan and reported the burnout and job-quitting intentions of PHC staffs who were principally responsible for implementing Japan's COVID-19 measures and who were generally considered to have achieved excellent results. However, this study had several limitations. First, this study was cross-sectional in design, and causality could not be clarified. Second, the percentage of PHCs and staffs participating in this study was low because informed consent for survey cooperation was sought during the seventh wave of the COVID-19 pandemic in Japan. PHCs and staffs that did not participate may have been too busy treating patients with COVID-19, leading to an underestimation of the association between burnout and job-quitting intentions. Conversely, the true strength of the association may be stronger than that observed in this study. Furthermore, more than two years have passed since the COVID-19 outbreak in Japan, and it is possible that a large number of staff had already quit by the time the survey was undertaken in 2022. Despite these factors, our findings are unlikely to involve overestimations in terms of the associations. In the context of these limita-

tions, burnout and job-quitting intentions were found to be prevalent among many PHC staffs, and the significant association between these factors suggests a major public health crisis in Japan; thus, immediate improvement of the work environment of the PHC staffs must be considered.

V. Conclusion

The PHC staffs in Japan had a high prevalence of both burnout and intention to quit the job, even after adjusting for covariates. Burnout had a strong association with job-quitting intentions, especially in the exhaustion domain, and was particularly pronounced in departments and occupation categories central to managing responses to COVID-19. Measures to prevent or reduce burnout and job-quitting intentions are essential to protect the public health systems in Japan.

Conflict of interests: None.

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