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Job burnout and its influencing factors among primary healthcare workers during the COVID-19 epidemic in Guangzhou, China, 2021–2022: from the perspective of institutional operation and management

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Abstract

Background The purpose of this study was to explore the job burnout of primary healthcare workers in Guangzhou during the prevention and control of COVID-19 epidemic and its influencing factors from the perspective of institutional operation and management in 2021–2022.

Methods A cross-sectional study involved 866 primary healthcare workers from different districts of Guangzhou, China. The Chinese version of the Maslach Burnout Inventory-General Survey (MBI-GS) was utilized to assess job burnout. From the perspective of organizational operation and management, the possible causes of job burnout among primary healthcare workers during COVID-19 have been categorized into 7 major aspects. Univariate and multivariate logistic regression analyses were conducted to identify influencing factors for job burnout in primary healthcare workers.

Results The detection rate of job burnout among primary healthcare workers was 78.29%. Men (OR = 2.39) and whose institution was located in urban–rural fringe (OR = 1.56) were more likely to detect job burnout. Conversely, institution heads showed a lower risk of job burnout. From the perspective of institutional operation and management, workers who were not satisfied with personnel management (OR = 2.41), materials and vehicles (OR = 2.89), subsidies and compensation (OR = 2.18), humanistic care (OR = 2.11), superior management (OR = 8.32) were found to have a higher risk of job burnout.

Conclusion The detection rate of job burnout among primary healthcare workers in Guangzhou was relatively high during the period of COVID-19. When there is another sudden major epidemic, the managers of institutions can focus on and deal with the problems related to the operation and management of institutions such as personnel management, materials and vehicles, subsidies and compensation, humanistic care, and superior management, so as to provide logistical support for the workers and alleviate their job burnout.

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Keywords COVID-19, Epidemic prevention and control, Primary healthcare workers, Job burnout, Institutional management

Background

Three years into the fight against the COVID-19, China has finally reached a turning point after a longer period of normalized epidemic prevention and control. Normalized epidemic prevention and control refers to achieving long-term effective management of epidemics after basic control has been achieved. This is accomplished through continuous preventive measures, implementation of the “Four Early” principles (early detection, early reporting, early isolation, early treatment), precise control at key stages, robust technical and resource support, strengthened leadership at all levels of organization, and dynamic management of risk levels. Its aim is to ensure the long-term effective control of epidemics, safeguarding public health and maintaining social and economic stability. Specifically, it involves six key aspects: 1. Emphasis on prevention: wearing masks, frequent handwashing, maintaining social distancing, and reducing gatherings. 2. “Four Early” principles: early detection, early reporting, early isolation, early treatment. 3. Targeted control: strengthening epidemic prevention in public places, communities, and key institutions. 4. Technological support: enhancing testing capabilities, utilizing big data and health codes. 5. Organizational reinforcement: ensuring governments and units fulfill epidemic prevention and control responsibilities. 6. Dynamic management: adjusting risk levels and response measures based on epidemic changes [1].

Over the past three years, China’s efforts against COVID-19 have not only safeguarded the lives and health of its citizens but have also yielded valuable insights and significant contributions to the global fight against the pandemic. During the period of normalized prevention and control of the COVID-19 epidemic, China adopted a firm dynamic zero COVID-19 strategy. The successful execution of this strategy is intricately linked to the effectiveness of the community health service system, serving as a fundamental pillar within China’s comprehensive healthcare system [2]. Primary healthcare institutions, a vital component of this system, encompass health centers in townships and towns, village health offices, and community health service centers (stations). Their primary role is to deliver essential public health services, including prevention, healthcare, health education, and diagnostic and treatment services for common ailments. Additionally, they provide rehabilitation and nursing care for specific diseases, serving as the primary guardians of residents’ health [3].

During the ongoing efforts in normalized prevention and control of the COVID-19 epidemic, there has been a notable shift in the primary actors engaged in the battle. The focus has transitioned from medical professionals primarily responsible for diagnosis and treatment to primary healthcare workers assuming a central role in prevention and control measures. Primary healthcare institutions now serve as the primary force in community-wide prevention and control initiatives [4, 5]. Under government direction, primary healthcare institutions have established a joint prevention and control system, coordinating horizontally with communities and street offices to provide basic medical and public health services to residents within their jurisdictions. They undertake epidemic prevention and control measures such as public education, home isolation supervision, and nucleic acid sampling. Vertically, they strengthen connections with higher-level healthcare institutions and disease control centers, strictly implement the first-contact responsibility system, and facilitate the transfer and referral of suspected fever patients [6]. The scope of work for primary healthcare workers has significantly evolved to include not only routine medical treatment but also active involvement in COVID-19 prevention and guidance [7]. They conduct comprehensive community screenings, transportation, isolation, and epidemiological investigations, which undoubtedly increase their workload and psychological stress. Especially under various policy requirements such as the “Notice on Leveraging the Role of Medical Institutions as Outpost Stations for Normalized Epidemic Prevention and Control”, “Notice on Issuing the Health Management Plan for Discharged COVID-19 Patients (Trial)”, and “Notice on Implementing the Basic Public Health Service Project in 2021”, the role of primary healthcare institutions as outpost stations has been further strengthened. Healthcare workers at the primary level have been entrusted with additional responsibilities, including monitoring and reporting of fever patients, training on epidemic prevention and control techniques, and management of discharged patients’ health [8]. Besides, real-time adjustments to epidemic prevention and control policies, contingent on the evolving regional epidemic situation, have demanded healthcare workers to dedicate extra time and effort to assimilate and apply policy changes. This, in turn, has augmented their workload [9]. The escalating demands in grassroots health work necessitate

more resources, effective management, and enhanced collaborative mechanisms. The confluence of these factors has led to the emergence of new challenges and difficulties.

Prolonged exposure to heightened work pressure and occupational stress renders primary healthcare workers susceptible to negative psychological impacts, such as job burnout, directly jeopardizing their health. Job burnout refers to the extreme physical and emotional depletion of individuals under long-term work pressure, mainly manifested as emotional exhaustion and idleness, numbness and negativity in depersonalization, and low sense of achievement in efficacy experience [10]. Emotional exhaustion and idleness refer to an individual's feeling of emotional and energy being excessively consumed by work, resulting in a sense of mental exhaustion. Depersonalization of numbness and negativity refers to the mental state of numbness, negativity, and apathy that individuals exhibit during work execution. Low sense of achievement in efficiency experience refers to the state where an individual's work ability is not fully utilized and the sense of work achievement is lacking [11, 12]. The consequences of job burnout may include emotional fluctuations and physiological issues such as headaches, sleep disturbances, fatigue, irritability, anxiety, depression, and more severe health problems like hypertension and myocardial infarction [13]. Behaviorally, job burnout may manifest as aggressive behavior towards others, interpersonal friction, self-harm, or harm to others. It can also lead to heightened stress, anxiety, physical and mental exhaustion, and insomnia, potentially resulting in marital breakdown and strained social relationships. In terms of mental well-being, job burnout can cause anger, indifference towards others, pessimism, diminished sense of achievement, decreased self-confidence, and other negative emotions, leading individuals to doubt their abilities and feel helpless and unsuccessful [14]. Job burnout among healthcare professionals is recognized as a public health crisis because it not only affects their personal lives and job satisfaction but also reduces work efficiency, thereby impacting public health security and placing strain on the healthcare system as a whole. Studies report instances of sudden death and suicide among healthcare professionals in Asian countries due to job burnout [15]. Furthermore, job burnout not only affects the psychological health of healthcare workers (resulting in insomnia, anxiety, and depression) but also impacts their physical health [16, 17]. A review has analyzed the adverse psychological effects of healthcare workers under COVID-19 and other risky working conditions, emphasized the importance of protecting the mental health of healthcare workers under the COVID-19, and proposed that working long hours in stressful environments is a risk factor

for job burnout [18]. In the long-term normalization stage of epidemic prevention and control in China, prolonged and tense work may lead to occupational fatigue among primary healthcare workers, thereby affecting the smooth progress of grassroots epidemic prevention work. We need to pay special attention to it.

This study used a quantitative survey method to investigate the job burnout of primary healthcare workers in Guangzhou during the COVID-19 epidemic prevention and control period from the perspective of institutional operation and management in 2021–2022, to analyze which aspects may be the influencing factors of the job burnout of primary healthcare workers. Hoping that the results of this study will provide some ideas for the operation and management of the primary healthcare system, so that the job burnout of primary healthcare workers can be alleviated in the future when responding to major epidemics, and they can carry out their work in a sustainable and healthy manner.

Methods

Participants

This study was a cross-sectional survey. The research subjects are personnel from primary medical and health institutions involved in COVID-19 epidemic prevention work in Guangzhou, China, 2021–2022. The inclusion criteria were: 1) officially employed staff of primary healthcare institutions; 2) participated in primary epidemic prevention work for more than 1 year; 3) voluntary participation in the survey. Exclusion criteria were: 1) personnel not on duty during the survey period; 2) personnel from other institutions on duty during the survey period; 3) unwillingness to participate due to personal reasons.

Questionnaire

Based on the previous reference to relevant literature and expert consultation, the final survey questionnaire mainly includes: 1) basic information of the survey subjects; 2) evaluation of the occupational stress and job burnout among the primary healthcare workers; 3) satisfaction with institutional operation and management.

The burnout evaluation was based on the Maslach Burnout Inventory-General Survey (MBI-GS), which was developed by Maslach and Jackson (1981) and then revised by Li Chaoping [19]. This questionnaire has been widely used among Chinese medical professionals and has been shown to have good reliability and validity. The Chinese version of the MBI-GS consists of three dimensions: emotional exhaustion (5 items), depersonalization (4 items), and reduced personal accomplishment (6 items) [20]. The Burnout Scale consists of 15 items, all of which are scored on a 7-point Likert scale, with

"never"- "every day" scored as 0–6, respectively. The internal consistency coefficients for the dimensions of emotional exhaustion, depersonalization, and reduced sense of accomplishment were 0.88, 0.83, and 0.82 [19]. The dimensions of reduced personal fulfillment were scored inversely and the other dimensions were scored positively, and the score of each dimension was the sum of the scores of all the entries in the dimension divided by the number of entries.

$\text{Burnout} = 0.4 \times \text{Emotional Exhaustion} + 0.3 \times \text{Dehumanization} + 0.3 \times \text{reduced personal accomplishment}$, the higher the score indicates the higher the degree of burnout. Referring to previous studies [21–24], the respondents were divided into three groups based on the total burnout score: no burnout group (0–1.49), moderate burnout group (1.50–3.49), and severe burnout group (3.50–6). Respondents with moderate or severe burnout were defined as "burnout cases".

In the questionnaire, issues related to institutional operation and management were categorized into seven major sections: personnel management, materials and vehicles, subsidies and compensation, humanistic care, superior management, joint prevention and control, and social cooperation.

Personnel management was assessed across four dimensions: personnel deployment, quantity of personnel, personnel workload, and personnel training. Materials and vehicles were evaluated based on three aspects: quantity of materials, number of vehicles, and the impact of vehicle shortages. Subsidy compensation was gauged by the timeliness of receiving epidemic prevention subsidies. Humanistic care was examined in terms of satisfaction with the institution's humanistic care. Superior management, which referred to the leadership, command, and supervisory responsibilities undertaken by managers of primary healthcare institutions during the COVID-19 epidemic prevention and control period, was evaluated primarily on three criteria: clarity of work guidelines, clarity of division of labor, and complexity of epidemic prevention procedures. Joint prevention and control was assessed through satisfaction with public security cooperation and neighborhood committee cooperation. Social cooperation was appraised based on residents' cooperation and the collaboration of volunteers from other organizations.

Except for sections assessed on a single aspect using a 3-point Likert scale (1 for always/satisfied, 2 for partially/moderate, and 3 for not receiving in a timely manner/unsatisfied), all other sections evaluated from multiple perspectives utilized a 5-point Likert scale, ranging from "very satisfied" to "very dissatisfied" scored as 1–5, with some items involving reverse scoring. The seven sections were scored independently. Sections evaluated from two

aspects categorized participants into three groups based on total scores: satisfied group (0–4), moderate group (4.01–7.99), and dissatisfied group (8–10). Sections evaluated from three aspects grouped participants into three categories based on total scores: satisfied group (0–6), moderate group (6.01–11.99), and dissatisfied group (12–15). Other sections evaluated from four aspects categorized participants into three groups based on total scores: satisfied group (0–8), moderate group (8.01–15.99), and dissatisfied group (16–20).

The questionnaire was developed using the Delphi method of expert consultation. Thirteen experts were invited for this study, including frontline staff and administrative personnel from community health service centers and township health clinics (with over 5 years of experience). All experts participated anonymously in multiple rounds of consultation. In the first round, items with importance ratings below 4, coefficient of variation above 0.25, or item-level content validity index (I-CVI) below 0.78 were revised or removed. After modifications, a second round of expert consultation was conducted. The final I-CVI for all items ranged from 0.85 to 1, and the scale-level content validity index (S-CVI) was 0.94. Ultimately, the questionnaire demonstrated a Cronbach's α coefficient of 0.849, indicating good internal consistency.

Investigation

The questionnaire was collected from November to December 2022, assessing the occupational burnout status of the study subjects over the past year. The survey utilized an online questionnaire administered through the Guangzhou Municipal Health Commission work group. Contact was established with the respective individuals responsible for each grassroots institution in the city, instructing them to distribute the electronic questionnaire to eligible staff, including at least clinical doctors, public health doctors, and nurses. In 2021–2022, Guangzhou had a total of 190 primary healthcare institutions, with 178 participating in the survey. Approximately 11,821 primary healthcare workers involved in epidemic response were surveyed. In this study, a total of 882 individual questionnaires were collected, of which 16 were invalid. Finally 866 health personnel from primary healthcare institutions in Guangzhou were included in this survey, resulting in a validity rate of 98.19%. The institutions where the study subjects were located covered primary healthcare institutions in all districts of Guangzhou.

Data analysis

SPSS 26.0 were used for statistical analysis. The scores of job burnout of medical staff were expressed as

mean ± standard deviation ($\bar{x} \pm s$). Demographic factors and institution management satisfaction had been defined as independent variables, and job burnout had been defined as a dependent variable. The univariate analysis main conducted by the Chi square test. All variables with $p < 0.10$ in the univariate analysis were included in multivariate logistic regression models to identify independent influencing factors. All the tests were performed with $P < 0.05$ as the differences were statistically significant.

Results

Demographics characteristics of the participants

The 866 participants’ institutions that were effectively collected in the questionnaire covered 11 districts of Guangzhou. There were 341 respondents (39.38%) from urban areas and 525 respondents (60.62%) from rural–urban fringe areas. Gender distribution included 223 men (25.75%) and 643 women (74.25%), with a male-to-female ratio of 0.35:1. The average age of the participants was 36.31 ± 8.26 years old. The majority held a college degree, with 587 participants (67.78%). Additionally, 77.48% of participants did not occupy administrative positions. Further demographic details are presented in Table 1.

The detection of job burnout

The job burnout rate was 78.29%, with 53.46% experiencing moderate burnout and 24.83% facing severe burnout. Participants had an average job burnout score of 2.59, meeting the criteria for moderate job burnout. The emotional exhaustion subscale score was (15.73 ± 8.66) , depersonalization subscale score was (9.21 ± 7.33) , and personal accomplishment subscale score was (12.88 ± 9.64) .

Factors related to job burnout

Univariate analysis of job burnout

The difference in the detection rate of job burnout was statistically significant across different genders, institutional locations, professional groups, and administrative positions. Additionally, there was a statistically significant difference between the satisfaction of primary healthcare workers with the management of personnel, materials and vehicles, subsidies and compensation, humanistic care, superior management, joint prevention and control, and social cooperation during epidemic prevention work and the incidence of job burnout ($P < 0.05$), as shown in Table 2.

Multivariate logistic regression analysis of job burnout

Burnout was treated as the dependent variable, assigned a value of 0 for negative and 1 for positive. Variables

Table 1 Demographics characteristics of the sampled participants ($n = 866$)

Variables	N	%
Gender		
Male	223	25.75
Women	643	74.25
Age group(years)		
≤ 30	237	27.37
31–40	382	44.11
≥ 41	247	28.52
Marital status		
Unmarried	189	21.82
Married	660	76.21
Others	17	2.96
Education level		
Secondary/high school and below	17	1.96
College degree	587	67.78
Bachelor	223	25.75
Master and above	39	4.50
Professional group		
Public health physician	143	16.51
Clinician	197	22.75
Physiotherapists	289	33.37
Other technical staff	158	18.24
Managerial staff	79	9.12
Job tenure		
≤ 2 years	82	9.47
≤ 5 years	114	13.16
≤ 10 years	218	25.17
≤ 20 years	256	29.56
More than 20 years	196	22.63
Professional title		
Junior ranking	333	38.45
Middle level (in a hierarchy)	401	46.30
Associate Senior and above	69	7.97
No title or pending	63	7.27
Administrative position		
Not have	671	77.48
Head of Department	171	19.75
Person in charge of the unit	24	2.77
Forms of employment		
Temporary staff	84	9.70
Contractual staff	297	34.30
Regular staff	473	54.62
Others	12	1.39

with $P < 0.1$ in Tables 2 and 3 were selected as independent variables and subjected to binary logistic regression analysis. The results of the multivariate analysis of participants’ burnout showed that gender, institutional locations, administrative positions, the issues related

Table 2 Univariate analysis of job burnout among participants

Variables	Total number of people	Burnout detected		χ^2	P	OR (95% CI)
		Number of people	Proportion (%)			
Gender				6.39	0.011	
Male	223	188	84.30			1.0 (reference)
Women	643	490	76.21			0.60(0.40,0.89)
District in which the institution is located				20.71	< 0.001	
Urban	341	240	70.38			1.0 (reference)
Urban–rural fringe	525	438	83.43			2.12(1.53,2.99)
Age(years)				3.25	0.197	
≤ 30	237	184	77.64			1.0 (reference)
31–40	382	309	80.89			1.22(0.82,1.82)
≥ 41	247	185	74.90			0.86(0.57,1.31)
Education level				5.68	0.128	
Secondary/high school and below	17	17	100.00			557,060,290,64
College degree	587	462	78.71			1.27(0.60,2.69)
Bachelor	223	170	76.23			1.11(0.51,2.42)
Master and above	39	29	74.36			1.0 (reference)
Professional group				11.32	0.023	
Public health physician	143	122	85.81			2.69(1.39,5.22)
Clinician	197	158	80.20			1.88(1.04,3.38)
Physiotherapists	289	217	75.09			1.40(0.81,2.40)
Other technical staff	158	127	80.38			1.90(1.02,3.51)
Managerial staff	79	54	68.35			1.0 (reference)
Job tenure				7.47	0.113	
≤ 2 years	82	62	75.61			1.0 (reference)
≤ 5 years	114	96	84.21			1.72(0.84,3.51)
≤ 10 years	218	178	81.65			1.44(0.78,2.64)
≤ 20 years	256	199	77.73			1.13(0.63,2.02)
More than 20 years	196	143	73.0			0.87(0.48,1.58)
Professional title				2.00	0.574	
Junior ranking	333	267	80.18			1.0 (reference)
Middle level (in a hierarchy)	401	313	78.05			0.88(0.61,1.26)
Associate Senior and above	69	51	73.91			0.70(0.38,1.28)
No title or pending	63	47	74.60			0.73(0.39,1.36)
Administrative position				10.60	0.005	
Not have	671	537	80.03			3.39(1.49,7.74)
Head of Department	171	128	74.85			2.52(1.05,6.04)
Person in charge of the unit	24	13	54.17			1.0 (reference)
Forms of employment				3.73	0.443	
Temporary staff	84	62	73.81			1.0 (reference)
Contractual staff	297	226	76.09			1.13(0.65,1.97)
Regular staff	473	381	80.55			1.47(0.86,2.51)
Others	12	9	75.0			1.06(0.26,4.29)
Percentage of epidemic prevention work				12.78	0.002	
0–49.9%	163	111	68.10			1.0 (reference)
50%–79.9%	189	149	78.84			1.75(1.08,2.82)
80%–100%	514	418	81.32			2.04(1.37,3.03)
Personnel management				27.40	< 0.001	
Satisfied	134	83	61.94			1.0 (reference)

Table 2 (continued)

Variables	Total number of people	Burnout detected		χ^2	P	OR (95% CI)
		Number of people	Proportion (%)			
Moderate	624	501	80.29			2.50(1.68,3.74)
Unsatisfied	108	94	87.04			4.13(2.13,7.99)
Materials and vehicles				33.59	< 0.001	
Satisfied	158	99	62.66			1.0 (reference)
Moderate	637	513	80.53			2.47(1.69,3.60)
Unsatisfied	71	66	92.96			7.87(3.00,20.64)
Subsidies and compensation				48.07	< 0.001	
Satisfied	120	67	55.83			1.0 (reference)
Moderate	302	233	77.15			2.67(1.70,4.19)
Unsatisfied	444	378	85.14			4.53(2.90,7.07)
Humanistic care				42.65	< 0.001	
Satisfied	390	267	68.46			1.0 (reference)
Moderate	335	283	84.48			2.51(1.74,3.61)
Unsatisfied	141	128	90.78			4.54(2.47,8.34)
Superior management				59.69	< 0.001	
Satisfied	148	82	55.41			1.0 (reference)
Moderate	681	560	82.23			3.73(2.55,5.44)
Unsatisfied	37	36	97.30			28.98(3.87,216.96)
Joint prevention and control				22.68	< 0.001	
Satisfied	313	220	70.29			1.0 (reference)
Moderate	494	403	81.58			1.87(1.34,2.61)
Unsatisfied	59	55	93.22			5.81(2.05,16.50)
Social cooperation				14.31	< 0.001	
Satisfied	515	381	73.98			1.0 (reference)
Moderate	348	294	84.48			1.91(1.35,2.72)
Unsatisfied	3	3	100			568,172,254.44

to personnel management, material and vehicles, subsidies and compensation, humanistic care, and superior management were the factors influencing the burnout of primary healthcare workers during the prevention and control of the COVID-19 and the differences were all statistically significant ($P < 0.05$). Notably, male primary healthcare workers and those in urban–rural fringe institutions faced a higher risk of burnout, while institutional heads had a lower risk. Unsatisfied with personnel management, material and vehicles, subsidies and compensation, humanistic care, and superior management increased the likelihood of detecting burnout. Refer to Tables 3 for details.

Discussion

The detection rate of job burnout among primary healthcare workers during the prevention and control of the COVID-19 epidemic was at a high level

After the outbreak of the epidemic, a considerable number of primary healthcare workers have devoted

themselves to the fight against the epidemic. Unlike their counterparts in high-level medical institutions, the daily responsibilities of primary healthcare workers often necessitate immersion in the community and interaction with the general population, leading to a more intricate and dynamic working environment. They represent the forefront force of epidemic prevention and control, underscoring the need for specific attention to their job burnout [25]. The results of this study showed that during the prevention and control period of the COVID-19 from 2021 to 2022, the total detection rate of job burnout among primary healthcare workers in Guangzhou was 78.52%, of which 53.46% was moderate burnout, 24.83% was severe burnout, and the average score of job burnout was 2.59 ± 1.26 , which met the standard of moderate burnout. However, the survey results conducted by Zou Yuxia et al. showed that the rate of job burnout among primary healthcare workers in Guangzhou was 73.21% before the outbreak of the epidemic [26]. This indicates that during the epidemic, due to the large amount of

Table 3 Multivariate logistic regression analysis of burnout among participants

Variant	B	S.E	Wald	P	OR (95% CI)
Gender (referenced as women)					
Men	0.87	0.23	13.98	<0.001	2.39(1.51, 3.77)
District where the institution is located (referenced as urban)					
Urban–rural fringe	0.44	0.19	5.19	0.023	1.56(1.06, 2.28)
Administrative position (referenced as the head of the institution)					
Ordinary employee	1.28	0.49	6.78	0.009	3.58(1.37, 9.36)
Head of department	1.28	0.50	6.44	0.011	3.60(1.34, 9.68)
Personnel management (referenced as satisfied)					
Moderate	0.55	0.24	5.32	0.021	1.73(1.09, 2.76)
Unsatisfied	0.88	0.37	5.60	0.018	2.41(1.16, 4.98)
Materials and vehicles(referenced as satisfied)					
Moderate	0.46	0.22	4.41	0.036	1.59(1.03, 2.44)
Unsatisfied	1.06	0.53	4.06	0.044	2.89(1.03, 8.09)
Subsidy and compensation (referenced as satisfied)					
Moderate	0.38	0.26	2.07	0.150	1.46(0.87, 2.46)
Unsatisfied	0.78	0.27	8.50	0.004	2.18(1.29, 3.69)
Humanistic care (referenced as satisfied)					
Moderate	0.46	0.22	4.41	0.014	1.69(1.11, 2.58)
Unsatisfied	1.06	0.53	4.06	0.028	2.11(1.09, 4.10)
Superior management (referenced as satisfied)					
Moderate	0.77	0.23	11.84	0.001	2.17(1.40, 3.37)
Unsatisfied	2.12	1.05	4.04	0.044	8.32(1.05, 65.66)

epidemic prevention work undertaken by frontline primary healthcare workers, as well as the significant psychological pressure, job burnout has risen to a relatively high level, which needs further attention [27].

Multiple factors jointly affected the job burnout among primary healthcare workers during the prevention and control of the COVID-19 epidemic

Gender, institutional locations, administrative positions, the issues related to personnel management, material and vehicles, subsidies and compensation, humanistic care, and superior management were the factors influencing burnout during the prevention and control of the COVID-19 epidemic among primary healthcare workers.

The survey found that during the prevention and control of the COVID-19 epidemic, the detection rate of job burnout was higher among males than in females among primary healthcare workers, which has also been found in some previous studies [28, 29]. This discrepancy may be attributed to the heavier multiple pressures that men often bear in their daily work and life. Men may strive for higher professional fulfillment and satisfaction, investing more energy towards these goals. In environments of high stress where male primary healthcare workers are unable to fulfill their duties adequately, their sense of

professional achievement may be left unsatisfied, leading to experiences of emotional exhaustion and diminished professional identity.

The detection rate of job burnout was higher in urban–rural fringe areas where the institutions were located. This could be attributed to the uneven distribution of medical resources in Guangzhou, which resulted in a heightened detection rate of job burnout among those working in relatively under-resourced areas. Wang Chunxiao et al. discovered that, in comparison to urban areas, primary healthcare workers in urban–rural fringe regions have lower levels of education and professional titles, potentially impacting the accessibility and quality of medical and health services [30]. Additionally, Peng Rongchun et al. found a substantial disparity in the number of healthcare professionals per square kilometer between urban and urban–rural fringe areas, with differences of up to 20 times in the most disparate districts [31].

Ordinary employees without administrative positions and department heads faced a significantly elevated risk of job burnout detection compared to institution heads, reaching approximately 3.60 times higher than that of institution heads. This may be because the heads of the institution were mainly responsible for organizing and coordinating the affairs and formulating the overall work plan during the prevention and control of COVID-19 epidemic. Moreover, institutional leaders generally have a longer length of service, rich work experience, so they were calmer when facing the epidemic. They exhibited higher levels of ideological awareness and are more likely to derive pride and satisfaction from their work, harboring a strong sense of professional identity. In the context of a major epidemic, effective leadership is pivotal for guiding a team successfully through the crisis. Leaders must consistently demonstrate decisiveness, confidence, and exemplary behavior, maintaining composure in the face of pressure [32]. Consequently, institutional leaders typically exhibit strong self-regulation abilities, effectively managing stress to prevent burnout. Moreover, effective leadership has a significant impact on employee engagement and emotional state, thereby having a significant impact on the performance and effectiveness of the entire organization [33]. If the detection rate of job burnout among institutional leaders is high, it may be detrimental to the sustainable development of the institution.

Those who were unsatisfied with issues related to personnel management had a higher risk of detecting burnout. This phenomenon is not unique, as previous studies have identified challenges such as unbalanced development, irrational allocation, and a shortage of high-quality human resources in certain areas, impacting primary healthcare [34]. The problem of burnout has

been identified in some areas. Whether before or after the epidemic, in urban or rural areas, the lack of primary public health human resources is a prominent problem in the structural imbalance of primary health personnel [35, 36]. Especially during the COVID-19 epidemic prevention and control period, insufficient personnel levels forced primary healthcare workers into multitasking and job transfers, intensifying their risk of burnout. Collaborative efforts in grassroots epidemic prevention are vital, but when task distribution was unreasonable, with an inadequate match between staff numbers, task difficulty, and staff capabilities, the efficiency of epidemic prevention and control is significantly compromised. Originally, some primary healthcare institutions already have insufficient ability to prevent and control infectious diseases. In addition, with the increase in the prevention and control of COVID-19 epidemic and the development and use of the health system, the number of systems that need to be operated and the amount of relevant data that need to be entered and collated continue to increase, and there is a higher demand for the ability to use information technology, primary healthcare workers may perceive a deficiency in their competence, leading to heightened work pressure and an increased susceptibility to job burnout.

Those unsatisfied with issues related to materials and vehicles also faced a higher risk of detecting job burnout. Materials and vehicles form the essential foundation for carrying out epidemic prevention work, and the shortage of epidemic prevention materials and transportation vehicles will greatly affect the progress of epidemic prevention work. Strengthening the construction of an emergency material management system, assigning dedicated personnel for material management, ensuring proper classification, standardization, and systematic management of materials, as well as improving information management and establishing material inventory systems, are crucial steps. Ensuring standards for emergency vehicles, collaborating with community streets, or engaging third-party companies for vehicle provision are essential measures.

Individuals unsatisfied with issues related to subsidies and compensation had a higher risk of detecting burnout. Those experienced delays in subsidy receipt had a 2.18 times higher risk of occupational burnout compared to those who received timely subsidies. A research also showed that there is a correlation between effort-reward imbalance and job burnout among medical personnel, and that when medical personnel do not receive due rewards for their time, energy, and emotional investment in their work, they may will be in a state of long-term anxiety, which in turn leads to burnout [37]. The temporary non-receipt of subsidies may be due to regional

economic constraints or institutional financial situations, leading to delayed grants.

Those who were unsatisfied with the institution's humanistic care faced a higher risk of detecting burnout. In this survey, the top five welfare measures requiring improvement, in order of priority, include diversified incentive mechanisms, a flexible scheduling system, a comprehensive leave system, more opportunities for title promotion, and more job training opportunities. In the face of the heavy workload of epidemic prevention at the grass-roots level, even though primary healthcare workers cannot leave their posts at will, they should, as far as possible, make reasonable arrangements for rest. Institutions with the capacity to do so should establish dedicated rest spaces for personnel, aiming to ensure primary healthcare workers receive sufficient rest time and a comfortable environment, thereby mitigating the risk of over-fatigue in prevention and control efforts.

Those who were unsatisfied with issues related to superior management faced a significantly higher risk of detecting job burnout, approximately 8.32 times higher than those who were satisfied. Problems related to superior management mainly included the work requirements of superior institutions to the subordinate institutions, such as whether grassroots epidemic prevention procedures were overly cumbersome, whether excessive information documentation was required, and whether the frequency of supervision was appropriate. Overly cumbersome epidemic prevention procedures not only impede progress at the grassroots level but also elevate the workload of primary healthcare workers. Excessive inspection and supervision may leave primary healthcare workers fatigued and merely coping, failing to achieve the genuine purpose of inspection and supervision.

Job burnout will not only reduce the efficiency and quality of work of primary healthcare workers, but also affect the quality of their daily life, and will also have a negative impact on the development of their careers. The relevant institutional managers should be highly alert and concerned about this, and need to promptly identify problems and address urgent issues in a targeted manner in order to ensure the healthy and sustainable development of primary healthcare work.

This study also has some limitations, it is a cross-sectional study, which makes it difficult to establish the causal relationship between variables and is prone to recall bias. During the questionnaire survey, respondents may have consciously or unconsciously exaggerated their views on issues due to their concern and motivation to drive improvements in relevant institutions, potentially leading to reporting bias. Additionally, this study only represents the situation in Guangzhou. Different regions vary in the severity of epidemics, operational methods,

and management styles of institutions. Therefore, it cannot be generalized to other regions in China or globally. When applying findings elsewhere, local socio-economic, and cultural factors should be carefully considered for appropriate adaptation and interpretation.

Conclusion

This study found that the job burnout of primary healthcare workers was at a high level during the COVID-19 epidemic. The risk of detecting job burnout was higher among primary healthcare workers who were male, whose institution was located in urban–rural fringe. Conversely, institution heads showed a lower risk of job burnout. From the perspective of institutional operation and management, those who unsatisfied with the issues related to personnel management, material and vehicles, subsidies and compensation, humanistic care, and superior management faced a higher risk of detecting job burnout. In response, when facing a new and sudden epidemic, management departments and institutions associated with primary healthcare should implement measures. These measures include rationalizing healthcare workers' work and rest schedules, flexibly adjusting their tasks, optimizing the allocation of medical and logistical resources, and augmenting investments in primary healthcare. The attainment of efficient and sustainable institutional operation and management is very important. This comprehensive approach is indispensable for safeguarding the well-being of primary healthcare workers.

Abbreviations

COVID-19 The coronavirus disease 2019
MBI-GS Maslach Burnout Inventory-General Survey

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Authors' contributions

JYQ and FHY designed the study. JYQ and FHY acquired the data. JYQ and XQ conducted the statistical analysis. JYQ drafted the manuscript, which all authors substantially revised. All authors contributed to interpretation of study results, critical revision of the paper and approval of final version, and agree to be accountable for all aspects of this article.

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Availability of data and materials

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board of Jinan University (NOJNUKY-2023-0037). The study team obtained informed consent from all participants. Participants were made aware that they could withdraw at any time.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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