Plan-Do-Check-Act-Theory-Based Job Satisfaction and Countermeasures Among Public Health Postgraduates

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Abstract: This study evaluated employment status and industry perceptions among public health postgraduates in China's Yangtze River Delta, using the Plan-Do-Check-Act (PDCA) cycle to propose improvements. A survey of 290 final-year students (mean age 26.16) revealed 66.6% had low public health sector satisfaction.Higher household income correlated with lower satisfaction (OR=0.70, 95% CI: 0.50–0.97), graduates from 2021 onwards (OR=5.23, 95% CI: 1.91–14.36) and those majoring in the five core public health disciplines (OR=2.20, 95% CI: 1.22–3.95) reported higher satisfaction. Recommendations include enhancing internship-employment linkages, offering career planning and counseling, and expanding practical opportunities.

Keywords: Plan-Do-Check-Act (PDCA); Public Health; Job Satisfaction; Career Development

1.Background

Public health, as a public service dedicated to protecting and improving population health, traces its conceptual origin to Winslow's seminal 1920 article, The Untilled Fields of Public Health, and has since been widely recognized and promoted by national governments and the World Health Organization (WHO)[1-2]. Unlike clinical medicine, which primarily addresses individual health issues, public health emphasizes the collective efforts of governments and societies to improve health-related environmental and social conditions, prevent and control diseases, provide essential medical and health services, raise health awareness, and strive toward equitable access to health resources for all.

A robust and well-trained workforce is the cornerstone and strategic foundation of a strong public health system, with young professionals playing a particularly vital role in this endeavor. Since 2001, China has expanded its public health education, with 57 universities now offering master's programs[3], forming a crucial pathway for cultivating high-quality, application-oriented public health professionals[4]. However, existing education and training models remain inadequate for effectively responding to complex public health emergencies and meeting the demands of an increasingly challenging professional landscape[5].Challenges such as an insufficient workforce, limited competencies, and sub-optimal qualifications among young public health professionals remain prominent in China. Existing research largely focuses on macro-level factors like education models and policies, neglecting micro-level aspects such as job satisfaction, career planning, and competencies[6]. Studies on other healthcare professions highlight the importance of professional recognition and job satisfaction in career development[7-11], yet similar data for public health graduates remain scarce. Further research is needed to identify workplace challenges and optimize policy interventions.institutions responsible for training public health professionals must cultivate multidisciplinary professionals skilled in research, epidemic response, and emergency management. The PDCA (Plan-Do-Check-Act) cycle, a proven quality management tool, offers a structured framework for continuous improvement[12]. Initially applied in manufacturing, PDCA has been adapted to healthcare and education, emphasizing process control and iterative enhancement[13].

This study try to apply the PDCA cycle framework, in conjunction with a questionnaire survey, to investigate the employment-related challenges faced by public health graduates. It aims to establish a cyclic mechanism of 'employment guidance planning, implementation, feedback, evaluation, and

improvement', and to offer comprehensive recommendations for optimizing the training and deployment of public health talents.

2. Methods

2.1 Study and Population Design

In this study, postgraduate students majoring in public health from universities in the Yangtze River Delta (Shanghai, Jiangsu, Zhejiang, and Anhui Province) were selected as research participants. The participants' majoring degree including five academic degree fields (epidemiology and health statistics, nutrition and food hygiene, occupational health and environmental hygiene, social medicine and health management, and health toxicology), and one professional degree (public health).

2.2 Measurement

A self-designed questionnaire was utilized on employment intentions and the factors influencing postgraduate public health students. The contents of the survey included the following: (1) general socio-demographic characteristics of the respondents (including age, major, sex, type of postgraduate degree, highest postgraduate degree major, and undergraduate major); (2) practice and employment intention (including practice, employment advice, and intended job); and (3) current situation and satisfaction with public health industry: includes three aspects (the current situation of the public health industry, employment situation, and impact of the epidemic), each measured using a single question with five-point Likert scale (1 point representing "strongly unsatisfied" and 5 points indicating "strongly satisfied"). Based on the score, the overall satisfaction level of the public health industry was divided into two groups, with a score ≥2/3 of the total score of this section classified into the high-score group and the remaining into the low-score group). An electronic questionnaire was used for the investigation, with 20 valid questionnaires recovered in the pre-investigation. Additionally, 290 valid questionnaires were recovered in the formal investigation, with an effective recovery rate of 100%.

2.3 Statistical Analysis

Statistical analysis was performed using SPSS 26.0 software (SPSS Inc., Chicago, IL, US). Quantitative data were normally distributed and described as mean ± standard deviation (x±SD). The chi-square test was used to analyze the differences in employment cognition distribution under different baseline characteristics, and a multivariate logistic regression model was used to analyze the influencing factors of employment cognition distribution. The significance level was $\alpha=0.05$.

3. Results

3.1 Demographics, Internship, and Career Information

A total of 290 participants were included in the study, with a mean age of 26.16 ± 2.21 years. The sample comprised 70 males (24.1%) and 220 females (75.9%). Among them, 130 (44.8%) were from urban areas, and 160 (55.2%) were from rural areas. The distribution across higher education institutions was as follows: 18 students (6.2%) from Shanghai, 76 (26.2%) from Jiangsu, 142 (49.0%) from Zhejiang, and 54 (18.6%) from Anhui. Regarding academic qualifications, the sample comprised 34 doctoral candidate (11.7%), 114 academic master candidate (39.3%), and 142 professional master candidate (49.0%). The majority (93.1%) graduated in 2021 or later. In terms of the highest degrees, 98 students (33.8%) majored in Public Health, 65 (22.4%) in Epidemiology and Health Statistics, 41 (14.1%) in Occupational And Environmental Health, 30 (10.3%) in Social Medicine and Public Health, 8 (2.8%) in Health Toxicology, 22 (7.6%) in Nutrition and Food Hygiene, and 26 (9.0%) in other disciplines. Regarding undergraduate majors, 200 students (69.0%) held a Bachelor of Medicine (BMed) in Preventive Medicine, 21 (7.2%) held a Bachelor of Management (BMgt) in Health Management, 35 (12.1%) majored in other medical-related fields, and 34 (11.7%) had non-medical backgrounds.

Concerning the annual family income distribution, 102 participants (35.2%) reported earnings, 113 (39.0%) reported incomes between 100,000 and 200,000 CNY (excluding 100,000 CNY), and 75 (25.9%) reported incomes exceeding 200,000 CNY. In terms of parental educational attainment, 197 participants (67.9%) had parents with a high

school education or lower, 87 (30.0%) had parents with a junior college or undergraduate degree, and 6 (2.1%) had parents with postgraduate degree. More than one-third of the respondents had no practical experience during their postgraduate studies, and 38.3% had 1–6 months of practical experience. Additionally, 54.1% had not participated in career guidance, 54.5% had not secured definite employment, and 54.8% intended to work outside their hometowns. Regarding career intentions, expressed a preference for working at the Centers for Disease Control and Prevention (CDC), while 19.0% aimed to work in hospitals (Table 1).

Table 1. Satisfaction with the Public Health Industry Among Public Health Graduate Students (N=290)

Demographic Characteristic		n (%)	Satisfaction with public health industry* n (%)		χ^2	*p*-value
			Low Score (n=193)	High Score (n=97)		
Sex	Male	70 (24.1)	40 (20.7)	30 (30.9)	3.67	0.06
	Female	220 (75.9)	153 (79.3)	67 (69.1)		
Household registrations	Urban	130 (44.8)	79 (40.9)	51 (52.6)	3.54	0.06
	Rural	160 (55.2)	114 (59.1)	46 (47.4)		
College	Shanghai	18 (6.2)	10 (5.2)	8 (8.2)	4.01	0.26
	Jiangsu	76 (26.2)	56 (29.0)	20 (20.6)		
	Zhejiang	142 (49.0)	95 (49.2)	47 (48.5)		
	Anhui	54 (18.6)	32 (16.6)	22 (22.7)		
Highest degree of education	Doctoral students	34 (11.7)	25 (13.0)	9 (9.3)	2.49	0.29
	Academic master degree students	114 (39.3)	70 (36.3)	44 (45.4)		
	Professional master degree students	142 (49.0)	98 (50.8)	44 (45.4)		
Graduation year	2020 and before	20 (6.9)	6 (3.1)	14 (14.4)	12.90	**<0.01**
	2021 and later	270 (93.1)	187 (96.9)	83 (85.6)		
Graduate majors	Public Health	98 (33.8)	68 (35.2)	30 (30.9)	14.41	**0.03**
	Epidemiology and Health Statistics	65 (22.4)	40 (20.7)	25 (25.8)		
	Occupational and Environmental Health	41 (14.1)	35 (18.1)	6 (6.2)		
	Social Medicine and Public Health	30 (10.3)	18 (9.3)	12 (12.4)		
	Health Toxicology	8 (2.8)	4 (2.1)	4 (4.1)		
	Nutrition and Food Hygiene	22 (7.6)	16 (8.3)	6 (6.2)		
	Other Majors	26 (9.0)	12 (6.2)	14 (14.4)		
Undergraduate majors	Preventive Medicine	200 (69.0)	137 (71.0)	63 (64.9)	3.24	0.36
	Health Management	21 (7.2)	14 (7.3)	7 (7.2)		
	Other Medical-Related Majors	35 (12.1)	24 (12.4)	11 (11.3)		
	Non-Medical-Related Majors	34 (11.7)	18 (9.3)	16 (16.5)		
Annual family income (CNY)	≤100,000	102 (35.2)	72 (37.3)	30 (30.9)	9.72	**0.01**
	100,001–200,000	113 (39.0)	82 (42.5)	31 (32.0)		
	＞200,000	75 (25.9)	39 (20.2)	36 (37.1)		
Parents' highest education degree	High School Degree Or Less	197 (67.9)	136 (70.5)	61 (21.0)	1.79	0.41
	Junior College Or Undergraduate Degree	87 (30.0)	53 (27.5)	34 (35.1)		
	Postgraduate Degree	6 (2.1)	4 (2.1)	2 (2.1)		
Practical experience (months)	1–6	111 (38.3)	78 (40.4)	33 (34.0)	1.63	0.44
	＞6	79 (27.2)	53 (27.5)	26 (26.8)		
	None	100 (34.5)	62 (32.1)	38 (39.2)		
Participation in career counseling	Yes	133 (45.9)	91 (47.2)	42 (43.3)	0.39	0.54
	No	157 (54.1)	102 (52.8)	55 (56.7)		
Already	Yes	131 (45.2)	90(46.6)	41 (42.3)	0.50	0.48

have a job in mind	No	158 (54.5)	103 (53.4)	56 (57.7)		
Preferred working area	Non-Hometowns	159 (54.8)	102 (52.8)	57 (58.8)	0.91	0.34
	Hometowns	131 (45.2)	91 (47.2)	40 (41.2)		
Type of intended working unit	CDC	149 (51.4)	89 (46.1)	60 (61.9)	6.96	0.22
	Hospitals	55 (19.0)	41 (21.2)	14 (14.4)		
	Government Officials	28 (9.7)	22 (11.4)	6 (6.2)		
	University or scientific research institute	24 (8.3)	17 (8.8)	7 (7.2)		
	Other	20 (6.9)	14 (7.3)	6 (6.2)		
	Pursue a doctor degree or study abroad	14 (4.8)	10 (5.2)	4 (4.1)		

* with a score ⩾2/3 of the total score of this section, classified into the high-score group and the remaining into the low-score group.

3.2 Satisfaction Among Public Health Graduates with the Industry's Current Status

The current satisfaction among public health graduates with the public health industry was assessed from three perspectives: the overall industry status, the employment situation, and the impact of the pandemic on public health employmen. Among the 290 participants surveyed, 56.9% rated the satisfaction with current situation of the public health industry as neutral, while 20.3% expressed satisfaction. Regarding the satisfaction with employment situation in the field, 47.2% reported a neutral view, and 21.7% expressed dissatisfaction. Concerning the impact of the epidemic on public health employment, 44.1% of respondents were dissatisfied, while 25.5% held a neutral opinion (Table 2). In terms of overall satisfaction of the public health industry, 193 individuals (66.6%) were classified into the low-score group, and 97 (33.4%) into the high-score group.

Table 2. Current Status of Satisfaction with the Public Health Industry (N=290)

Public Health Industry Satisfaction	Strongly Unsatisfied n (%)	Unsatisfied n (%)	Neutral n (%)	Satisfied n (%)	Strongly Satisfied n (%)
Current situation of the public health industry	18 (6.2)	32 (11.0)	165 (56.9)	59 (20.3)	16 (5.5)
Employment situation in public health	26 (9.0)	63 (21.7)	137 (47.2)	50 (17.2)	14 (4.8)
Impact of the pandemic on public health employment	33 (11.4)	127 (43.8)	74 (25.5)	48 (16.6)	8 (2.8)

3.3 Multivariate Analysis of Public Health Industry Satisfaction

Univariate analysis revealed statistically significant differences in public health graduate students' satisfaction with the public health industry based on graduation year, highest degree obtained, and annual family income (Table 1). These variables that were statistically significant in univariate analysis were included as independent variables in multivariate analysis.

A multivariate logistic regression analysis was conducted, with overall satisfaction with the public health industry as the dependent variable (0 = low score; 1 = high score). The results showed that higher income levels were significantly associated with lower satisfaction (OR = 0.70, 95% CI: 0.50–0.97, p = 0.03). In contrast, graduates who majored in one of the "Five Major Disciplines of Public Health" (OR = 5.23, 95% CI: 1.91–14.36, p < 0.01) and those who graduated in or after 2021 (OR = 2.20, 95% CI: 1.22–3.95, p = 0.01) were significantly more likely to report higher satisfaction levels (Table 3).

Table 3. Multivariate Analysis of the Satisfaction with Public Health Industry (N=290)

Variables	β (SE)	OR (95%CI)	*p*-value
Annual Family Income	-0.36 (0.17)	0.70 (0.50–0.97)	0.03

Year Of Graduation			
2020 And Before (Reference)			
2021 And Beyond	1.66 (0.52)	5.23(1.91–14.36)	0.01
Highest Professional Degree Classification			
Other Majors (Reference)			
The Five Major Health Professions In Public Health†	0.79 (0.30)	2.20 (1.22-3.95)	< 0.01

*The cognition score of the public health industry was used as the dependent variable (0=low score; 1=high score).
†The five major health professions in Public Health: Public Health, Epidemiology and Health Statistics, Occupational and Environmental Health, Nutrition and Food Hygiene

4. Discussion

Given the current global public health challenges and the potential outbreak of future pandemics such as "X disease," the career choices of postgraduate students majoring in public health carry significant implications for the development of public health systems and services. Investigating their employment intentions and perceptions not only enhances understanding of career development trajectories but also informs strategies to optimize talent cultivation and improve the quality of public health services.

Despite the increasing demand for public health professionals, the current training and education model for public health talent still faces considerable challenges. Concurrent field practice has been shown to be more effective than traditional classroom-based methods in public health graduate education[14]. Although approximately two-thirds of public health graduate students reported having some form of practical experience, more than half lacked definite job offers at the time of the survey. This gap between training and employment readiness underscores the need to strengthen the connection between practical training and real-world employment through stable university-employer partnerships. Internship programs should be closely aligned with actual public health demands to better prepare students for the workforce. Collaboration between academic institutions and employers can also enhance public health capacity while contributing to research output and undergraduate education[15]. Regular employment fairs and career development seminars could serve as effective bridges between graduates and potential employers. However, more than half of the students surveyed reported not receiving employment guidance, potentially limiting their capacity for career planning and adaptability to the labor market. To address this, universities should incorporate compulsory courses in career planning and employment guidance, helping students understand industry trends and formulate individualized career development strategies. In addition, over half of the students expressed a willingness to work outside their hometowns, which may present additional challenges related to social integration and adaptation. To support this mobility, institutions should offer regional cultural adaptation training and promote the development of cross-regional employment information-sharing platforms.

Student satisfaction and attitudes toward the public health profession play a crucial role in shaping their career trajectories and, ultimately, the quality of public health services. Our findings revealed that only a minority of public health postgraduates held a positive view of the current employment landscape, with many believing that the pandemic had adversely affected job prospects in the sector.

In addition to facing uncertainties in employment, postgraduates experienced significant psychological stress and employment-related anxiety during the pandemic[16]. The inherent complexity and specificity of public health work may exacerbate employment concerns among students. To improve the profession's image and attract more talent, media and academic institutions should actively promote success stories and exemplary cases in public health. Furthermore, policy communication should clarify governmental support for the public health sector, thereby boosting students' confidence in the field's future prospects. Mental health interventions have been shown to alleviate burnout symptoms among graduate students[17]. Providing accessible mental health services and targeted career counseling can help students cope with occupational stress and

clarify their professional positioning.

This study explored the employment perceptions and satisfaction levels of public health graduate students, identifying the influence of various factors such as household income, graduation year, and major. Results indicated that participants from lower-income households demonstrated greater awareness of the public health industry. Conversely, students from higher-income backgrounds were significantly less satisfied with the current status of the industry—potentially due to their broader access to career opportunities and resources, which may reduce their dependence on public health career paths. Graduates majoring in one of the “Five Major Disciplines of Public Health” and those who graduated in or after 2021 reported significantly higher levels of satisfaction. This trend may be attributed to greater curricular alignment with real-world needs and the increased visibility of public health during the
pandemic. The heightened societal focus on public health challenges and the incorporation of relevant content into education may have enhanced student awareness and professional identity. These findings highlight the need to further integrate emerging public health issues and practical applications into graduate curricula.

To enhance the employability and overall quality of public health graduates, universities should adopt the PDCA (Plan–Do–Check–Act) model as a structured management framework. The PDCA cycle can support the diversification and deepening of public health education while providing valuable teaching and research opportunities. It also facilitates the development of professionals equipped with project evaluation skills and multidisciplinary competencies[18].

This involves establishing a circular management mode of "employment guidance Plan, Do, Check, Action quality analysis and improvement.": (1) Employment guidance plan (P): Formulates a detailed employment guidance plan for postgraduates, including career planning, skill training, and internship arrangements. Establish clear employment guidance goals and schedules to ensure the orderly conduct of various activities; (3) Do and feedback (D): Equip the employment guidance plan with the necessary resources, such as funds, personnel, and facilities, and establish work rules and procedures to ensure the effectiveness of employment guidance activities; (4) Check and feedback (C): Dynamically monitor the quality of employment guidance work, establish a ledger, analyze problems timely, and provide a basis for improvement in the next round of the PDCA cycle; (5) Action quality analysis and improvement (A): summarize the results according to the employment rate and other indicators, identify the existing problems and deficiencies, put forward improvement directions, and optimize the employment guidance management mode[19].

5.Study Limitations

This study has certain limitations. First, data were collected only from the Yangtze River Delta region (Shanghai, Jiangsu, Zhejiang, and Anhui), which may limit the generalizability of the findings. Future research should consider broader geographic coverage. Second, although the questionnaire was pre-tested and referenced validated instruments, it was self-designed and requires further validation in larger, more diverse samples.

6.Conclusions

In this study, few public health postgraduates hold a positive view of current employment prospects, with higher income levels associated with lower satisfaction. Graduates from the "Five Major Disciplines of Public Health" and those completing their studies in or after 2021 demonstrated higher levels of satisfaction with the public health industry. These findings support the application of the PDCA model in employment guidance, emphasizing the need to strengthen career services, develop digital employment platforms, and cultivate interdisciplinary talent through systematic planning and support.

Acknowledgments

The authors thank all participants of the study. The authors also express their gratitude for the generous support of the Zhejiang Province Youth and Youth Work Research Project.

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