

## SELF-RATED PHYSICAL AND MENTAL HEALTH OF COMMUNITY WORKERS DURING THE COVID-19 OUTBREAK IN CHINA: A CROSS-SECTIONAL STUDY

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### ABSTRACT

**Introduction:** The COVID-19 has become a global pandemic and impacts the mental and physical health of all people in the world. In China, the community workers played an important role in the combat against COVID-19. This study aimed to investigate the self-rated physical and mental health of community workers during the COVID-19 outbreak in China, and identify factors associated with differences in self-rated health.

**Materials and methods:** From February 29 to March 27, 2020, an online questionnaire of 12 items Short Form Health Survey was used to investigate the physical and mental health of 702 community workers from Jiangsu Province. The data on working characteristics, social support, Stress Appraisal Measure and socio-demographic variables were collected as well. Multiple linear regression models were fitted to identify predictors of self-rated health among the community workers.

**Results:** The community workers had poorer self-rated physical health, but better self-rated mental health compared to the residents of other places in China. The participants with higher level of education, working in a community with more population, having thought of seeking for help, having more working pressure sources, and having higher Stress Appraisal Measure scores had worse self-rated physical health, while the participants being community work administrators, wearing not disposable protective equipment, having thought of seeking for help, reporting more total working hours since COVID-19 outbreak, reporting more working pressure sources, and having higher Stress Appraisal Measure score had worse self-rated mental health.

**Conclusion:** COVID-19 had great impact on community workers' physical health, but limited on mental health. The associated factors of physical and mental health may have practical implications for public health emergency-associated physical and mental health services planning and implementation.

**Keywords:** COVID-19, china, community worker, physical health, mental health, SF-12.

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### Introduction

In mid-December 2019, Coronavirus 2019 was first detected in Wuhan, China, and then spread rapidly throughout the country<sup>(1)</sup>. In order to effectively control the epidemic, from January 23 to 29, all provinces, autonomous regions, and municipalities in mainland China successively announced the implementation of the First Level emergency response (the highest level). As one of the strategies, the social isolation policy was implemented, which encouraged people to stay at home and avoid social gathering<sup>(2)</sup>. All areas of the country implemented

closed management of urban communities and rural villages, set up inspection and registration system, and measured temperatures on both entry and exit. The residents followed the call for self-isolation, and community workers took the responsibility to provide essential goods. Community-based management was a key factor for curbing the spread of the virus. As an extension of governance for social management, four million community workers, together with volunteers, visited 650,000 urban and rural communities across the country to communicate epidemic prevention knowledge and offered psychological counseling and helped households receive daily

necessities. They helped provide dragnet screening of potential virus carriers, made sure every corner was disinfected and helped millions of households with difficulties in making a living.

The potential associations between COVID-19 outbreak and decline in both mental and physical health were well documented. Anxiety, depression, distress, acute stress, and COVID-19-related fear were reported in China and other countries, and these symptoms not only appeared in health-care workers<sup>(3-5)</sup>, but also in general population<sup>(6, 7)</sup>, children, adolescents<sup>(8)</sup> and students<sup>(9)</sup>. The physical impact of COVID-19 on elderly people were sleep disorders, joint pain, loss of appetite, weight loss, reduced functional capacity<sup>(10)</sup>; The impact on students were greater energy intake and less physical activity<sup>(11)</sup>; while fever, cough, weakness, skin damage<sup>(11)</sup> were commonly identified among the health-care workers. However, although the impact of the COVID-19 outbreak on mental and physical health among healthcare workers and the general population have been widely documented in the literature, little is known about the self-rated mental and physical health of community workers who were working in the frontline in China.

Scholars have noticed that people's mental and physical health was affected during the epidemic, especially medical staff and ordinary residents, but our team believed that in addition to medical staff and general population, the health status of community workers should also be paid attention to. The reason was that, in China, the community workers took a heavy and risky task, and beard great physical and psychological pressure. They were not only responsible for the residents' daily necessities guarantee, but also for the community epidemic prevention. Especially in the early stage of the epidemic when all kinds of protective materials were in short supply, they needed to face the risk of being infected during work. Due in part to a lack of baseline data, less is known about the factors that may predict negative mental and physical health consequences among community workers in China. Because of this, opportunities for intervention by emergency management, public health, and healthcare authorities that may protect community workers from these health impacts remains limited. This study intended to describe physical and mental health of community workers, and explore the associated factors of health, and then provide implications for public health emergency-associated physical and mental health services planning and implementation.

In this study, we used the Short Form-12 (SF-12) to evaluate the physical and mental component summary scores of community workers in China. SF-12 is a highly valid and reliable psychometric instrument used to assess the self-rated physical and mental health of populations in US<sup>(13, 14)</sup>, and it was also universally used in China and other counties<sup>(15-18)</sup>.

In spite of SF-12 has been widely utilized all over the world to assess the health of populations, it has not been used in the study of frontline community workers in the times of COVID-19. Given the proven validity and reliability of SF-12, it can be used to more accurately assess the health impact of COVID-19 among community workers, and to guide the provision of targeted interventions. To our knowledge, this is the first study to use SF-12 to assess the self-rated health of community workers in China.

## Methods

### *Study design and study population*

This was a cross-sectional study conducted from February 29 to March 27, 2020. Our target population was the community workers who involved in community management and service during COVID-19 outbreak, including community work administrator (i.e. the village head or the director of the residents committee) and staff, property management staff, government functionary, volunteers and so on. *Eligible participants were:*

- 18 years or older;
- Engaged in front-line work of epidemic prevention and control in community;
- Voluntary participation in this study.

### *Procedure*

We designed a questionnaire and uploaded it to an online survey platform ("Survey Star", Changsha Ranxing Information Technology Co. Ltd, Changsha, China), then a QR code was generated. We used convenient sampling and snowball sampling methods to recruit participants. We sent the QR code to community workers of Jiangsu Province, and invited them to forward it to their colleagues or other workers engaged in community epidemic prevention and control via mobile phone.

This study was approved by Human Research Ethics Committee of the Affiliated Hospital of Xuzhou Medical University and written informed consent was obtained from all subjects (XY-FY2020-KL038-01).

## Measures

Our questionnaire included 5 parts:

- Demographic information: age, gender, educational level, monthly income, marital status, occupation.
- Working characteristics during COVID-19 outbreak: the number of days off per week, working hours per day, work shift, community population, numbers of COVID-19 infections in the community, types and utilization of protective equipment, sources of knowledge on COVID-19, sources of working pressure, whether to seek help and the kind of help.
- Social support sources and extent: several possible social support sources were listed, such as spouse, parents, children, siblings and so on. The social support extent was scored on 4-point Likert scales, ranging from 1(No support) to 4 (full support).
- Stress appraisal measure (SAM): the scale was invented by Peacock, introduced into China and sinicized by Xue. It contains 28 items (19). The scale uses Likert 5-point scoring (0~4), which means "no", "a little", "general", "relatively more", and "quite a lot" or "completely disagree", "not quite agree", "not sure", "comparatively agree" and "completely agree". "0" means "no"/"completely disagree", "4" means "very much"/"completely agree". The overall Cronbach's  $\alpha$  coefficient of SAM was 0.678. The construct validity test showed that the six factors were moderately correlated, and the correlation coefficient ranged from 0.262 to 0.743. With the exception of few items, the SAM was significantly correlated with the Internal-External Locus of Control Scale, Symptom Check List 90, and the Positive and Negative Affect Scale.
- SF-12: SF-12 (12-items Short Form Health Survey) contains 12 items. It has 8 dimensions: General Health (GH), Physical Functioning (PF), Role Physical (RP), Bodily Pain (BP), Vitality (VT), Social Functioning (SF), Role Emotional (RE), and Mental Health (MH). The Physical Component Summary (PCS) is the sum of GH, PF, RP and BP. The Mental Component Summary (MCS) is the sum of SF, RE, MH and VT. Using a standard scoring method, of which details can be referred to a professional book (20), we can calculate the standard score of PCS and MCS. The standardized score ranges from 0~100 (20). The higher score means the better health.

## Statistical analysis

Data analysis was performed using SPSS (Statistical Package for the Social Science) 18.0. Frequencies, percentages, means, standard deviations

and quartile were used to describe the demographic variables, working related variables, social support, SAM score and PCS and MCS score. Multiple stepwise regression analysis was conducted to examine factors associated with the PCS and MCS.

The PCS and MCS score were the dependent variables, the demographic variables, working related variables, social support score and SAM score were the independent variables. After univariate analysis (T test, ANOVA, Non-parametric Test), variables with statistical differences ( $P < 0.05$ ) were considered to be included in multiple stepwise regression analysis (Backward stepwise,  $\alpha_{in} = 0.10$ ,  $\alpha_{out} = 0.15$ ).

## Results

### Participant characteristics

A total of 702 community workers participated in this study. 302 (43.0%) were males and 400 (57.0%) were females. The mean age was 33.78 years old ( $SD = 8.93$ ), with a range from 18 to 65 years old. 89.5% of the participants had a college or undergraduate degree. 43.0% of the participants' monthly income was 3001~6000 CNY. 70.7% of the participants were married. 4.8% of the participants were community work administrators.

### Working conditions during COVID-19 outbreak

The working hours on weekdays ranged from 1 to 24 hours, and the median working hours were 8 (IQR 6-10); since the COVID-19 outbreak, the cumulative working days ranged from 1 to 100 days, and the median working days were 30 (IQR 19-36); those with night shifts had 1 to 7 night shifts per week, and the median night shifts were 2.5 (IQR 2-3); the number of community's epidemic prevention and control workers ranged from 0 to 1400, and the median number was 10 (IQR 6-20).

The most commonly used protective item was medical surgical masks, accounted for 67.0%. 72.6% of the participants' protective items were provided by the government. 80.9% of participants wore one mask for more than 4 hours. Internet was the most common source of knowledge (89.2%).

The top three stresses of participants were: worrying about infecting family members after work (75.5%), worrying about being infected (71.2%), and resident's not cooperating (67.2%). 37.3% of the participants had thought about asking for help, and the top two demanded help were knowledge on COVID-19 prevention (74.8%) and data on COVID-19

spread (65.6%). In addition, 58% and 51% of the subjects, respectively, had needs for knowledge of evaluating their physical and mental health. More details were listed in Table 1.

Characteristics	n	%
The average number of days off per week during COVID-19 outbreak		
None	312	44.4
1	122	17.4
2	122	17.4
≥3	146	20.8
Work shift		
Day shift	472	67.2
Night shift	14	2.0
Day shift and night shift	216	30.8
Community population		
Less than 10,000	584	83.2
10,001–30,000	82	11.7
More than 30,000	36	5.1
COVID-19 infections in community		
Yes	14	2.0
No	688	98.0
Protective equipment used (multiple choices)		
Medical surgical masks	470	67.0
PE Glove	310	44.2
Monolayer mask	216	30.8
N95/N99 mask	178	25.4
Surgical gloves	140	19.9
Goggle	138	19.7
Multi-layer cotton mask	84	12.0
Protective mask	76	10.8
Isolation gown	70	10.0
Others	12	1.7
Source of protective goods (multiple choices)		
Government provided	510	72.6
Self-bought	358	51.0
Donation	166	23.6
Others	10	1.4
The frequency of changing a mask		
≤4 hours	134	19.1
>4 hours	568	80.9
Knowledge sources during COVID-19 outbreak (multiple choices)		
Internet	626	89.2
TV	470	67.0
Unified learning within the workplace	332	47.3
Broadcast	286	40.7
Family members	150	21.4
Medical staff	120	17.1
Others	12	1.7
Sources of working pressure during COVID-19 outbreak (multiple choices)		
Worrying about infecting family members after work	530	75.5
Worrying about being infected	500	71.2
Resident's not cooperating	472	67.2
Tired/ Lack of sleep	356	50.7
Higher authorities (Inspection, filling forms, writing reports, taking pictures, etc.)	282	40.2
Helpless (No support, no protective clothing and masks, etc.)	188	26.8
Others	12	1.7
Have you ever thought about seeking for help during COVID-19 outbreak		
Yes	262	37.3
No	440	62.7
If yes, what kind of help do you want to get (n=262, multiple choices)		
Knowledge on COVID-19 prevention	196	74.8
Data on COVID-19 spread	172	65.6
Knowledge on evaluating physical health	152	58.0
Knowledge on evaluating mental health	134	51.1
Knowledge on keeping healthy	106	40.5
Others	14	5.3

**Table 1:** Working characteristics during COVID-19 outbreak (N=702).

### Social support

The mean score of social support was 38.94 (SD=9.34), with a range from 12 to 48. Among the sources of social support, the three with the highest percentage of “full support” were parents (78.3%) and spouse (74.9%), and the Party and Youth League organizations/labor union (64.7%).

### Stress appraisal measure

The medium SAM score was 44 (IQR 35-53), with a range from 0 to 75.

### Predictors of MCS and PCS

The mean score of PCS was 48.20 (SD=10.02); the mean score of MCS was 55.98 (SD= 10.55). A higher PCS was associated with being a community work administrator, wearing more protective goods and having more knowledge sources during COVID-19 outbreak, while a lower PCS was associated with a higher level of education, more community population, having the thought of seeking for help during COVID-19 outbreak, more working pressure sources during COVID-19 outbreak, and higher SAM score. A higher MCS was associated with being male, more days off each week, more knowledge sources during COVID-19 outbreak, and higher social support score, while a lower MCS was associated with being a community work administrator, wearing not disposable protective equipment, having thought of seeking for help, more total working hours since COVID-19 outbreak, more working pressure sources, and higher SAM score. More details can be seen in Table 2.

### Discussion

Our results showed that the community workers have poorer PCS but better MCS compared to the general population in Hangzhou, Chengdu, Hong Kong and Australia<sup>(21-24)</sup>.

The reason for the poorer PCS of community workers may be that they undertake heavy physical labor and don't get enough rest. During the period of Level I emergency response, the community workers not only need to assist in implementing social isolation policies, measure body temperature at entrances and exits, provide necessities for residents, they also need to provide preventive knowledge and psychological assistance to residents, therefore, nearly half of the participants worked seven days a week, and have worked continuously for 30 days. Compared with the physical impact of COVID-19, its psycho-

logical impact may be smaller. This may stem from the initial control of COVID-19. The Jiangsu Provincial Government adjusted the Level emergency response to Level II at 24:00 on February 24, 2020, while this study started on February 29, 2020.

At this time, Jiangsu Province reported a total of 631 confirmed cases of COVID-19 infections and no new infections for 5 consecutive days. This means that the previous prevention and control measures were effective, which to a certain extent affirmed the efforts of community workers. In addition, 98% of the participants did not work in a community with COVID-19 infections during outbreak, so COVID-19 outbreak may have limited effect on community worker's mental health. In addition, 98% of the participants during the outbreak had not worked in a community with people infected with COVID-19.

We found that three variables: number of stress sources, the idea of seeking for help, and SAM scores were negative predict factors of PCS and MCS score, and social support was positive predict factor of MCS score. This was consistent with the stress process model which was verified in former studies<sup>(25, 26)</sup>. The stress process model believes that event as a source of stress, under the influence of various factors such as individual cognition, coping styles, and social support, will cause the body to produce stress responses including physical, psychological and behavioral responses, which ultimately affect individual's health<sup>(27)</sup>. In this study, COVID-19 outbreak was a stressor, and caused a series of stress responses in community workers, including concerns about the health of themselves and their family members, pressure from higher-level authorities, and physical fatigue, these responses ultimately affected the physical and mental health of community workers. Therefore, providing necessary support for community workers may help improve their physical and mental health. The support should include ways to cope with stressors, more social support from family members, adequate protective items and other required support.

Our result showed that participants with more sources of knowledge had a better PCS and MCS. Zhong believed that health education programs aiming at improving COVID-19 knowledge were helpful for Chinese residents to hold optimistic attitudes and maintain appropriate practices<sup>(28)</sup>. Community workers were a special group in the fight against COVID-19. They did not have professional medical knowledge, but they were at risk of infection at work, so in order to protect their health, we should design and provide targeted health education to community workers, especially the knowledge of COVID-19 prevention, data on COVID-19 spread, and knowledge on evaluating physical and mental health. We also found an interesting phenomenon that the social

Variables	PCS Score		MCS Score	
	β (95%CI)	p	β (95%CI)	p
Gender	-			
Female			Ref	
Male			2.589 (1.198,3.980)	<0.01
Education Level			-	
Secondary school and below	Ref			
College or undergraduate and above	-1.825 (-4.173,0.523)	0.127		
Monthly income (Per advanced grade)	-		NS	
Marital status	-		-	
Married				
Single				
Occupation				
Others	Ref		Ref	
Community work administrator	6.248 (2.927,9.569)	<0.01	-3.301 (-6.503,-0.099)	0.043
Years of working (Per advanced grade)	-		NS	
The average number of day(s) off per week during COVID-19 outbreak(Per advanced grade)	-		1.954 (1.174, 2.734)	<0.01
Work shift	-		NS	
Day shift				
Night shift				
Day shift and night shift				
Community population (Per advanced grade)	-2.121 (-3.494,-0.748)	0.003	NS	
COVID-19 infections in community	-		-	
No				
Yes				
The frequency of changing a mask	-		NS	
≤4 hours				
>4 hours				
Whether all protective equipment was disposable	-			
Yes			Ref	
No			-1.272 (-2.730, 0.186)	0.087
Have you ever thought about seeking for help during COVID-19 outbreak				
No	Ref		Ref	
Yes	-3.114 (-4.675,-1.552)	<0.01	-2.339 (-3.814,-0.865)	0.002
Age	-		NS	
Total working hours since COVID-19 outbreak	-		-0.005 (-0.010, 0.001)	0.084
Number of protective goods	1.036 (0.556,1.516)	<0.01	-	
Number of knowledge sources during COVID-19 outbreak	0.563 (0.103,1.023)	0.017	0.505 (0.066, 0.944)	0.024
Number of working pressure sources during COVID-19 outbreak	-0.388 (-0.838,0.063)	0.091	-1.009 (-1.468,-0.550)	<0.01
Social support score	NS		0.171 (0.096, 0.246)	<0.01
SAM score	-0.073 (-0.125, -0.022)	0.005	-0.102 (-0.151,-0.054)	<0.01

**Table 2:** Result of multiple stepwise regression analysis of MCS/PCS on predictor variables (N=702,  $\alpha_{in}=0.10$ ,  $\alpha_{out}=0.15$ ).

Ref: Reference, CI: Confidence Interval, NS: Not significant in the multivariate analysis, -: Variables were not significant in the univariate analysis.

work administrator identity was a positive predictive factor to PCS but a negative predictive factor to MCS. The community work administrators undertook the task of community's COVID-19 prevention and control, and bore greater responsibility than other community workers, so their mental stress may be greater. But as they are administrator, they may have stronger sense of self-efficacy and responsibility which will stimulate their potential and made them feel better. Furthermore, all people in China have noticed the importance of community work, making it more meaningful and challenging, which may also promote their physical health to a certain extent. Our study has several limitations.

First, the purposive sampling was limited to one province of China, therefore, the health status and associated factors of community workers might be biased and are not transferable to those who worked in other areas. Second, we collected information using a self-reported on-line questionnaire, which can be a source of bias. Finally, this study was conducted from the end of February to March 2020, when COVID-19 was generally considered to be under control in China, so our study has no way to ascertain the health status and associated factors of community workers at the onset or peak period of COVID-19 outbreak.

## Conclusion

COVID-19 had great impact on community workers' physical health, but limited on mental health. In order to promote the physical health of the community workers, we should pay more attention to those people with higher level of education, working in a community with more population, having thought of seeking for help, having more working pressure sources and having higher SAM scores, while those community workers being community work administrators, wearing not disposable protective equipment, having thought of seeking for help, reporting more total working hours since COVID-19 outbreak, reporting more working pressure sources and having higher SAM scores deserve attention for their mental health.

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