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Characterize health and economic vulnerabilities of workers to control the emergence of COVID-19 in an industrial zone in Vietnam



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ABSTRACT

The detection of first COVID-19 infected industrial worker in Vietnam on 13 April 2020 prompted timely effort to examine the health problems, behaviors, and health services access of industrial workers to inform effective and appropriate COVID-19 control measures, minimizing the risk of industrial sites becoming the next disease cluster. A search strategy involving search terms corresponding to 'health', 'industrial worker', and 'Vietnam' was applied to search for related papers published in English on Web of Science, PubMed, and Google Scholar. Duplicates were removed, and relevant data were extracted from the full text of remaining publications. Results showed that underlying health problems, including respiratory system problems, were common among industrial workers. Many suffered occupational diseases and/or work-related injuries. Self-treatment (without medication) was the most used method when having health problems (by 28.2–51% of participants), followed by visiting commune health centers (24%) and self-medication (20.3%). Findings suggest a high risk of disease spreading among industrial workers and of them suffering more severe conditions when infected. Economic vulnerabilities may be the reason for workers' reluctance to taking time off work to attend hospital/clinic. These imply a need for involving local pharmacies, commune health centers, traditional health providers or village health collaborators as local health gatekeepers who are the first point of detecting and reporting of suspected COVID-19 cases, as well as a channel where accurate information regarding COVID-19, protective equipment, and intervention packages can be delivered. Having COVID-19 testing centers at or near industrial sites are also recommended.

1. Introduction

On 13 April 2020, Vietnam reported the COVID-19 case numbered 262, a twenty-six years old man who works for Samsung Display Company at the Samsung industrial site in Bac Ninh Province of Vietnam (Vietnam Ministry of Health, 2020). This is the first case of an infected industrial worker confirmed in Vietnam. Moreover, tracing of travel and contact history of the patient showed that he has continued to go work during the period of 31 March to 6 April while experiencing mild COVID-19 symptoms, travelling by company bus and being in

close contact with at least 100 people, mostly at the workplace (Thanh Nam, 2020). Given the crowded nature of industrial factories with workers travelling to work on packed company bus from various locations in a region - the 262 patient lives in Ha Loi, Me Linh, Hanoi and likely infected by his relative, who is a confirmed case living in the same village (Vietnam Ministry of Health, 2020), with the detection of this case in Vietnam, industrial sites present a risk of becoming the next disease cluster. This indicates the need for timely efforts to examine the characteristics of health status, health-related behaviors, and health services access of industrial workers, a vulnerable population, such that

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Table 1
Review of health problems, health-related behaviors and health service access among industrial workers in Vietnam.

No	Study	Subject	Health problem	Health-related behaviors/knowledge	Health services access
1	(Tuyen et al., 2019)	Women aged 40 and above and are working at 4 textile enterprises in Vietnam		<ul style="list-style-type: none"> 17.4% used contraceptive or hormonal drugs 54.1% was lacked information about breast self-examination 15.8% had sufficient practice on BSE (self-reporting) 	
2	(Tran et al., 2019b)	3 industrial areas in Hanoi and Bac Ninh	<ul style="list-style-type: none"> 84.2% had acute or chronic conditions 	<ul style="list-style-type: none"> 85.5% was never smoked 16.6% had hazardous drinking status 15.7% had binge drinking status 42.6% used condoms when they had sex with their spouse/intimate partners in their last sexual intercourse Prevalence of using condoms in their last sexual intercourse with sex workers, casual partners without receiving money, and casual partners were 38.3%, 39.3%, and 43.9%, respectively 	45.0% had used reproductive health services
3	(Tran et al., 2019a)	4 industrial areas in Hanoi and Bac Ninh		<ul style="list-style-type: none"> The mean breast cancer knowledge score was 6.9 (SD = 5.1) (Score Ranged from 0 to 18) The mean cervical cancer knowledge score was 7.9 (SD = 5.0) (Score Ranged from 0 to 19) 	Participants often found health information via medical staff (50.0%), followed by the internet (49.3%) and social media (47.9%).
4	(Tran et al., 2019c)	3 industrial areas in Hanoi and Bac Ninh	<ul style="list-style-type: none"> Average number of health problems was 1.9 The prevalence of depression was 38.6%, mean PHQ9 score in depression group was 9.1 	<ul style="list-style-type: none"> The average working hours per day of the participants was 8, the average years of experience was 10 76.7% exposed with noise 57.7% exposed with high temperature 50.2% exposed with dust 35.8% exposed with toxic chemicals 37.6% exposed with toxic gas Average number of health hazards exposure at work was 2 13.8% smoked 13.7% had hazardous drinking status 13.8% smoked 13.7% had hazardous drinking status 50.8% workers had more than 60 min working in one posture 	
5	(Pham et al., 2019)	3 industrial areas in Hanoi and Bac Ninh	<ul style="list-style-type: none"> The mean EQ-5D index was 0.74 (SD = 0.21) The average number of health problems in our sample was 1.91 (SD = 1.63) problems. 		
6	(Le et al., 2018)	female workers aged 18–49-years-old in four industrial zones in Hanoi, Da Nang, Ho Chi Minh city and Binh Duong	32.1% of female migrants reported having reproductive tract infections/problems/symptoms		Prevalence with health insurance cards accounted for 97.84% in Hanoi, 99.62% in Da Nang, 99% in HCM city and 80.75% in Binh Duong
7	(Quynh Nguyen et al., 2017)	Workers in Chi Linh, Hai Duong, Province, Vietnam	<ul style="list-style-type: none"> 15.5% had musculoskeletal disease in last 12 month 28.5% had headache in last 3 months 		<ul style="list-style-type: none"> 47.5% used self-treatment at least one time within 12 months 59.8% of respondents have health insurance 64.0% had a health care insurance Average call on hotline was 2 times/person The maximum re-call number was four times The main topics of hotline consultations were STDs/sexually transmitted infections (STIs) and HIV/AIDS prevention, modern contraceptives, information about health services providers, and menstruation issues
8	(Vu et al., 2016)	female workers in industrial zones in Long Bien, Hanoi with intervention including hotline, sending communications via short message service (SMS), and a map of health services providers			<ul style="list-style-type: none"> Most of the participants found the SMS service and content useful or very useful, 85% and 88%, respectively

(continued on next page)

Table 1 (continued)

No	Study	Subject	Health problem	Health-related behaviors/knowledge	Health services access
9	(Tran et al., 2016)	female workers in a seafood processing factory in Vietnam	<ul style="list-style-type: none"> 77.7% female workers experienced after-shift musculoskeletal disorder symptoms in at least one body part the proportion of pain: hips and lower extremities (53.3%), shoulders and upper extremities (42.6%) and neck (41.1%) Frequency of accidents at 167/1000000 h of working, risk factor at 4.49 Workers had sleep disturbances and stress/family tension 	<ul style="list-style-type: none"> 22.3% had to work seven days per week 73.9% had to work more than 8hr per day 	<ul style="list-style-type: none"> Most useful topics in the booklet and map were cost of services (31%), location of health care centers (26%), and contraceptive methods (22%)
10	(Ramasingam et al., 2012)	workers from furniture-manufacturing companies in Vietnam	<ul style="list-style-type: none"> 25.4% had reproductive tract infections symptoms (e.g. abnormal vaginal discharge, vaginal itching, and genital wart/ulcer) in the previous 6 months 		
11	(Kim le et al., 2012)	female migrant workers in industrial zones in Ha Noi			
12	(Marucci-Wellman et al., 2010)	Workplaces in Xuan Tien Commune - industrial zone	<ul style="list-style-type: none"> Incident rate of work-related injuries was 516/1,000 (95% CI = 506 to 610) 89% had to stop normal activities after injuries 		<ul style="list-style-type: none"> 78.7% had a health care insurance 21.6% sought health care at a health center 37.8% self-treatment (i.e. washing their genital area with feminine hygiene fluid) 20.3% self-medication 16.2% did nothing 11% were treated at a hospital, 24% at the commune health station 3% by a private physician 4% by a traditional healer 51% reported self-treating 9.2% not treated at all 28.2% self-treatment at home 6.3% used traditional treatment 13.6% visited commune health center 28.2% visited district hospital 11.7% visited province hospital 2.8% visited central hospital 80% paid out-of-pocket
13	(Phung et al., 2008)	workers from 4 provinces: Hai Duong, Hung Yen, Thua Thien Hue, Long An	<ul style="list-style-type: none"> Incident rate of work-related injuries for nationwide areas was 7.01 cases/1,000 Formal workers at factories were more likely to have work-related injuries, RR = 1.456 		
14	(Chia et al., 2007)	workers from a PVC lead stabilizer factory in Singaporeworkers from a battery factory in Hai Phong City, Vietnam	<ul style="list-style-type: none"> Vietnamese workers had blood lead (toxic) level at 20.6 ± 1.9 meg/dL (twice as normal) 	<ul style="list-style-type: none"> 49.8% smoking 32.2% drinking regularly 	
15	(Chien et al., 2002)	Workers in a Vietnamese Refractory Brick Facility	<ul style="list-style-type: none"> High prevalence of respiratory system problem: cough (43%) and shortness of breath (40%) The prevalence of chest radiograph abnormalities was 9.6% 	<ul style="list-style-type: none"> 19.9% current smoker 8.7% former smoker 	
16	(Matsuda et al., 1997)	ten factories in Ho Chi Minh City and Hanoi	<ul style="list-style-type: none"> Prevalence of subjective fatigue complaints significantly increased after work 30.0% female workers had irregularity of menstruation. 	<ul style="list-style-type: none"> The overall average working time was 8.6 hrs; the longest being 10.2 hrs Over 50% of workers were exposed to heat, dust and noise 	
17	(Matsuda, 1996)	Factory workers in Vietnam	<ul style="list-style-type: none"> Cumulative number of occupational diseases (by the end of 1994): Silicosis 6507; Asbestosis 1; Tuberculosis 13; Noise induced hearing loss 840; Lead poisoning 60; Mercury poisoning 6; Others 68 Occupational accidents in 1993: Fatal accidents 212; Deceased workers 231 		

effective and appropriate COVID-19 control measures would be established. We believe that these informed measures would not only be critical to minimize the threat of cluster transmission in a Vietnamese industrial zone but also provide useful insights and suggestions for similar settings elsewhere.

2. Materials and methods

For evidence on health problems, behaviors, and healthcare access of industrial workers in Vietnam, we conducted a review of relevant literature. We first applied a search strategy which involves a series of search terms that correspond to 'health', 'industrial worker' and 'Vietnam' combined using Boolean operator 'OR' to search for related papers published in English, on three databases of Web of Science, PubMed and Google Scholar (Table A.1). The articles from these three sources were then extracted and imported to EndNote software for duplicates removal. Screening of titles and abstracts of the combined list of papers were then conducted by two independent researchers and papers not directly relevant to the topic interested be removed. Finally, we examined the full text of remaining articles and extracted information regarding author name, year of publication, characteristics of research subjects including their health problems, risky/ protective health behaviors as well as healthcare access.

3. Results

Main findings are presented in Table 1. The result showed that underlying health problems were common among industrial workers (Pham et al., 2019; Tran et al., 2019b; Tran et al., 2019c), with many suffering occupational diseases (Quynh Nguyen et al., 2017; Tran et al., 2016) and/or work-related injuries (Marucci-Wellman et al., 2010; Phung et al., 2008; Ratnasingam et al., 2012). A high prevalence of respiratory system problems was also reported (Chien et al., 2002). Self-treatment (without medication) was found to be the most used method when having health problems (by 28.2–51% of participants), followed by visiting commune health centers (24%) and self-medication (20.3%). Health-related information was usually obtained through medical staff and online sources (Tuyen et al., 2019).

4. Discussion

Our rapid review of published papers on health problems, behaviors, and health services access of industrial workers indicated a high prevalence of underlying acute and chronic health issues, of which many are work-related, in this population. Industrial workers thus can be considered a vulnerable population, at higher risk of suffering more severe COVID-19 conditions should they get infected, as reports found the disease likely to develop complications on people with underlying health problems (Centers for Disease and Control Prevention, 2020). In terms of health services access, commune health stations and local pharmacies (for self-medication) appear to be first place industrial workers visit when having health problems, instead of hospitals or private clinics. In addition, a high proportion of workers who self-treated without medication possibly were practicing traditional and home remedies that are handed-down through older generations or from friends and relatives, a practice common among Vietnamese people. In the context of COVID-19, such behaviors can be considered risky. For example, an infected COVID-19 worker may confuse their mild symptoms with that of the common cold and continue to work, travel, and have close contact with other people while inappropriately self-medicated, increasing the risk of disease transmission and developing complications. This likely occurred in the case of patient numbered 262 when he continued working for a whole week while having cold-like symptoms. Our findings can also be considered reflecting the barriers to healthcare access faced by industrial workers due to their economic disadvantages. The reason a large proportion of workers studied in previous researches chose self-treatment or self-medication rather than taking time

off work and go to hospital/ clinic maybe their fear of having payment cut for the time not working, or even their concern of low performance evaluation (due to being off work) and being denied the opportunity of promotion and bonus. Afraid of having salary reduction, shift cut, or being laid off may also pressure industrial workers to continue going to work despite their possible worries about the safety of commuting to and working in factories amidst the COVID-19 outbreak.

Indeed, the risks of disease spreading can be amplified considering the typical features of industrial zones in Vietnam. Industrial sites are often clusters of factories that are usually located at or near a traffic hub of a region, which in normal time would ensure ease of transportation of materials and products as well as of workers commute. In times of disease spreading, however, this would mean a greater possibility of workers being in close contact with people from various regions when commuting to and from work or mingle around the areas. Workers at these industrial factories in many cases are from other locations in the province or other provinces who may come home after a shift or on the weekend, increasing the possibility of being in contact with an infected person or chance of them infect other people. Even without these travelling, the crowded nature of these factories would make having safe distance between workers during shift and at the end of workday challenging.

Appropriate and effective detection and control measures can be informed based on these understandings of vulnerabilities and behaviors of industrial workers as well as the characteristics of their workplace. Since the first COVID-19 case was detected in the country, in addition to restrictions on mobility and social gathering, centralized quarantine and aggressive contact tracing, there should be involvement of local pharmacies and commune health centers, as well as other unofficial health taskforces like traditional health providers or village health collaborators in detecting and reporting of suspected cases, such as people who buy cold medicine or come for home remedies advice. These local health 'gatekeepers' can also be utilized as points of delivery of accurate information regarding COVID-19, protective equipment, and intervention packages. Having testing centers at or near industrial sites can also be helpful to avoid unnecessary travelling of workers to have themselves tested. When mobility restrictions are gradually relaxed over time, it is crucial that travelling from and to industrial sites continued to be monitored closely and strict adherence to protective measures of people wearing masks and keeping safe distances.

5. Conclusions

With manufacturing worldwide being reduced and halted and uncertainty looming over the global economy as a result of COVID-19, industrial workers are faced with not only the risk of having the disease but also challenges to maintain their living. Measures that can effectively control the emergence of COVID-19 in industrial sites not only support the overall effort of combating the disease, but also help to protect this vulnerable population from more suffering in the future. The insights and recommendations provided by this study hopefully can also provide a timely reference to similar situations elsewhere in the world.

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Declaration of Competing Interest

None.

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Appendix

Table A1
Search strategy.

Concept	Search terms
health	health, well-being, vulnerability
industrial workers	industrial zone, industrial park, industrial worker*, worker
Vietnam	Vietnam, Viet-nam

In each concept, search term will be linked with each other by word “OR”, and we use the word “OR” to combine all the concept.

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