

PHILIPPINES STATISTICS AUTHORITY

Health in the Workplace: Examining the Contribution of Organizational Factors on the Occurrence of Musculoskeletal Diseases in the Philippines

NATIONAL CONVENTION ON STATISTICS

ROBELYN C. REVILLA

8/30/2019

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Robelyn C. Revilla

ABSTRACT

Objectives: Workplace has been well-established as one of the major factors that directly shaped the health, safety, and even health behavior of employees. Musculoskeletal diseases such as back pain, neck and shoulder pain, and leg pain, registers the greatest number of observed cases among workers. This paper aims to explore which workplace attributes are associated with the incidence of musculoskeletal disorders among Filipino workers. Many studies on the effects of the workplace on health in the Philippines are commonly done at the industry level or sector-specific which usually utilized a small-scale survey or selected companies.

Methods: The data used in this study came from the Integrated Survey on Labor and Employment (ISLE) 2015/2016. This survey was able to collect data from 9,894 establishments nationwide. There are six (6) organizational characteristics being tested as explanatory variables. The first two were related to the physical attribute of the establishment while the remaining four (4) were organizational practices. The main outcome measure is the occurrence of musculoskeletal disease which refers to those establishments with at least one (1) recorded case for the reference year.

Results: Using logistic regression model, the results showed that five out of six organizational factors are associated with the occurrence of musculoskeletal diseases in establishments. These are business classification, geographic location, conduct of annual physical exam, implementation of healthy lifestyle program, and ergonomics intervention.

Conclusions: This study highlights that despite the implementation of safety and health control measures/programs/interventions in the workplace, musculoskeletal diseases are still prevalent in the workplace. Further studies on a combined individual and organizational data to be able to have a more holistic picture of workplace health status are recommended.

INTRODUCTION

Right to work is just not enough; employers should also respect the right of every worker to have access to favorable working conditions. The Sustainable Development Goals (SDG) targets to provide not only protection of labor rights of every citizen but also to promote safe and secure working environments, inclusive for all even for migrant workers, women, and those working in precarious employment (International Labour Organization, 2019). Apart from ensuring individuals to have a sustainable income for a living, policy should focus also on promotion of healthy and fulfilling working environment. This would be essential as putting healthy workforce in the center of the development plans will end up to a more robust, inclusive, and poverty-reducing economy. Risky and hazardous workplace, however, clearly implies direct costs not just to the employees and affected families but to employers and the community as well.

Workplace has been well-established as one of the major factors that directly shaped the health, safety, and even health behaviors of the employees (Sorensen & Barbeau, 2008; Berkman, Kawachi, & Theorell, 2014). The link between worksites and health is clear and has been fully determined. In a much direct way, workers especially in manufacturing handling biochemical products and wastes such as asbestos, coal from mining, and cotton textile, have been reported to develop difficult-to-cure respiratory ailments (Barber & Fishwick 2019; Lai & Christian, 2013; Hosgood, 2012, Coggon & Taylor, 1998) and even cancer (Nynas et al., 2017). Workers having exposure to nature such as in agriculture are more prone to acquire dreadful infectious diseases such as schistosomiasis and other arthropod- or vector-borne diseases (Hibbs, 2011, Watts & El Katsha, 2010). Indirectly, prolonged exposure to work-related stress and being in sedentary activities such as excessive sitting as a work culture are known to lead to chronic diseases. Long-term exposure to stress affects one's mood and behavior and even damages organs and tissues leading to inability to cope up to such damages that would result to chronic diseases (Kivimaki & Steptoe, 2013).

In the Philippines, as of 2017, majority (70%) of the workers spend less than 48 hours a week in the workplace. This indicate that most of the businesses and establishments comply with the labor standards of requiring the workers to render services at least 40 to 48 hours (full time work) a week, still, according to the report on Decent Work Statistics - Philippines, one out of five full-time workers experience excessive hours of work, by the ILO standard, which is more than 48 hours in a week the workplace. Evidence show those long working hours (> 40 hours) poses serious threat to well-being (Virtanen et al., 2012). This risky condition is compounded also by the fact that not all companies and establishments implement safety control measures and health policies/programs in the workplace.

The extent on which how this non-compliant on labor standards has relation to prevalence of occupational diseases and injuries is not yet fully accounted. Much studies on the effects of the workplace on health in the Philippines is commonly done at the industry level or sector-specific which usually utilized a small-scale survey or selected companies as case in point (Lu, 2012, Lozano-Kuhne et al, 2012, Lu, 2008). This study describes the overall workplace health condition on a national scale using the latest released Integrated Survey on Labor and Employment (ISLE) for year 2015-2016. Moreover, this paper examines as well the contribution of the organizational factors to the occurrence of occupational disease specifically musculoskeletal diseases in the country.

REVIEW OF RELATED LITERATURE

Workplace and Health

Occupational safety and health is the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; it calls for the prevention of any impairment in the health and well-being of workers caused by their working conditions or work environment; OSH stands for the protection of workers from risks and hazards that could adversely affect their health and well-being and for their placement in an occupational environment adapted to his/her physiological ability (EO 307).

The type of work and the environment where one works affects the health outcome of the worker. Employee lifestyle and occupational health are two different approaches in analyzing health risks. Both have its own advantages and disadvantages but when combined provide holistic information on health (Robroek, 2011, Eakin et al., 1995). Another strategy to monitor employees' health in the workplace is to offer occupational health services through consultation with health workers and conduct of periodic exam (Plomp, 1996, Heikkila, 1979). Screening activities (i.e. blood tests), a common component of periodic exam, is a good way to identify health risks among employees (Mattke et al, 2013).

Exposure and Occupational Disease

Occupational disease is defined as an abnormal condition or disorder caused by exposure over a period of time to risk factors associated with work activity. It may develop in two ways either 1) as a result of an occupational accident/injury or 2) due to prolonged exposure to different hazards (Cantley et al., 2015, Lu, 2012, Fang, 2009, Lu, 2008). Although there are studies that failed to establish evidence of health hazards to low level chronic exposures to substances (Klein, 1976). The most common workplace hazards are ergonomic, physical, environment, chemical exposure, biological, etc. Usually, workers are confronted not only by one risk hazard but by combination of these which amplify health risks (Devereux et al., 2002, House et al, 1979)

There have been debates on what classifies as an occupational disease. This is important because some occupational injuries and diseases are compensable by the government. For an illness to be classified as work-related the cause should be established first. However, this is where the difficulty lies, there are illnesses that are related to the work but not solely attributable to work. This is why it was hard (in the early days) to consider certain diseases (such as occupational stress) as an illness (House et al, 1979).

Protective and Preventive Factors of Occupational Diseases

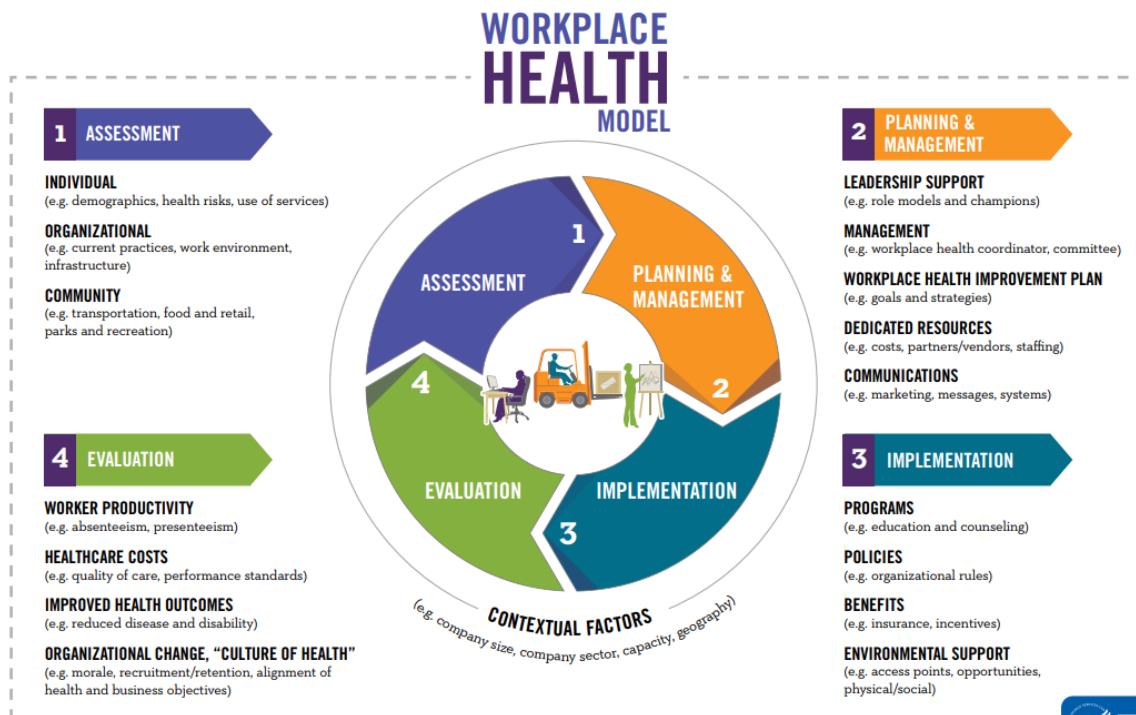
The law requires that every establishment should have a designated health officer. Their role is very important to ensure that the establishment complies with the standards set by the government for a safe and healthy workplace and to improve the health care in the workplace. Health officers can emanate from the health profession or can be trained and certified.

Ergonomics interventions are implemented to address or prevented the development of musculoskeletal disorder and occupational injury (Cantley et al., 2014, Jan-Erik, 1998). Though a company study conducted in Finland shows the result of an experiment which failed to prove the association/effectiveness of participatory ergonomics in preventing musculoskeletal disease (Haukka et al, 2008). Most ergonomic intervention studies describe workplace changes in the individual level; very few included organizational level adjustment in the analysis. It is has great potential and may provide better impact on the health outcome of workers (Wijk et al, 2011).

Ergonomics require company-wide participation. The senior management should champion the efforts and provide the appropriate support (Dixon et al., 2009). Both middle managers and rank and file employees contribute to the success of the change efforts (Punnett et al., 1974 Supplement 2009)

Knowledge Gaps

Only sector specific assessment of workplace health has been studied so far. There is scarcity in national level assessment of occupational health.



Source: Center for Disease Control and Prevention

The CDC Workplace Model provides a framework of how workplace health can be evaluated. It encompasses wide variety of factors that affects workers' health outcomes.

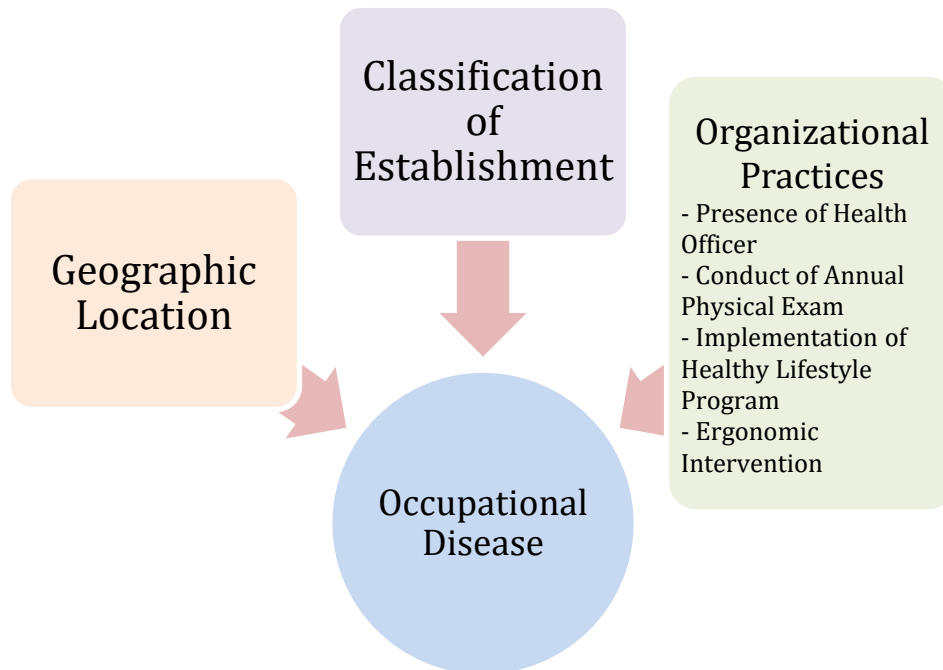
Objectives of the Study

As explained earlier, this paper generally examines factors or characteristics at establishment level that contribute to the occurrence of the musculoskeletal diseases particularly the commitment of the employers for a safe and secure working environment.

Specifically, this sought answers to the following questions:

1. What are the characteristics of the establishments/industries in the Philippines?
2. How and to what extent the organizational factors contribute to the incidence of musculoskeletal diseases in the country? In other words, what contextual factors are associated with musculoskeletal diseases?

The analytic strategy on how the following questions will be answered is framed on the conceptual framework formulated below:



The mix of the theory reviewed and given the limitation of the data for this survey, the six factors that were identified as those that are hypothesized to have strong linkage with dependent variable are location of the establishment, business classification, presence of health officer, conduct of annual physical exam, implementation of healthy lifestyle program, and ergonomic intervention. These factors are general in nature and are applicable across all industries unlike some health control measures that are sector specific (e.g. wearing of proper protective equipment/gear).

DATA AND METHODS

Data

The data used in this study came from the ISLE 2015/2016. This is a nationwide survey of establishments with at least 20 workers. It is a modular survey that covers different aspects of employment, labor standards, and labor relations. Two (2) of the modules under labor standards are the occupational safety and health (OSH) practices and occupational injuries and diseases (OID). This survey is a regular survey of the Philippine Statistics Authority conducted every two years. This survey is the only source of survey-based official OSH and OID statistics. One of the uses of ISLE is to provide inputs to studies on industry trends and practices, and bases for the formulation of labor policies.

This survey used a stratified sampling design with the industry serving as domain and employment size as stratum. Geographic locations of establishments were not considered as a stratification variable to give emphasis on detailed industry groupings. Therefore, estimates generated from this survey were only applicable to the national level. This survey was able to collect data from 9,894 establishments. All establishments were included in the analysis portion of this study.

Measures

Due to the limited availability of variables in the Philippine setting, this paper will only cover a part of the Workplace Health Model mentioned earlier.

Dependent variable. The dependent variable for this study is work-related musculoskeletal diseases. In ISLE, these refers to Carpal Tunnel Syndrome, Shoulder Tendinitis, Neck-shoulder pain, Back pain, and others that the establishment may identify. The variable of interest specifically is the occurrence of musculoskeletal diseases which is measured as either “present/with recorded case/s of musculoskeletal disease” or “absent/without”. *Present* refers to those establishments with at least one (1) recorded case of any musculoskeletal disease for the reference year otherwise *absent* if there is no recorded incident.

Independent variables. There are six (6) organizational characteristics being tested as explanatory variables. The first two were related to the physical attribute of the establishment while the remaining four (4) were organizational practices.

The survey utilized the Philippine Standard Geographic Code (PSGC) to indicate the location of the business. Since there are too many codes even for the bigger geographic groupings (by region), establishments were rather sorted into urban and rural based on their geographic code. For the industry variable, the survey used the Philippine Central Product Classification (PCPC) to categorize establishments by their economic activities and goods and services. For this study, establishments were re-classified into two (2) categories: 1) product or 2) non-product. Industries that produce by-products such as agriculture (raw materials), manufacturing, mining (oil, minerals, etc), and utilities (electricity, gas, water) belong to the first group. Then industries that provide services were grouped to be the second category. This is because establishments have varying degree of hazards depending on their sector. Workers of *non-product/service* businesses may encounter physical, psychological, and ergonomic hazards however employees of *product* enterprises face additional hazards (e.g. chemical and biological) on top of those mentioned previously in their daily operations.

The second group of independent variables refers to policies and programs implemented in the organization. These safety and health measures signify the commitment on the part of the management to improve workplace health. The law requires that every business should have a designated health officer to ensure the safety and wellness of the workers in the establishment. However, there are still some establishments that do not comply with these standards.

Each establishment was asked whether they implement/practice the following prevention/control measures/activities against health hazards: 1) annual physical exam, 2) healthy lifestyle program; and 3) ergonomics intervention. There are only two possible response for each item (Yes/No).

Statistical Analysis

The establishments included in this paper were characterized using descriptive statistics such as frequency distribution and mean and standard deviation. Using bivariate analysis, the relationship of each factor to the dependent variable was determined. The organizational factors that are associated to the occurrence of musculoskeletal diseases at establishment level are tested using logistic regression model.

RESULTS

Table 1 describes the select characteristics of the establishments that responded to the latest round of the ISLE 2015/2016. The survey was able to collect information from 9,894 establishments or industries of the whole country.

Almost two-thirds (64.5%) of the establishments are in urban areas. The urban areas here are composed of those in the National Capital Region and other highly urbanized cities (HUCs). According to business classification, majority of the establishments surveyed (70.5%) belong to the non-product group, meaning these establishments provide services instead of products and goods. Nine in ten (90.7%) establishments have a designated health officer in their workplace and four out of five (80.5%) establishments conduct annual physical examination for its employees. Nearly two-thirds (60.8%) claimed that they are implementing healthy lifestyle program; however, only a third of establishments have its own ergonomics program in place. Musculoskeletal diseases, as defined here in this study as presence or absence of such diseases in an establishment reported for the year 2015. Around 14.1 percent of establishments reported any incidence of musculoskeletal disease/s for that year.

Table 1. Profile of the Establishments surveyed by selected background characteristics, Philippines, 2015-2016

Variables	Percent (n=9,894)
Geographic Location	
Urban	64.5
Rural	35.5
Establishment's Category	
Product	29.5
Non-Product	70.5
Have a Designated Health Officer	
Yes	90.7
No	9.3
Conduct Annual Physical Examination (APE)	
Yes	80.5
No	19.5
Implement Healthy Lifestyle Program	
Yes	60.8
No	39.2
Ergonomics Intervention	
Yes	30.8
No	69.2
Occurrence of Musculoskeletal Disease	
Yes	14.1
No	85.9

Source: Philippine Statistics Authority, Integrated Survey on Labor and Employment, 2015/2016

Table 2 shows the bivariate relationship of the presence of work-related musculoskeletal diseases on the selected characteristics of the establishment such as geographic location, the business classification (whether it produces good or provides services) and the management programs (organizational factors).

By geographic location, there seems to be equal proportion of establishments with reported cases of musculoskeletal diseases whether urban or rural. The chi-square test of significance also verified the trivial difference.

By classification, there are more establishments that reported they have case/s of musculoskeletal disease in the product group than in the non-product group. By management practices, establishments that have a designated health officer, conducts annual physical exam of employees, instigates a healthy lifestyle program, and employs ergonomics program have higher proportion of reported cases of occupational disease than those establishment that do not have the specified programs.

Five out of six independent variables are associated with the dependent variable occurrence of musculoskeletal disease at 0.001 level of significance using chi-square test statistics.

Table 2. Bivariate Association between Occurrence of Work-Related Diseases in an establishment and selected background characteristics, Philippines, 2015-2016

Variable	Occurrence of Occupational Diseases		Total (n=9,889)	Sig.
	Yes	No		
<i>Geographic Location</i>				ns
Urban	14.4	85.6	100.0	
Rural	13.6	86.4	100.0	
<i>Establishment's Classification</i>				***
Product	20.4	79.7	100.0	
Non-Product	11.5	88.5	100.0	
<i>Have a Designated Health Officer</i>				***
Yes	14.7	85.3	100.0	***
No	8.9	91.1	100.0	
<i>Conduct Annual Physical Examination (APE)</i>				

Yes	15.4	84.6	100.0	***
No	8.7	91.3	100.0	
<i>Implement Healthy Lifestyle Program</i>				
Yes	16.6	83.4	100.0	***
No	10.3	89.7	100.0	
<i>Ergonomics Intervention</i>				
Yes	19.2	80.8	100.0	***
No	11.9	88.2	100.0	

Source: Philippine Statistics Authority, *Integrated Survey on Labor and Employment, 2015/2016*

Note: *** sig. at $P < 0.001$, ** $P < 0.05$, * $P < 0.1$

Three models using logistic regression were generated. The first model only contains the establishment's classification as the independent variable. The second model is an expansion of the first model that includes organizational characteristics and management practices. The third model is the full model. Across the three models, the establishment's classification is consistently significant. Location and some management practices are also significant in the two models. However, having a designated health officer in the establishment is not significant.

If the establishment is in the product category, the odds of recording a musculoskeletal disease is twice higher than non-product sectors holding all other variables constant. If the establishment is located in the urban areas, the odds of observing case of musculoskeletal disease is lower by 10 to 20 percent than if it is in the rural areas, holding all other variables constant. If the establishment conducts an annual physical exam of employees, the odds of logging a case increases by 40 percent, holding all other variables constant. If the establishment practices healthy lifestyle program, the odds of occurrence is higher by 50 percent, holding all other variables constant. If the establishment implemented an ergonomics program in the workplace, the odds is higher by 40 percent than those establishments that do not implement it, holding all other variables constant.

Table 3. Association between Occurrence of Work-Related Musculoskeletal Diseases in Establishments and selected Background Characteristics using Logistic Regression Model, ISLE, Philippines 2015-2016

Variable	Model 1		Model 2		Model 3 (Full)	
	OR	95 % CI	OR	95 % CI	OR	95 % CI
<i>Establishment's Classification</i>						
Product	2.0	[1.75, 2.20]***	2.0	[1.75, 2.23]***	2.0	[1.75, 2.23]***
Non-Product						
<i>Geographic Location</i>						
Urban			0.8	[0.75, 0.96]**	0.9	[0.75, 0.96]*
Rural						
<i>Conduct Annual Physical Examination (APE)</i>						
Yes			1.4	[1.21, 1.73]***	1.4	[1.17, 1.69]***
No						
<i>Implement Healthy Lifestyle Program</i>						
Yes			1.5	[1.27, 1.66]***	1.4	[1.25, 1.64]***
No						
<i>Ergonomics Intervention</i>						
Yes			1.4	[1.21, 1.56]***	1.4	[1.20, 1.55]***
No						
<i>Have a Designated Health Officer</i>						
Yes					1.2	[0.95, 1.56]
No						
No. of Observations	9,890		9,890		9,890	
Log Likelihood	-3965.0		-3893.4		-3892.2	
Hosmer- Lemeshow Chi-square	0.0		4.4		9.8	
Correctly Classified (%)	85.9		85.9		85.9	

Source: Philippine Statistics Authority, Integrated Survey on Labor and Employment, 2015/2016

Note: *** sig. at $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

DISCUSSIONS AND CONCLUSION

As discussed earlier in this paper, the objective of this study is to explore which workplace attributes are associated to the incidence of work-related musculoskeletal diseases. Six (6) characteristics of the establishment were examined. Two (2) were related to the establishment's operations (location and business classification) and the other four (4) were management/organizational policies and practices (health officer, annual physical exam, healthy lifestyle program, ergonomics program).

After running the logistic model for the dependent variable, the results confirmed some literature findings but contradict others. The type/classification of business expressed in the by-product of the establishment indicated that those that *produce* something have higher chance of observing a musculoskeletal disease than those establishments that provides *services*. This validates the findings that certain industries such as agriculture, manufacturing, mining etc., have higher hazard risk such as exposure to harmful elements combined with strenuous physical work. Establishments in urban areas have lower odds of occurrence because of the available medical facilities in cities. Conduct of annual physical exam is a good way to monitor the health status of workers. Development of workplace diseases can be detected through a series of medical tests and doctor's consultation.

The result for the variable of implementation of healthy lifestyle program in the establishment came as a surprise when it contradicted the expectation that healthy lifestyle programs prevent or improve health and wellness of individuals. However, in this case, we cannot assume the success of the program itself without looking at the participation of employees. The presence of the program alone is not sufficient to directly influence health outcomes but it is more of an enabling factor. Workers that practice healthy lifestyle (e.g. active, proper nutrition) have lower risk of developing an illness (Porter, 2003). Another point is that this form of lifestyle is very difficult to practice/maintain. Filipinos are amongst the least active population in the world (Althoff et al., 2017). Due to the limitation of the data, we cannot determine the rate of participation of employees in this kind of program for each enterprise since the survey only collect organizational level data.

The ergonomics intervention is another management program that contradicts the notion of improved employee wellness as it is designed to ensure ease of work processes and decrease risks/hazards. The model revealed greater chance of observing work-related musculoskeletal disease in establishments with this type of program. For this instance, we can assume that there may be other factors, at the employee level for example (same as in the healthy lifestyle program), that has greater impact on the health outcome of workers.

Unexpectedly, having a designated health officer in the establishment is not associated with the dependent variable. Theoretically, having experts and knowledgeable officers in the workplace should have a higher probability of detection of illness. However, the model indicates no association between the two. Difference in qualifications of the health officer, whether they are certified/licensed health professionals, trained or accredited, or simply a designation of position could potentially be a better predictor.

The surprising result may indicate a potential bias on the part of the establishment. Since the source of the data is from a self-reported questionnaire that is rather long and the module of OSH and OID is at the latter part of the questionnaire. There is a tendency to under report work-related illness due to response burden. Another possible reason for not reporting work-related illness is the fear of being tagged as a hazardous establishment that may be targeted by labor inspection. Time is also an important factor that was not included in the analysis. Since the survey

is cross-sectional, we cannot determine if the the occurrence of disease was before or after the implementation of preventive programs. There is a possibility that programs were introduced because there are existing cases of diseases. This is to avoid further incidence of the disease which is the main purpose of preventive/control measures.

Individual level analysis on morbidity and mortality is sourced from the vital registration and Department of Health but it lacks organization level data. As illustrated in the workplace health model in the beginning of this paper, it is important to also look into the place of work (not only the environment but also management practices) to determine other factors that influence health outcomes in the workplace. Further studies on a combined individual and organizational data to be able to have a more holistic picture of workplace health status is recommended. There is a potential data source from the Department of Labor and Employment (DOLE) of a combined individual and organizational data on workplace health. Establishments are required by the law to submit annual medical report and accident report to DOLE. There is also the labor inspection report, conducted by the DOLE, that assess compliance to General Labor Standards which contains information on Occupational Safety and Health practices. However, there are numerous challenges in accessing information from those sources: 1) non-compliance of many employers to submit said reports; 2) absence of a functioning database to store the data collected from submitted reports; 3) limited industry coverage of the labor inspection.

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