

Occupational Hazards and Illnesses of Filipino Women Workers in Export Processing Zones

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This was a baseline study on occupational exposure and health problems among women workers in export processing zones. Physical, chemical, and ergonomic hazards were evaluated and measured through workplace ambient monitoring, survey questionnaires, and interviews with 500 respondents in 24 companies (most were female at 88.8%). The top 5 hazards were ergonomic hazards (72.2%), heat (66.6%), overwork (66.6%), poor ventilation (54.8%), and chemical exposure (50.8%). The most common illnesses were gastrointestinal problems (57.4%), backache (56%), headache (53.2%), and fatigue/weakness (53.2%). Logistic regression showed an association between certain work-related factors and occupational illnesses, and psychosocial problems. Highly significant associations were hearing loss with years spent in the company ($p = .005$) and gender ($p = .006$), headache and dizziness with poor ventilation ($p = .000$), backache with prolonged work ($p = .003$). These results will have implications for policy and program formulation for women workers' concerns and issues in export zones.

occupational health and safety women workers export zones
occupational illnesses and injuries

1. INTRODUCTION

In many countries, women are confronted with a myriad of problems which affect their health, development, and economic participation in society. Women perform various roles in the household and are often responsible for their children's education, food, clothing, and upbringing. In many instances, they are also major breadwinners. In the Philippines, 36.9% of the labor force was found to be female. Most of them were in export processing zones. In 1994, 65–77% of female workers were laborers [1].

Messing and Evert's [2] early study looked into occupational hazards and their effects among women. They analyzed work conditions and related health effects in male and female job ghettos in fish-processing plants in Québec, Canada. They concluded that women were generally required to

work at a faster rate than men, with their additional responsibilities at home such as housework and taking care of children having synergistic effects on their health.

In the Philippines, very few local studies have been conducted in the light of occupational and environmental monitoring of companies. In fact, there is no study on women workers as a special group. Pablo [3] conducted risk assessment of major companies at the Subic Bay Free Port Zone, but this only focused on three companies. Earlier, Pineda-Ofreneo [4] studied the work problems of female workers in garment subcontracting companies, which included low income, seasonality, and irregularity of work. Those local studies, however, did not cover the effects of occupational hazards on women's health. Among those that touched on this topic was Lorenzo [5], who found nerve conduction

abnormalities among battery workers exposed to lead. Ramos and Florencio [6] conducted a study on nutrient supplementation among 59 anemic women in a garment factory. Santillan's [7] is an earlier study, which reported a single case of spontaneous abortion registered with the Bureau of Workmen's Compensation during the period of 1952–1956. It should be noted that this study was based on reporting, and more reliable results would have been obtained through comprehensive surveys or longitudinal studies on abortion and their association with workplace hazards. In another study, Santillan [8] found that government laborers suffered from infectious and parasitic diseases. Among these, tuberculosis was the greatest concern.

This research aimed to elucidate data on women's exposure to hazards and on associated health problems. It also looked into the compliance of companies with mandatory requirements for healthy and safe work environments. This endeavor is very timely and significant in light of the growing number of female workers in the manufacturing industry, particularly in export processing zones where employers prefer women workers. The health of the woman worker is important because she takes on varied roles such as mother, wife, and housekeeper in addition to being a breadwinner.

The most important aspect of this project is the eventual implication for policy and program formulation and evaluation for workers. By looking into common occupational hazards among women workers, we can gear more program and policy oriented actions for this group that can be adopted by the Department of Labor and Employment (DOLE) of the Philippines as well as the companies concerned.

2. METHODOLOGY

Observation in this study was done with stratified sampling procedures. Categories were based on company size, which was determined using the classification of DOLE: small for fewer than 100 workers, medium for 100–199 workers, and large for 200 and more workers. The respondents were taken randomly from each stratum per size

and type of the company and each was given a questionnaire to fill out.

The three main hazards evaluated and measured were physical (heat, cold, vibration, noise); chemical (solvents, gases and vapors, dusts); and ergonomic (musculoskeletal disorders, injuries, illumination, prolonged work, mental demand, etc.) hazards. This was done through workplace monitoring, survey questionnaires, and interviews. Data were encoded with SPSS version 14.0. Statistical analysis included descriptive, correlation, and multinomial logistic regression.

3. PRESENTATION OF DATA

3.1. Data on Companies

3.1.1. Company profile

Among the 24 companies investigated, 25% were small-, 37.5% were medium-, and 37.5% were large-scale. Most of them were in the manufacturing industry. All of the small-scale companies, 89% of the medium-, and 77% of the large-scale ones were involved in electronics (except semiconductors).

In terms of work shifts, all small-scale companies implemented the first shift. Across all company sizes, workers most commonly changed shifts, with the first shift followed by the second and then by the third. The work schedule is an important factor to consider in safety practices due to the reported prevalence of injuries and accidents in the night shift, which falls on the second or third shifts.

3.1.2. Occupational hazards

Table 1 lists the most common physical hazards. The most prevalent ones across all company sizes were noise, vibration, and extreme temperature.

Regarding chemical hazards, workers in all small-scale companies were exposed to particulate matter, its most prevalent form being smoke (100%). Eighty-nine percent of medium- and large-scale companies had similar conditions, with the most common particles being dust and

TABLE 1. Physical Hazards and Company Size

Physical Factor	Company Size					
	Small		Medium		Large	
	N	%	N	%	N	%
Noise	6	100	8	89	5	56
Vibration	4	67	5	56	2	22
Temperature extremes						
cold	3	50	4	44	2	22
hot	1	17	4	44	4	44
Atmospheric pressure extremes						
high	0	0	0	0	0	0
low	0	0	0	0	0	0
Radiation						
non-ionizing	0	0	0	0	0	0
ionizing	0	0	0	0	0	0

TABLE 2. Chemical Hazards and Company Size

Chemical Agent	Company Size					
	Small		Medium		Large	
	N	%	N	%	N	%
Particulate matter	6	100	8	89	8	89
Dust/fiber	3	50	5	56	4	44
Fume	4	67	5	56	8	89
Smoke	6	100	4	44	0	0
Mists	1	17	2	22	1	11
Gas	1	17	5	56	2	22
Vapors	2	33	5	56	5	56

TABLE 3. Ergonomic Hazards and Company Size

Ergonomic Factor	Company Size					
	Small		Medium		Large	
	N	%	N	%	N	%
Improper lifting/lifting of heavy load	4	67	5	56	5	56
Repetitive movements	6	100	9	100	7	78
Awkward posture	6	100	5	56	3	33
Prolonged working hours	3	50	6	67	5	56
Excessive mental tasks	2	33	3	50	1	11

fumes, and fumes, respectively. No biological agents were present in any company of any size (Table 2). The most prevalent ergonomic hazards in all the companies were repetitive movements and awkward posture (Table 3).

3.2. Data on Respondents

Among the 500 respondents, most were female (88.8%), single (69.6%), and worked

in production or assembly-line workstations (87.4%). The mean age was 22.8 years, indicating a very young and active working population. Seventeen point two percent of women had been in the company since 2004, 33.6% were visual inspectors, 76.8% were contractual workers. The most common work schedule was over 8 hrs per day (60.6%).

Table 4 shows that women workers were most frequently exposed to ergonomic hazards leading

to exertion injury on the back (73.4%), excessive work (66.7%), and heat (66.0%). As for illnesses, women suffered from cough and colds (59.5%), gastrointestinal problems (57.7%), and physical exhaustion (55.6%) (Table 5).

Among the respondents, 5% worked in small-, 22% in medium-, and 73% in large-scale companies. Most female workers worked in the large-scale companies, comprising 73% of the total worker population there.

TABLE 4. Frequency Distribution of Hazards Among Women Workers

Hazard	N	%
Noise	190	42.8
Heat	293	66.0
Cold	194	43.7
Vibration	187	42.1
Radiation	147	33.1
Chemicals	220	49.5
Smoke/gas	185	41.7
Dust	209	47.1
Virus/bacteria	193	43.5
Excessive work	296	66.7
Prolonged standing	206	46.4
Ergonomics, e.g., exertion injury on back	326	73.4
Monotonous work	219	49.3
Awkward posture	175	39.4
Poor illumination	139	31.3
Poor ventilation	239	53.8

TABLE 5. Frequency Distribution of Illnesses Among Women Workers

Illness	N	%
Headache	246	55.4
Cough and cold	264	59.5
Gastrointestinal problem	256	57.7
Musculoskeletal disorder	246	55.4
Tuberculosis	196	44.1
High blood pressure	186	41.9
Urinary tract infection	208	46.8
Arthritis	190	42.9
Skin allergy	207	46.6
Hearing problem	183	41.2
Visual problem	236	53.2
Reproductive problem	202	45.5
Physical exhaustion	247	55.6

3.3. Data on Multinomial Logistic Regression

3.3.1. Risk factors to most common occupational illnesses in the workplace

Tables 6a and 6b show various risk factors associated with the most common occupational illnesses. Gender influenced hearing loss ($p = .006$), cough and colds ($p = .029$), hypertension ($p = .001$), fatigue ($p = .006$), tuberculosis ($p = .001$), reproductive problems ($p = .001$), gastrointestinal problems ($p = .033$), urinary tract infections ($p = .025$), and arthritis ($p = .001$); and years of employment affected hearing loss ($p = .005$) and arthritis ($p = .001$). Hearing loss was associated with noise ($p = .006$), longer tenure ($p = .005$), and it was more prevalent among women ($p = .050$), while chemicals were associated with headache and dizziness ($p = .012$),

TABLE 6a. Risk Factors to Most Common Occupational Illnesses

Risk Factor	Fatigue	TB	Reproductive Problems	GI Problems	UTI	Arthritis
Gender (female)	2.486 (.006)	0.203 (.001)	0.270 (.001)	1.948 (.033)	.495 (.025)	36.34 (.001)
Years in the company						79.37 (.001)
Dust			0.554 (.017)			
Poor ventilation	3.180 (.001)	0.039 (.001)	2.808 (.001)			
Excessive work			1.640 (.043)			10.38 (.001)
Poor posture	2.009 (.003)					12.91 (.001)
Excessive heat	0.528 (.007)					
Sustained work						31.52 (.001)

Notes. Numbers in parentheses refer to significance level; TB—tuberculosis, GI—gastrointestinal, UTI—urinary tract infection.

TABLE 6b. Risk Factors to Most Common Occupational Illnesses

Risk Factor	Hearing Loss	Headache and Dizziness	Backache	Cough and Colds	Hypertension	Eye Strain
Gender (female)	0.279 (.006)			2.067 (.029)	0.294 (.001)	
Years in the company	1.148 (.005)					
Noise at the workplace	0.880 (.050)					
Chemicals		0.547 (.012)				
Dust		1.654 (.051)		1.901 (.014)		1.601 (.050)
Poor ventilation		1.093 (.001)		0.334 (.001)		0.404 (.001)
Excessive work			0.610 (.035)	2.209 (.001)	2.209 (.001)	
Prolonged work			0.503 (.003)			
Poor posture			1.803 (.017)			
Nature of work			1.768 (.050)			
Cold			1.759 (.008)			
Type of work				1.977 (.024)		2.262 (.006)

Notes. Numbers in parentheses refer to significance level.

and dust with headache and dizziness ($p = .051$), cough and colds ($p = .014$), eye strain ($p = .050$), and reproductive problems ($p = .017$).

3.3.2. Factors associated with psychosocial problems

Most risk factors related to psychosocial problems were associated with alcohol drinking.

They were excessive ($p = .016$) and strenuous ($p = .005$) work, excessive mental and visual demands ($p = .039$), being female ($p = .003$), and verbal abuse ($p = .050$). This was followed by drug use, which was associated with type of work, strenuous work, excessive mental and visual demands, and gender (Table 7).

TABLE 7. Factors Associated With Psychosocial Problems

Risk Factor	Psychosocial Problems							
	Mental Illness	Anger and Frustration	Absen-teeism	Alcohol Drinking	Smoking	Drug Use	Rest-lessness	Performance at Work
Excessive concentration	0.332 (.049)	1.817 (.050)						
Repetitive movements		2.315 (.004)	2.315 (.004)				2.247 (.030)	
Work schedule		2.009 (.050)						
Frequent standing			2.315 (.004)					
Type of work			2.312 (.005)		0.525 (.025)	0.543 (.034)		
Excessive work				1.931 (.016)				
Strenuous work				1.852 (.005)	1.951 (.003)	1.980 (.002)		1.587 (.037)
Excessive mental and visual demands				0.566 (.039)		1.980 (.002)		
Gender (female)				0.386 (.003)	0.525 (.025)	0.235 (.000)		0.485 (.044)
Verbal abuse				1.475 (.050)				1.951 (.002)

Notes. Numbers in parentheses refer to significance level.

TABLE 8. Variables/Factors Associated With Certain Organizational Factors

Organizational Factors	Factors/Variables					
	Dissatisfaction With Work	Absen-teeism	Smoking	Drug Use	Sleeping Problems	Poor Work Performance
Job security	4.794 (.006)				3.090 (.016)	
Skills being used	3.191 (.002)					
Satisfaction with salary		9.036 (.001)			0.271 (.001)	3.087 (.001)
Availability of maternity leave		4.675 (.019)				
Skills applicability		56.487 (.000)	0.352 (.002)	0.3610 (.0030)		
Gender composition of labour		56.487 (.001)	0.254 (.001)	0.2029 (.0001)		
Availability of promotion			4.160 (.035)	4.2940 (.0310)		
Type of work			0.521 (.003)	0.5390 (.0440)		
Time pressure		56.487 (.001)				7.632 (.001)

Notes. Numbers in parentheses refer to significance level.

3.3.3. Variables/factors associated with certain organizational factors

Some variables/factors were found to be associated with certain organizational factors. Satisfaction with salary was associated with absenteeism ($p = .001$), sleeping problems ($p = .001$), and poor work performance ($p = .001$); while skills applicability was associated with absenteeism ($p = .000$), smoking ($p = .002$), and drug use ($p = .003$) (Table 8).

4. DISCUSSION

In this study, multinomial logistic showed that significant associations existed between occupational hazards such as physical, chemical, and ergonomics factors and the incidence of occupational illnesses and injuries, reproductive health problems, and psychosocial disorders among women workers. In similar research on occupational health among women construction workers, Lakhani [9] found that respiratory, eye, and skin problems and noise-induced hearing loss were prevalent amongst workers exposed to hazards including dust, noise, heat and cold, non-ionizing radiation, and various chemicals.

Discriminatory barriers to financial and career advancement were found to be linked to recurrent physical and psychological symptoms and more frequent visits to the doctor among women workers.

Factors such as years spent in the company followed by gender and noise were most strongly associated with hearing loss. With all other factors constant, the odds of hearing loss increased by 114% for every additional year in the company. Since occupational hearing loss is a chronic illness caused by prolonged exposure to noise, years spent in the company were a risk factor.

Poor ventilation and dust were the most significant risk factors to headache and dizziness. Those exposed to poor ventilation were 1.5 times more likely to suffer from headache and dizziness. Cough and colds were also associated with this risk factor, with exposed individuals being 33.4% more susceptible. Females were twice more likely to develop cough and colds compared to men. A serious health problem, risk of pancreatic cancer, was found to be associated with exposure to textile dusts and chemicals among women workers [10]. Moreover, risk of esophageal cancer in the textile industry

was found to be associated with exposure to chemicals, metal, and dust [11, 12]. The study also found that pulmonary tuberculosis was highly associated with poor ventilation, gender, and type of work. Pulmonary tuberculosis was investigated since it has great impact on workers due to its communicability, the need to take medical leave, and possible termination of work.

Eyestrain was found to be associated with ventilation, dust, and type of work. Workers exposed to dust were 1.6 times more likely to experience eye strain. Dust irritates the eyes, and this is aggravated by poor ventilation. Poor ventilation was also related to tiredness and excessive fatigue, along with type of work and poor posture. Assembly-line workers were 2.7 times more likely to be tired than supervisors. The mechanism behind this probably involves impairment of respiratory function, oxygen delivery, and cellular respiration secondary to inhalation of toxic chemicals. On the other hand, poor posture strains muscles and joints causing fatigue. It was found that those with poor posture at work were twice more likely to be tired and exhausted, with all other factors constant.

There are related studies on chemical hazards influencing women's health that produced different results. It was found that there was an increased incidence of lung cancer among female workers in the foam manufacturing industry but this was not associated with chemical (isocyanate) exposure [13]. In addition, endotoxin was found to be inversely related to both esophageal and stomach cancer among female workers in the textile manufacturing industry [11, 12]. In fact, it was suggested that chronic exposure to endotoxin may reduce risk of liver, stomach, and esophageal cancer in this population. Therefore, further study is needed [12].

Gastrointestinal (GI) problems, on the other hand, were associated with type of work and gender. Assembly-line workers were 2.2 times more likely to have GI problems than supervisors. However, GI symptoms may be caused by nonoccupationally-related factors such as nutrition and family-related conditions. Meanwhile, gender was the only factor closely linked to urinary tract infection (UTI). This

maybe due to the limitations of the questionnaire (significant risk factors to the development of UTI may not have been included). However, selected interviews conducted among the workers revealed that UTI may have been precipitated by the relatively few restrooms and their placement far from the production line. Infrequent breaks due to the high quota demands per day may also have been a factor.

Another significant finding is that there was a relationship between arthritis and poor posture, gender, type of work, sustained work, and excessive work. Although arthritis can be genetically determined, it can be aggravated by overuse of joints. This might be the case among those performing excessive, strenuous, and sustained work in poor posture. For backache, nature of work, exposure to cold, and poor posture were some of the significant factors. Moreover, assembly-line workers were 1.76 times more likely to develop backache compared to supervisors because the former were required to exert manual force and perform strenuous activities rather than just monitor the activities as was the case with the latter. Poor posture and improper body mechanics also contributed by placing undue stress on the joints and muscles, leading to pain, soreness, or even muscle rupture. As for hypertension, females were 29.2% more likely to develop it than males, and those with excessive work were 2.2 times more at risk. In the walk-through investigation, it was observed that the females were usually assembly-line workers, while the males were supervisors. Thus, female gender and excessive work went together. Excessive work was also highly associated with allergies due to longer and greater exposure to allergy-causing chemicals and dust.

Organizational factors have also been associated with adverse health outcomes. In Araki, Muto, and Asakura's [14] study, overtime work was associated with an increased need for mental health management among Japanese female workers. The amount of overtime work, marital status, and having children were also significant factors in determining health status. Meanwhile, Shimizu, Mizoue, Takahashi, et al. [15] found that job rank contributed significantly

and positively to general health, while age, communication with superiors, and self-management skills contributed negatively.

Alcohol drinking is also a concern for occupational health practitioners and management. It can lead to absenteeism and decreased productivity. This study found alcohol drinking to be highly associated with excessive work, strenuous work, and excessive visual and mental demands. Workers with strenuous work were 1.8 times more likely to drink than others. It is surprising that women had a higher likelihood of drinking than men. This may be because they were the usual victims of abuse in the workplace. In addition to drinking, smoking was another concern. In this study, it was related to gender, type of work, and strenuous work. Those with strenuous work were 1.95 times more likely to smoke than those with work that was not strenuous.

Illegal drug use was also a very serious problem. It leads to violence, health problems, addiction, and even death. Variables found to be highly associated with drug use included strenuous work and excessive mental and visual tasks. Drug use was 1.9 times more likely to occur among those with strenuous work and excessive mental and visual demands. The depth and magnitude of this problem at the workplace must be further investigated. Meanwhile, restlessness was 2.2 times more likely to occur among those with longer working hours. This may be secondary to fatigue and prolonged monotonous work. On the other hand, poor performance at work was associated with gender, verbal abuse, and strenuous work. Strenuous work led to fatigue and burn-out, manifested as decreased productivity and poor performance. Those outcomes were 1.5 and 1.9 times more likely to occur among those with strenuous work and in workers who were verbally abused, respectively.

Organizational factors that had a highly significant association with satisfaction at work included job security and skills applicability. Those who had job security were 479% more likely to be satisfied than contractual and seasonal workers. Unfortunately, many of the companies

investigated did not provide tenure and employed workers on a contractual basis only. Those whose skills were appropriate to the nature of their work were 319% more likely to be satisfied with their work than others. Time pressure/high quota, skills applicability, maternity leave, and gender were found to be highly associated with frequent absenteeism. Absenteeism was more common in females and 4.6 times more likely among those whose companies did not provide maternity leave. It was also 56 times more common in workers with high quota requirements.

Numerous other studies have also documented the effects of occupational hazards and organizational factors on workers' health. Among systems analysts in Brazil, visual fatigue was associated with mental workload, inadequate equipment and workstations, low level of worker participation, being a woman, and fascination with the computer [16]. A study of the electronics industry revealed that physical job demands were associated with musculoskeletal symptoms, while pressure at work was related to lower job satisfaction and psychosomatic symptoms [17]. In China, the psychological health of oil workers was found to be impaired by increasing occupational stress and being new to the job [18]. Longer working hours were associated with poor health, dissatisfaction with life, poor recuperation from fatigue [19], and hypertension among Japanese white-collar workers [20]. Social and organizational factors contributed to the development of musculoskeletal disorders among garage workers [21]. It is to be noted that those relationships hold for those who are full-time as well as part-time and seasonal workers [22].

The likelihood of smoking was found to increase with lack of promotion, inappropriate use of skills, being female, and assembly-line work. The likelihood of smoking also increased fourfold among those who had no avenues for promotion. Availability of promotion was also closely linked to the use of illegal drugs, along with skills application, gender, and type of work. In this case, drug use may be a form of coping with frustrations arising from lack of benefits and poor organizational factors. Sleeping problems were associated with job security

and salary. They were 3 times more likely among contractual workers than their tenured counterparts. The strong motivational value of monetary incentives has long been established by sociologists; therefore, low compensation or perceived inequity in income distribution can lead to many problems among workers. Poor work performance is one of them. In this study, salary, as well as time pressure, was highly associated with this factor. Those with good salaries were 3 times more likely to perform well than those who were poorly paid, while those who were time-pressured had a 7.6 greater chance of performing poorly.

5. CONCLUSION AND RECOMMENDATION

This study showed that there were significant associations between certain work-related factors and the incidence of occupational illnesses and injuries, reproductive health problems, and psychosocial disorders. Occupational hazards and their effects on the health of women workers were also identified.

With multinomial logistic regression, noise was found to be associated with hearing loss, while chemicals, dust, and poor ventilation were related to headache and dizziness as well as to cough and colds. Other significant associations included backache with radiation, excessive work, and poor posture; hypertension with excessive work; and exhaustion with excessive heat, poor body posture, and poor ventilation. Moreover, the study showed that psychosocial problems (mental illness, absenteeism, drinking problems, smoking, etc.) were related to particular organizational factors such as repetitive work, prolonged standing, strenuous work, and excessive mental and visual demands, among others.

It should also be noted that while many of the small- and large-scale companies reportedly had health and safety committees, none of them functioned properly. The management saw their role in the area of occupational health and safety as mere providers of part-time doctors and nurses to employees and submitting illness/injury reports to DOLE. The other key elements

of a health and safety program, such as industrial hygiene and surveillance measurements, ergonomic assessment and control measures, and safety interventions were lacking. This necessitates the need for a change in the outlook and initiative among companies regarding the provision of occupational health and safety for their employees.

This study identified and established associations between work-related hazards and illnesses among women workers. However, a more quantitative method is needed to determine the possible range of etiologic relationships. The findings and applications of such a study, together with the combined knowledge gathered from previous research, will hopefully extricate Filipino women workers from the perils and inequities they face everyday.

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