Health Check-up and Assessment of Working Conditions of Women Workers in MEC Electronics Company

Report submitted by the
Institute for Occupational Health and Safety Development
(IOHSAD – Philippines)
December 2024

BACKGROUNDER

In the landscape of the Philippine workforce, the precarious state of occupational health and safety (OSH) stands as a critical concern that demands urgent attention. Despite the evidence of a pervasive and significant number of occupational injuries, illnesses, and accidents, OSH in the Philippines remains undervalued and, more importantly, inadequately addressed.

The gravity of the situation becomes glaringly apparent when analyzing available data. In the year 2021 alone, 27,636 occupational injuries, with a significant 41.7% emanating from the manufacturing sector were reported. Meanwhile, the Integrated Survey on Labor and Employment (ISLE) reported 132,710 cases of occupational diseases, further underlining the magnitude of the challenge faced by Filipino workers (Philippine Statistics Authority, 2024).

While the Philippine government took a positive step forward by enacting the Occupational Safety and Health (OSH) Law, Republic Act 11058, in 2018, the persistently subpar performance of companies in complying with OSH standards remains a cause for serious concern. Four years after the implementation of this landmark legislation, the Department of Labor and Employment (DOLE) reported that slightly over half of the local businesses inspected failed to adhere to OSH standards, illustrating a glaring gap between legislation and practical implementation.

The most recent Labor Inspection Report, covering the period from January to August 2023 and encompassing 25,387 establishments with 2.4 million workers, paints a disconcerting picture. The initial compliance rate stands at a mere 58.48%, and even after corrections, the overall compliance rate barely improves to 72.60%. Majority of those who failed in the compliance are micro, small and medium enterprises. This exposes a systemic failure in ensuring the safety and well-being of the workforce. The common violations, which cut across different sizes of enterprises, include the absence of first aiders, safety officers, fire safety inspection certificates, OSH committees, formulated OSH programs, and mandated OSH training and education.

Compounding the issue is the limited number and problematic coverage of labor inspections conducted by the Department of Labor and Employment (DOLE) authorized labor inspectors. According to information presented by the DOLE during budget deliberations in Congress last October 2022, there are only 1,200 OSH inspectors. Each inspector requires a day or more to assess business compliance, and the duration depends on the size of the company (Bagaoisan, 2022). This scarcity of inspectors becomes evident in the face of the vast task at hand which is ensuring OSH compliance in 1,109,684 establishments across the country (Table 1). The number of enterprises inspected for the first six months of 2023 (25,387) is a measly 2.28% or would roughly fall to 5.5% per year. Consequently, the limited number of inspectors hinders the ability to conduct regular and thorough monitoring, exacerbating the challenges in upholding OSH standards nationwide (Table 2).

Table 1. Total number of establishments that needs to get inspected

SIZE	NO. OF ESTABLISHMENTS	% SHARE	TOTAL EMPLOYMENT	% SHARE
MICRO	1,004,195	90.49%	2,816,091	32.69%
SMALL	96,464	8.69%	2,183,667	25.35%
MEDIUM	4,484	0.40%	607,990	7.06%
LARGE	4,541	0.41%	3,006,821	34.90%
TOTAL	1,109,684	100%	8,614,569	100%
MSME	1,105,143	99.59%	5,607,748	65.10%

Source: Philippine Statistics Authority, 2022 List of Establishments

Table 2. Total number of labor inspectors

Labor Inspectorate	No.
Labor Inspectors with General Authority	634
Labor Inspection Auditors	33
Technical Safety Inspectors	107
Total	1,200

Source: Department of Labor and Employment, Bureau of Working Conditions Annual Report 2022

On the other hand, ordinary Filipino workers grapple with issues of low wages, irregular employment, and challenges in forming unions. For many, these concerns take precedence over occupational safety and health (OSH) matters in the workplace. This broader context contributes to the observed low level of awareness of OSH among workers in high-risk industries.

Clearly, the conditions of workers in different industries are greatly affected by the government and company management's attitude towards the Filipino labor force in general as well as on their health and safety issues in particular. As a low middle income country towing the global economic policy of neoliberalism, this has led to a widespread and massive undermining of the workers' rights, maintaining the cheap wage economy and exacerbating poverty all for the super profits of foreign capitalists and their local cohorts.

The persistent neglect of these vital aspects of workers' health and safety necessitates a comprehensive and concerted effort to heighten awareness, exact accountability and produce tangible actions to bridge the gap between legislation and the realities faced by workers in high-risk industries.

RATIONALE

In the Philippines, numerous high-risk industries heavily rely on chemical substances. Given the labor-intensive nature of many of these companies, the associated hazards faced by workers are considerable. While these industries are the ones usually subject to inspection, reports coming in from companies that have Unions report lack of representation in the conduct of labor inspection and poor dissemination of its reports. Considerably, the real working conditions may be under reported or not at all.

The initial study done by IOHSAD, which was completed last November 2023 involved three companies namely: Globesco (paint industry), MEC (electronics industry), and Nexperia (semiconductor industry). The specific objectives of the study included the establishment of initial data on working conditions, hazards encountered along with an assessment of the control measures implemented by the respective companies. The study was also able to identify and list the chemicals used in these industries, provide a description of the diverse experiences of workers concerning the chemicals they encounter and handle its possible impact on their working and health conditions.

Fifty (50) workers from MEC Electronics participated in the study (11 males, 39 females). Majority of them were regular workers working 8 up to 12 hours shifts and 42% admitted that they are aware of using potentially harmful chemicals in their place of work, ranking third among the identified hazards in the workplace after heat and noise. The initial list of chemicals being used in MEC are the following:

- MIBK (Methyl isobutyl ketone)
- Flux
- Alcohol
- Alteco
- PUC/Z black 45.3
- Tinning bar
- Solder Lead
- Lubricant
- Tinning flux
- Varnish
- Silicon

As shared by the workers from their clinic data, Tuberculosis and Pneumonia are frequent illnesses while headache, cough, and difficulty of breathing are the top three symptoms. Subjectively, they have attributed all of these to the fumes, dust and gases they have encountered at the workplace and rightfully are compensable diseases. Among the respondents, a number have complained of reproductive health problems, to include: Ovarian cysts, Leiomyoma, Breast Cancer, abortion and fertility problems. Even the respondents of the paint company Globesco had shared that a female employee had trouble conceiving and suffered repeated miscarriages. All of them are exposed to different chemicals at work.

Reproductive diseases and illness have long been a topic of research and discussions among the medical and labor community. Evidence suggestive of harmful effects of occupational exposure on the reproductive system and related outcomes has gradually accumulated in recent decades. Generally, occupations involving the manufacture/or application of some of the persistent chemicals that are not easily degradable, bioaccumulative chemicals, use of toxic solvents and fumes are reported to be associated with reproductive dysfunction (Chinese Center for Disease Control

and Prevention, 2023). Aside from chemicals, intense heat and radiation, heavy physical load and irregular work schedules warrant full protection of pregnant workers (Kumar, 2004). For other work risks, such as exposure to non-ionizing radiation, and psychosocial stress, the evidence is often suggestive but not conclusive.

While body harm and injuries can automatically be related to an incident or workplace accident, it is not so for reproductive illnesses, currently not classified as compensable diseases under the Social Security System's Employees' Compensation Commission. Companies usually and can easily brush off any correlation between workplace conditions and problems such as multiple abortions, fertility problems or newborn issues like low birthweight or fetal death. The lack of workers' awareness, the absence of workers' OSH committees, and the lack of a support network of professionals (third party) who can investigate such issues, along with a weak government OSH machinery, do not bode well for OSH in general.

This study gathered data on baseline occupational health and safety and reproductive health conditions among a sample population of women workers in MEC Electronics from February to October 2024. This included a detailed listing of chemicals and chemical use which can be used for further research, to campaign for safer workplaces and to fill in gaps in practice and legislation.

The study did not attempt to establish immediate and direct correlation between occupational exposure to chemical hazards and adverse reproductive outcomes. The study can only suggest probable cause and effect correlations on occupational exposure and target sample in MEC Electronics, in the light of known theories and propositions already set by scientific and medical studies.

Gathered data relied more on target respondents' on-hand information, and less on the standard clinical or technical measurement procedures to obtain required data (like biomedical screening or work environment monitoring). There is also no information generated from the company management or clinic. This also does not encompass detailed studies on other hazards such as ergonomic, physical, or psychosocial risks, nor does it include the lifestyle habits or experiences of the target respondents.

METHODOLOGY

Study Site Classification

MEC Electronics Philippines Corporation, under the ACES group, is a lead designer and manufacturer of cable assemblies, wire harnesses, AC/DC supply cords, audio/video cables, computer interface, telecommunication cables, magnetic components and connector parts. MEC products, according to an online promotion site, are found in a variety of challenging application environments including medical, industrial, test and measurement, audio-video, telecommunications and automotive. It offers more than 10,000 combinations of types of product and continues to grow through customized designs.

It was established May 16, 1989 and started its operation in the Philippines, August of 1990. Located in Cavite Export Processing Zone in Rosario, Cavite, it comprises four buildings and employs 576 individuals, with a gender distribution of 63.37% female and 36.63% male. The facility consists of four buildings: one for the production process (factory), another for the warehouse, a third for administration, and the fourth for the canteen. It is classified as a high-risk industry.

MEC serves more than 1,000 customers in over 20 countries around the world. Its products are usually sold to computer makers in Taiwan and USA. MEC for the more than 50 years since incorporation in 1976, has been the choice partner for connectivity solutions to leading Original Equipment Manufacturers (OEMs), Original Design Manufacturers (ODMs), branded consumer electronics and Fortune 500 companies. The physical base is in Taoyung, Taiwan with factories in the Philippines, Dongguan, Suzhou, and Chongqing in China.

Data Collection

Initial Survey

Clustered sampling was used to generate the study population. The workers were divided into the different “line work” and were then randomly selected. 109 names of women (Annex A), representing 30% of the total population of MEC women workers were listed.

A survey form in the form of a questionnaire was prepared containing information on socio-demographics, working and health conditions (Annex B) and a pre-survey orientation was done with the enumerators and leaders of the MEC union. The forms were pre-tested and necessary corrections and adjustments were done. The enumerators started the data collection as early as January 2024.

Data collation was done by the end of February with workers screened for reproductive health conditions. Out of the total 109 women workers, 51 (Annex C) underwent individual interviews by doctors using a prepared medical record sheet.

Medical Check-up

The medical check-up was conducted on a staggered basis from February to October 2024. It included history taking, physical examination, and a review of records. Interviews were also conducted to gather information on length of employment, possible chemical exposure, previous work experience outside MEC, the nature of work, and other diseases or illnesses. All collected data were then tallied and collated.

RESULTS

Survey Results

Of the 109 (30% of the 365 total women workers) target survey participants, 107 were interviewed by the enumerators. The total response rate was 98% (107/109). Table 3 shows the demographics of the respondents.

Socio-Demographic Profile

Most of the respondents are regular employees (102 or 95.32%) with almost half in the 45-54 age range, married and high school graduates. By length of service, the distribution was 28.9% (31) had been with MEC for 1-5 years, 19.62% (21) have been working for 21-25 years, and 3.73% (4) workers have been with MEC for 31 or more years.

The majority of workers (96.26% or 103) reported working 8 hours per day. However, 29.90% (32 out of 107) indicated working 8 to 10 or 12 hours per day, reflecting 2 to 4 hours of overtime. This situation is common for nearly all workers, as required by management.

A total of 97.19% (104 workers) receive daily wages ranging from PHP 489 to 540 (US$ 8.37 to US$ 9.25). Regarding benefits, most workers reported receiving the following: Service Incentive Leave (SIL), Sick Leave, Vacation Leave, Maternity Leave, Night Differential, Birthday Allowance, Perfect Attendance Incentive, Uniform Allowance, PhilHealth, Medical Insurance, Social Security System/ECC, and PAG-IBIG. The five-day SIL can be availed after one year of employment and may be used for illness or vacation. However, the Sick Leave benefit is only available starting the fifth year of employment.

In response to the survey question about previous employment before MEC, 57 workers (53.27%) reported being previously employed in various companies and industries. Meanwhile, 35 workers (32.71%) stated that MEC was their first job, while 15 did not respond. Among those with prior work experience, 52% had also worked in an electronics company.

Table 3. Demographics of Respondents

Age Profile		**Status**		**Education**	
Age Ranges (years)	No.	**Civil Status**	No.	**Educational Attainment**	No.
15-24	4	Married	48	Elementary	0
25-34	23	Widow	10	High School	83
35-44	28	Single/Separated	35	Vocational	15
45-54	48	Live-In	0	College	4
55-64	4	No Answer	12	No Answer	5
Mean Age	**42**				

Work Profile	
Years Working with MEC	No.
1-5	31
6-10	17
11-15	4
16-20	10
21-25	21
26-30	17
30 above	4

Previous Work	
Before MEC	No.
Yes	57
No	35
No Answer	15
Nature of Previous Work	
Electronics Company	42
Work with no exposure	6
Garments Factory	9
Total	**57**

Situational Data on Work and Safety

The factory is arranged in an assembly line type represented by side-by-side work tables grouped accordingly. A whole building is dedicated to the different processes to build the products with no divisions in-between. In general, the following are the different processes (Table 4):

Table 4. Process Flow for MEC Factory Workers

In MEC, 104 of the respondents know that there are health and safety officers in the company forming part of the OSH committee, more specifically called the Joint Labor Management Committee. For the health and safety personnel, mentioned are a

part-time doctor and dentist, a full-time nurse who multitasks with other administrative roles, full-time first aiders, safety officers and safety engineers.

The facility has one clinic equipped with first aid kits and medicines. Annual physical examinations are conducted, including basic tests such as CBC, chest X-ray, ECG, urinalysis, and fecalysis. Patients with identified illnesses are called individually for appropriate treatment and/or referral. Generally, workers without findings do not receive their laboratory results. Those requiring further medical evaluations or procedures are referred to point-of-care clinics or hospitals accredited by their Health Maintenance Organization (HMO). For illnesses requiring prolonged treatment or chronic conditions such as a brain tumor, patients must cover expenses once their HMO limit is exhausted. The HMO coverage is capped at PHP 70,000 (approximately USD 1,190).

For the sanitary facilities, the buildings have separate comfort rooms and toilets for males and females. Drinking fountains/stations are provided with separate hand washing areas. There are no bathing facilities, but there are locker rooms. There is a sewer system and there are garbage disposal areas which are emptied regularly. There was a previous issue on waste disposal wherein the surrounding community was complaining of the pollution in the air, possible contamination of their source of water, their food and their plants. The community members allegedly were getting sick. The company allegedly corrected the problem.

For food services, there is a company canteen which can seat 900 people, selling relatively cheap food for the employees.

The majority of workers reported receiving Personal Protective Equipment (PPE) (see Table 5). Gloves and ordinary surgical masks, along with head caps, earplugs or muffs, coveralls, and safety shoes, are provided free of charge, although employees sometimes supply these themselves. The availability of PPE affects how often it is replaced. Cloth gloves are issued weekly, while masks are provided daily. Other items, such as coveralls and safety shoes, are replaced only when damaged, often delayed if stocks are unavailable. Workers sometimes require a working apron, but they must purchase these themselves. According to employees, the masks provided are subpar, and respirators are only supplied for work in particularly dusty environments.

When asked about labor inspections by the Department of Labor and Employment, 47 respondents (45.19%) said yes, 50 (46.72%) were unaware of any inspections, 5 reported none had occurred, and 6 did not respond.

Among those who answered yes, 16 out of 47 (34.40%) could not recall when the inspection took place, while 66% indicated it occurred around March 2023. Only 3 respondents (6.38%) knew that part of the inspection findings concerned the building's electrical system. No one could recall any other important or detailed findings from the inspection.

Table 5. Presence of PPE, APE, Health facility, OSH Personnel

PPE	No.	Annual Physical Exam	No.	Health Facilities and Supplies	No.
Yes	97	Yes	104	Yes, there is	104
No	7	No	0	No	0
No Answer	3	No answer	3	No answer	3

OSH Personnel	No.	Inspection Done	No.	When Was Inspection Done	No.
Yes, there is	104	Yes	47	Know (March 2023)	31
No	0	No	5	Don't Know	16
No answer	3	No answer	6		
Dont Know	0	Dont Know	50	No Answer	0

When asked about control measures at the administrative and engineering levels implemented by management, 65 out of 107 respondents (60.75%) confirmed the rotation of workers. Additionally, 77 respondents (71.96%) acknowledged the implementation of safe work practices, while 68 (63.55%) observed good maintenance of equipment. Furthermore, 89 respondents (83.18%) confirmed that safety training is conducted.

Table 6. Control Measures (Administrative and Engineering Levels)

ADMINISTRATIVE	No.	%
Rotation of workers	65	60.75 %
Safe work practices	77	71.96 %
Good maintenance of equipment	68	63.55 %
Conduct of safety training	89	83.18 %
Rest period/breaks (15-30 mins.)	81	75.70 %
Proper placement of workers	58	54.21 %
Laboratory orientation	21	19.63 %

ENGINEERING	No.	%
Inadequate ventilation	68	63.55 %
Segregation/Isolation	14	13.08 %
Substitution/Kapalit	16	14.95 %
Enclosure/Pagkulob	37	34.58 %
Remote control	2	1.87 %

According to 81 out of 107 workers (75.70%), rest periods or breaks of 15 to 30 minutes are enforced. Proper placement of workers was observed by 58 respondents (54.21%), while only 21 out of 107 workers agreed that management conducts laboratory orientation.

Moreover, 68 respondents (63.55%) felt that workplace ventilation is inadequate. Only 14 workers (13.08%) indicated that a segregation or isolation system is in place, while 16 (14.95%) acknowledged the practice of substitution (kapalit). Additionally, 37 workers (34.58%) confirmed the use of enclosure (pagkulob), and only 2 out of 107 agreed on the presence of remote control systems.

Work Hazards and Health Conditions

Table 7. Work Hazards Identified by Women Workers in MEC

Hazard	Total	Details
Physical – Heat	86	There is no air conditioning system, the exhaust is poor, and there are not enough electric fans. These conditions are worsened by the extremely hot and humid weather from March to May, along with the use of heat-generating machines and instruments, such as heat guns.
Chemical – Dust, Fumes, Gases	85	The insertion-molding process generates heat and a strong odor resembling burnt plastic. The soldering process produces dark smoke with a noxious smell, although the company allegedly switched to lead-free soldering before 2010. Additionally, the recycling of physically damaged or rejected cables creates dust.
Physical – Noise	80	Noise of machines
Physical – Vibration	60	Vibration of machines
Physical – Poor lighting	59	Poor lighting in certain areas of the workplace

Ergonomic	58	Workers experience repetitive motion, prolonged working hours, demanding tasks and workloads, improper lifting of heavy loads, multi-tasking, mental stress due to the 'quota system,' and awkward working positions.
Biologic	42	Virus, pneumonia, tuberculosis
Physical – too bright lights and radiation	4	

Ranked from the most to the least reported, the identified possible hazards include physical heat, chemical dust/fumes/gases, physical noise, physical vibration, poor lighting, ergonomic factors such as poor work positions and shift work, biological hazards like viruses and bacteria, and minor observations such as strong lighting and radiation.

Heat was the most frequently cited concern, with reasons detailed in the table above. Employees have long complained about the heat due to the lack of air conditioning throughout the factory and the inadequate supply of electric fans and exhaust systems.

In April 2024, a heat wave swept across the country, with ambient temperatures reaching 37 degrees Celsius and the heat index rising to 48 degrees—considered a danger level. During this time, workers brought individual electric fans to alleviate the extreme heat. Although management initially disapproved, they eventually allowed it as some workers began fainting and experiencing weakness.

At MEC, noxious odors are produced by burning PVC (Polyvinyl Chloride), a synthetic thermoplastic plastic that is one of the most widely used plastics worldwide. These odors are generated during the molding or insertion process and during the recycling or disposal of rejected cables.

Similar experiences occur during other stages of production, including the tinning process (preparing wires for soldering), the soldering process itself, and the flushing of wires using solvents to remove impurities.

In short, the entire production process involves a variety of chemicals that can irritate and burn the eyes, nose, or skin, particularly when heat is applied, or when these substances are inhaled or absorbed into the body.

Below is a list of chemicals used in various production processes (Table 8).

Table 8. List of Chemicals Used in MEC and Possible Effects

Process	Chemical Used (in the process)	Possible Effects
Stripping	PVCs or Plastics	Exposure to Polyvinyl Chloride (PVC) can negatively impact reproductive health. This is primarily due to its ability to leach chemicals like *phthalates*, known endocrine disruptors, which can disrupt hormone balance. Such exposure may lead to reduced sperm count, abnormal sperm motility, and potential issues with ovarian function in females.
Crimping	Lubricant (WD 40) - contains Alkane, Petroleum, Carbon Dioxide, Glycol and many other chemicals	It emits a strong odor that may cause dizziness and vomiting. Endocrine Disruptor – has an effect on the body "hormones" which control pregnancy, menstruation, and reproductive development
Degreasers Thinning and Cleaning	Solvent Degreasers: Alcohol (Isopropyl, Ethyl Alcohol, Ethanol, Ethyl Acetate, Methanol, Methyl Acetate, Butyl Cellosolve) Hydrocarbons – fuel or petroleum derivatives (Toluene, Mineral Spirits, Heptane, Naphtha, Trichloroethane Ketones (Xylene, Acetone, Methyl isobutyl ketone or MIBK)	Chronic occupational exposure to methyl isobutyl ketone (MIBK) has been linked to nausea, headaches, eye irritation, weakness, insomnia, intestinal pain, and slight liver enlargement in humans. However, no studies have shown effects on the reproductive system, and research on its carcinogenic potential has yielded negative results. In general, solvents are known endocrine disruptors—substances that interfere with the endocrine system and may cause adverse health effects.

Tinning and Soldering	Solder Lead or Bar (“any lead containing materials may affect body hormones and cause fertility problems, abortion, fetal death in utero or fetal anomalies)	MEC claims that their soldering materials have long been switched to 'non-lead' alternatives. However, even non-lead soldering materials—despite being labeled as non-hazardous—can still emit toxic fumes or gases. Exposure to these fumes may cause 'metal fume fever,' dizziness, vomiting, and irritation of the nose, eyes, throat, and lungs. Prolonged exposure can lead to serious conditions such as asthma, pneumonia, emphysema, and siderosis.
Insertion or Molding	PVC Injection (Polyvinyl Chloride)	Endocrine Disruptor
Final Visual		
Packing		
Recovery Area	PVC - heating and/or stripping	as above
Varnishing	Varnish (may contain volatile organic compounds)	
Marking	hardener H – 1	Irritant to the eyes, skin and lungs
Manual Putting	Epoxy (Bisphenol, Styrene, Vinyl Chloride, Methyl Metacrylate, Benzene, Eporite, Hexane, Epoxy Resins) Ethyl Acetate Rugby Silicon Adhesive	Endocrine Disrupting Chemicals

In terms of possible exposure to hazardous chemicals, a large portion of the workers—85 out of 107 (79.83%)—were aware of the potential risks associated with chemical exposure.

At MEC, workers receive a one-hour orientation on managing the workplace. During this session, chemicals are briefly discussed in relation to their use in daily tasks, with short instructions on handling them and basic first aid measures. However, this orientation is not reviewed, repeated annually, or updated for long-term employees.

Workers subjectively feel that these orientations are severely inadequate and lack detailed information. While they have access to the Safety Data Sheets (SDS) for the chemicals used at work, these documents are written in English, making them difficult to read and understand.

As to the symptoms experienced by the employees, refer to Table 8 below.

Table 9. Symptoms and Diagnosed Illnesses of Employees

Symptoms	Frequency
Headache	75
Hip and Back Pain	71
Cough	69
Decrease in Visual Acuity	66
Hand Tremors	65
Difficulty Breathing	63
Hand Weakness	62
Decreased Hearing	59
Colds	48
Itchy Skin	44
Chest pain	43
Easy Fatiguability	39
Forgetfulness	29
Red Eyes	29
Insomnia	26
Stomach Pain	24
Skin Eruptions/Allergies	23
Mouth Sore	18
Constipation	8
Disorientation	2

Table 10. Experience Accidents in the Workplace

	No. of respondents (MEC)	Nature of Accident
Yes	40	Burns, Falling of Heavy Weight, Slipping, Chemical splash in eyes, Fingers getting caught in machines, amputated or clipped fingers, chemical burns, incision wound due to blades, electrocution
No	65	
No answer	2	
Total	**107**	

Forty (40) out of 107 or 37.38% answered yes to experiencing accidents in the workplace with the nature of the accident listed above.

Carrying Loads		
Yes	33	Usual carried loads are 3-5 kilos of wires, small transformer
No	74	
Total	**107**	

Table 11. Diseases/Illnesses Experienced in the Workplace

ILLNESS/DISEASE	No.	LENGTH OF EMPLOYMENT	COMMENTS
HYPERTENSION	15	The duration of employment before falling ill ranged from 0 to 28 years, with a mean of 12.8 years and a median of 13 years. Workers were involved in various tasks across MEC's production lines, including soldering, crimping, tinning, cleaning, and final visual inspection. Abortion cases occurred at different points during employment—some as early as a few months after starting work, while others happened 5 to 8 years later.	
Diabetes	9		
Abortion	9		Three out of the nine were not yet employed at MEC when the abortion occurred. Of these three, two were working at another electronics company at the time.
Ovarian Cyst	8		Common condition is Polycystic Ovarian Syndrome (PCOS)
Breast Cyst	6		All were benign tumors
Leiomyoma	6		
Adenomyosis and Dysfunctional Uterine Bleeding	5		
Infertility/Hirap mabuntis	4		1 had Adenomyosis, the other, the partner is infertile
Stillbirth	2		1 with comorbidity; Asthma
Ovarian Cancer	1		Operation done and chemotherapy

Out of the 107 workers interviewed, 51 reported a history of current reproductive health conditions. After the medical check-up, 47 of these 51 were interviewed. Two had already resigned, while the other two missed their scheduled interviews due to shift overtime work and eventually declined to participate.

Table 12. Workers' Current and Previous Medical History

ILLNESS/DISEASE (Current and Previous)	No.
Systemic Viral Illness/Cough and Colds	49
Reproductive Health Problems	41
Hypertension	15
Musculoskeletal Disorders	12
Vision Problems	9
Diabetes	9
Urinary Tract Infection	9
Cholelithiasis	6
Pneumonia	6
Tuberculosis	5

Table 11 shows that among the women workers who underwent medical check-ups, hypertension ranked as the most common condition, followed by diabetes. Reproductive system issues included abortion, ovarian cysts, breast cysts, leiomyoma, dysfunctional uterine bleeding, infertility, stillbirth, and ovarian cancer.

Table 12 reveals that when including workers' past medical history, the most common conditions are systemic viral illnesses (such as cough and colds), hypertension, and musculoskeletal disorders. If combined, reproductive illnesses rank second overall and, when listed individually, still fall within the top 15, except for stillbirth and ovarian cancer.

ANALYSIS AND DISCUSSION

A total of 107 respondents were interviewed, two short of the 109 required to complete 30% of the total female workforce. These figures are based on the number of workers in the factory, excluding those in administrative and clerical positions.

The data indicates that half of the respondents are within the reproductive age bracket (15-45 years old), exposing them to various reproductive hazards in their work environment. The number of older workers (46-54 years old) is nearly the same. The majority of respondents are married, although most were single when they were first hired by MEC. This reflects a common practice or preference in the industry, as single women are considered more cost-efficient due to requiring fewer benefits and having fewer family responsibilities.

Most respondents are high school graduates, highlighting that labor-intensive work at MEC does not require a college degree and typically demands only middle-level skills. While current studies show that only 20-25% of industries are willing to hire high school graduates directly, the transition to the K-12 curriculum aims to increase their employability. However, the K-12 strategy faces challenges, such as aligning competencies with industry needs, strengthening work immersion programs, and providing better career guidance and labor market information. It is also worth noting that while this system may create a pool of skilled workers, it does not necessarily generate more jobs or improve wage levels.

HAZARDOUS WORK CONDITIONS

As ranked by the workers themselves, heat and noise as physical hazards, along with exposure to dust, fumes, and gases as chemical hazards, emerged as the most significant concerns. The deadly combination of heat and chemical hazards in the workplace poses serious risks to workers' health. Key processes such as soldering, insertion molding, and recycling of rejected cables and wires all involve the use of heat. This exposure to heat has led to widespread health impacts, particularly during the April to May 2024 heatwave. Many workers reported experiencing headaches—identified as the most common symptom—along with dizziness and fainting. Heat can also exacerbate pre-existing conditions such as hypertension, which is the most frequently diagnosed work-related disease among MEC workers. Although the risk of factory fires is associated with these conditions, no such incidents have occurred.

While many workers cited a lack of air conditioning, there are air conditioning units within the facility. However, these units do not function properly. The problem is compounded by inadequate ventilation and an insufficient number of electric fans. Although workers acknowledged that the exhaust system has been adjusted, it remains ineffective. They continue to experience the presence of fumes, noxious substances, and smoke at their workstations. These hazardous substances should be swiftly removed if the ventilation system was working efficiently.

MEC women workers also face challenges in identifying the chemicals to which they are exposed. They are often unable to pinpoint specific hazardous substances, relying instead on sensory cues such as the presence of an unpleasant odor and the black smoke produced when heat is applied. Through surveys and interviews, workers identified several chemicals used in the production process, including methyl butyl ketone (MBK), methyl isobutyl ketone (MIBK), tinning flux, soldering bars, ethyl and isopropyl alcohol, epoxy, PUC/Z black 45.3, lubricants, varnish, and silicon, among others.

Like many workers in the semiconductor and electronics industries, MEC workers handle toxic chemicals such as solvents, adhesives, resins, and etchants. These synthetic organic chemicals pose severe health risks, including acute and chronic conditions, and may even cause death with prolonged exposure in the absence of proper industrial hygiene measures. Women workers are particularly vulnerable due to the effects of these chemicals on reproductive health.

(Electronics Watch, Comments to UN Special Rapporteur on Toxics and Human Rights; Inputs on Gender and Toxics).

The use of solvents in the production process presents both immediate and long-term health risks. Short-term exposure to solvents can cause skin, eye, and lung irritation, dizziness, headaches, and in extreme cases, unconsciousness or death. Chronic exposure, however, may result in severe neurological problems such as tremors, behavioral changes, and slurred speech. Additionally, it may lead to cancers, dermatitis or skin allergy, weakening of the immune system, and reproductive health issues. These reproductive concerns include hormonal changes, reduced fertility, and pregnancy complications such as miscarriages, low birth weight, preterm birth, and birth defects. Solvents can also pass into breastmilk, potentially causing intellectual and developmental issues in offspring

Heavy metals such as lead, copper, tin, nickel, and silver are serious toxicants as carcinogens known to damage cells and organs in the body. Among these, lead is the most toxic and poses significant health risks even at low levels of exposure. Lead exposure can disrupt both male and female reproductive functions by altering sperm production, menstrual cycles, and pregnancy outcomes. It is also associated with high blood pressure and can cause intellectual dysfunction in children.

While MEC has claimed to have shifted to non-lead solders that are reportedly less hazardous, these alternative materials still contain other heavy metals. The fumes or gases produced during soldering remain toxic and can lead to conditions such as metal fume fever, dizziness, vomiting, and irritation of the eyes, nose, and throat. Prolonged exposure can cause severe respiratory problems, including asthma, pneumonia, emphysema, and siderosis. Despite their industrial usefulness, all heavy metals are considered carcinogenic to varying degrees (Journal of Cancer Prevention).

Additionally, solvents used at MEC -- including toluene, benzene, hexane, and methanol, are listed as chemicals of concern. International guidelines, such as the *“How to Protect Workers from Chemical Hazards in Electronic Supply Chains Guidance for Public Buyers V. 1.0”* (Electronics Watch, 2020), explicitly advise discontinuing their use and replacing them with safer alternatives.

Polyvinyl chloride (PVC) is another major concern. This plastic resin, commonly used for wires and cables due to its resistance to chemicals, sunlight, and water oxidation, poses significant health and environmental risks throughout its lifecycle—from production to disposal. Exposure to vinyl chloride, the chemical used to produce PVC, is linked to liver, brain, blood, and lung cancers. When PVC is heated or burned, it releases phthalates into the air, which, when inhaled, can cause birth defects, testicular cancer, liver damage, and early puberty in girls. Additional health effects include endocrine disruption, reproductive impairment, neurotoxicity, immune system suppression, and respiratory irritation.

A particularly alarming issue is the arbitrary labeling of chemicals used in MEC's production processes. Workers report that chemical containers are labeled without providing adequate precautions or detailed ingredient information. This lack of transparency, combined with inadequate chemical safety orientations, difficult-to-understand Safety Data Sheets (SDS), and the absence of regular training, leaves workers confused and uncertain about the hazards they face.

The failure to provide accurate information on chemical hazards constitutes a serious violation of the workers' "right to know"—a fundamental occupational health and safety principle. It is crucial to thoroughly investigate the effectiveness of MEC's hazard communication practices to identify and address the gaps in worker safety and ensure comprehensive protection at all levels of operation.

Noise from machines and ergonomic issues are also significant concerns for MEC workers. Women workers report that repetitive tasks, awkward work positions, and lifting heavy loads—ranging from 3 to 5 kilograms (including wire harnesses, cables, and transformers)—cause considerable physical strain. Hip and back pain are the second most commonly reported symptoms among the workers. Notably, the Occupational Safety and Health (OSH) Committee has consistently identified work-related musculoskeletal disorders as the most prevalent occupational disease since 2015.

In addition to physical strain, workers face psychosocial stressors due to multi-tasking (especially when there is insufficient manpower), shift work, and the demanding quota system. Studies indicate that these hazardous working conditions may also have adverse effects on reproductive health.

Although no formal hazard map has been created, workers have identified key areas of exposure and vulnerability throughout the production processes. Several factors worsen these hazards: the absence of physical barriers between manufacturing processes (as the factory layout consists of a large open space), the practice of assigning workers to multiple roles and workstations, and the pressure from the quota system, which increases mental and physical stress.

Recurring issues persist despite ongoing concerns raised by workers. These include: exposure to fumes, odors, and chemicals; lack of proper training on handling chemicals; no knowledge about the chemicals being used; noise from equipment and machinery; excessive heat and inadequate ventilation; ergonomic problems from repetitive motion and heavy lifting; and high stress due to multi-tasking and production quotas.

These concerns are consistent with observations made by *Electronics Watch*, a global organization dedicated to using public procurement leverage to promote and protect the rights of workers in global supply chains. The persistence of these hazards highlights the urgent need for better industrial hygiene, improved working conditions, and stronger worker protections.

DISEASES, ILLNESSES AND INJURIES

The commonly experienced symptoms and work-related illnesses among MEC workers can be directly linked to the hazardous conditions they face daily. Symptoms such as headaches, cough, colds, difficulty breathing, and chest pains are likely caused by exposure to heat, noxious gases, fumes, and dust. Additionally, noise from machinery and the physical and mental strain of multitasking under the quota system may also contribute to frequent headaches. This correlation extends to more serious occupational diseases, including hypertension, diabetes, pneumonia, tuberculosis, musculoskeletal disorders, and urinary tract infections (UTIs)—conditions diagnosed among a significant number of workers.

MEC also neglects to ensure a safe, accident-free workplace. Data reveals that 37.38% of workers (40 out of 107) reported experiencing workplace accidents. These accidents include chemical burns, slips and falls, being struck by falling objects, chemical splashes in the eyes, fingers caught in machines (including amputations), incision wounds from blades, and electrocution. These findings highlight the urgent need for MEC to implement comprehensive safety control measures, including regular safety training and education for all workers, proper usage and maintenance of safety equipment and hazard identification processes.

While individual cases of reproductive illnesses among MEC women workers do not exceed national averages, when combined, they represent the second most notable number of illness in this study. These cases include menstrual disorders, abortion, ovarian dysfunction, breast cysts, and ovarian cancer. Such conditions may be linked to occupational exposure to hazardous chemicals. While many workplace chemicals remain insufficiently tested for reproductive harm, established reproductive toxins used in MEC's operations include benzene, toluene, and methyl alcohol. There are also numerous studies documenting cases of women suffering from cancers, reproductive disorders, congenital anomalies and many other harmful and even fatal health conditions due to occupational exposure.

Although this study did not investigate the long-term health effects on workers' offspring in depth, the respondents indicated that their children are currently alive, healthy, and free from physical or mental deformities—potential consequences of maternal chemical exposure.

These concerns are particularly urgent for women, who face disproportionate exposure to workplace chemicals due to their overrepresentation in chemical-heavy industries, poorer working conditions compared to men, and increased biological vulnerability. On average, MEC's women workers have 1 to 2 children, with at least one worker reporting difficulty conceiving due to ovarian and uterine conditions.

Despite these alarming findings, MEC management consistently denies any direct connection between workplace chemical exposure and reproductive illnesses. This refusal to acknowledge responsibility is made worse by the company's failure to conduct health surveillance or work environment monitoring—critical measures for assessing occupational risks.

MEC's inaction contradicts the *Precautionary Principle outlined in Principle 7 of the UN Global Compact,* which urges companies to take proactive measures to protect human health and the environment. The four key components of the Precautionary Principle are: (1) taking preventive action in the face of uncertainty, (2) shifting the burden of proof to the proponents of an activity; (3) exploring a wide range of alternatives to possibly harmful action; and (4) increasing public participation in decision-making.

MEC's failure to adopt these preventive measures demonstrates a clear disregard for worker safety and violates their right to a safe and healthy workplace. Prioritizing the protection of women workers, particularly through their equal participation in chemical management and decision-making processes, is crucial to addressing these systemic health and safety failures.

CONTROL MEASURES AND COMPLIANCE WITH STANDARDS

The DOLE Department Order No. 136-14 Series 2014, titled *"Guidelines for the Implementation of Globally Harmonized System (GHS) in Chemical Safety Program in the Workplace,"* addresses various aspects of chemical safety, with a focus on Section 6 (Chemical Safety Program Elements). This Order specifies two control levels: engineering and administrative, while also addressing the workers' right to know. Despite these provisions, the survey results reveal inadequate implementation of this order.

Within the scope of the study, the safeguarding measures adopted by the companies are often limited to providing masks (to counter noxious fumes) and furnishing personal protective equipment (PPEs) as well as some administrative controls. It is noteworthy that the utilization of PPEs represents the lowest and least effective level in the hierarchy of controls (Safety International, 2023). In MEC, the majority use cloth masks, not the most ideal in preventing fumes and dust. The prevalence of respiratory illnesses and accidents due to burns and falling objects shows that the company is still negligent in isolating workers from the hazards brought about by the use of chemicals, machines, and equipment. As seen in the results, while administrative and engineering controls combined are merely present, their implementation remains insufficient and inconsistent.

Beyond the inadequacy of appropriate PPE, the absence of strict occupational safety and health (OSH) control measures extends the potential danger to workers' families. Worker reports highlighting the absence of adequate local and general ventilation in their workplace raise significant OSH concerns. The open, one-room setup of the factory makes all workers vulnerable, with the company paying less attention to measures to totally enclose hazardous processes from other processes.

It is crucial to note that government data indicates the indoor air quality program ranks among the least implemented OSH programs by companies. This underscores the urgent need for companies to prioritize and address ventilation issues as a crucial component of their OSH control measures. As seen in the results, while administrative controls are implemented to some extent, there is

minimal focus on engineering controls, and overall, there is no active effort to promote a culture of safety in the workplace.

Annual Physical Examinations (APE) play a vital role in early health issue detection, ensuring the well-being of employees, and fostering a proactive approach to workplace health and safety. However, the study brings to light a concerning revelation: Despite the identification of common symptoms and illnesses, such as Pneumonia, Tuberculosis, prevalence of reproductive illnesses, Urinary Tract Infections, Hypertension, Headache, and Muskuloskeletal Disorders, workers feels that there is not enough transparency on these conditions where workers are not given access to results of their medical examinations if the results are normal, the conditions persist or recur and preventive health programs absent.

The predominance of reproductive health disorders including abortion, ovarian cysts, problems with menstruation, and conceiving in a company that utilizes not just a few but a multitude of chemicals, some classified as hazardous, warrants health surveillance under Rule 1960 of the OSHS. However, neither this nor the concomitantly important OSH component of biochemical monitoring for workers and work environment monitoring is being conducted, as far as the workers know. There is no consultation between management and workers for a regular and relevant occupational health and safety plan.

The mere presence of health facilities does not translate to the provision of relevant health services. These facilities seem to serve a nominal purpose, appearing to comply with laws but lacking a real impact or purpose in safeguarding and enhancing workers' health and safety.

Annual spot audits conducted by authorized labor inspectors have been mandated by the OSH Law. However, while a significant percentage of workers are aware of labor inspections conducted by the Labor Department in their company, they are not aware or informed about the results. Moreover, while workers are encouraged to be present during inspections to enhance transparency and accountability among stakeholders, this involvement has often been symbolic and performative.

Workers in high-risk industries handling chemicals face evident exposure to hazardous working conditions. Beyond the imperative to safeguard their health and safety, they merit additional compensation and benefits for undertaking hazardous tasks. Notably, **hazard pay is not mandatory for all workers in the Philippines.**

While specific laws and guidelines currently grant hazard allowances to certain workers exposed to risks, such provisions are limited. The Magna Carta for Scientists, Engineers, Researchers, and Other Science and Technology Personnel in Government (Republic Act 8439), effective since 1998, establishes a hazard allowance for those engaged in hazardous undertakings or workplaces. This allowance ranges from ten (10%) to thirty (30%) percent of their monthly basic salary, contingent on the nature and extent of the hazard. For MEC only the registered chemists are given hazard pay by virtue of Republic Act 10657, known as the Chemistry Profession Act of 2015, and its Implementing Rules and Regulations.

According to the workers, some of them receive “additional pay” for “special work” done, meaning those that are considered hazardous.

A critical discourse among workers surfaces a compelling question: why is hazard pay exclusively designated for professionals when all workers face similar risks with hazardous chemicals? Consequently, the violation of the workers right to know has led to very poor awareness and low expectations regarding occupational safety among the workers. In the survey, almost all of the respondents were aware of possible exposure to hazardous chemicals and answered affirmatively, even though all of the respondents were using chemicals in their work on a daily basis.

CONCLUSION

The passage of RA 11058, *"Act Strengthening Compliance with Occupational Safety and Health Standards and Providing Penalties for Violation Thereof,"* was a positive step in the workers' struggle for safe and healthy working conditions. It not only reinforced the Occupational Safety and Health Standards by mandating safety protocols but also helped push employers to prioritize safety and health in workplaces across the Philippines.

Almost seven years after its passage there are still significant gaps noted. The Occupational Safety and Health Center (OSHC) reports that most of the current violations by companies involve absence of OSH programs, non submission of reports, absence of OSH personnel (safety officers and first-aiders), non-conduct of OSH training for all workers including toolbox meetings, absence of OSH committees and non-issuance of PPE or issuance of sub-standard PPE.

MEC is an electronics company utilizing chemicals in various processes of production. It is shown that there are violations in safety standards specifically on chemical safety measures of handling hazardous materials according to DOLE D.O. 136-14 or the Globalized Harmonized System (GHS). There are shortcomings on labelling, storage requirements, information and training, PPE, work environment monitoring, risk assessment and communication (including SDS), and medical surveillance as well as quick response.

The results of medical examinations and testimonies from workers who are current or former patients highlight the inadequacy of MEC's control measures and occupational safety and health services. The recurrence and persistence of work-related illnesses—particularly reproductive and respiratory conditions—along with repeated workplace accidents, demonstrate that the company is failing to provide effective preventive measures. Management has remained evasive, defensive, and unwilling to engage in open consultations with workers to directly address health and safety concerns. As a result, a suitable and effective OSH plan either does not exist or is confined solely to the management committee, excluding meaningful worker participation.

Workers at MEC face considerable challenges in voicing their concerns and are not allowed to engage actively in the OSH committee, where their participation is often reduced to token representation. This lack of involvement constitutes a

violation of workers' fundamental rights—including their **right to know, their right to refuse unsafe work, and their right to safe and healthy working conditions.**

Although the Philippines has not ratified International Labour Organization (ILO) Convention 170 on Chemical Safety, the government has adopted various standards on chemical safety, including DOLE Department Order 136-14 and the Commission on Human Rights' (CHR) Human Rights Agenda (HRA-CHR IV-A2014-007) on "The People's Right to Chemical Safety." Companies have a moral and legal obligation to adhere to these standards and uphold the Fundamental Principles and Rights at Work. Protecting workers from the harmful effects of chemicals not only safeguards their well-being but also promotes the broader protection of the public and the environment. Therefore, there is an urgent need to strengthen the implementation and enforcement of these safety standards to ensure compliance and uphold workers' rights.

RECOMMENDATIONS

To strengthen occupational safety and health (OSH) programs and ensure that workers' rights are upheld, several key measures should be implemented.

1. **Strengthen Workers' Representation in OSH Programs**

   It is crucial to amplify workers' voices in OSH decision-making to better address their needs and concerns. This can be achieved by establishing strong and active **Workers' OSH Committees** in workplaces, with or without organized unions. These committees should be composed of worker representatives who can actively participate in identifying hazards, monitoring compliance, and advocating for safer working conditions.

   An empowered Workers' OSH Committee will help ensure that all OSH programs remain transparent, proactive, and responsive. By doing so, workers' fundamental rights—including the right to know, the right to refuse unsafe work, the right to free and appropriate personal protective equipment (PPE), and the right to report workplace incidents—will be effectively protected and promoted.

2. **Create OSH Guidelines for High-Risk Industries**

   Specific OSH guidelines for high-risk industries such as electronics, semiconductor, and chemicals that deal with hazardous and toxic substances must be created in consultation with workers, unions, OSH practitioners and other relevant stakeholders.

3. **Strengthen OSH Law by Criminalizing Violations of Workers' Safety and Health Rights**

   There is a growing need to push for stricter enforcement of OSH laws, including the criminalization of gross OSH rights violations. The case of MEC demonstrates that inadequate safety measures and weak management systems have resulted in repeated workplace accidents, illnesses, and

injuries. While no fatalities have been reported, continued non-compliance poses an ongoing risk to workers' lives.

There is also a need for businesses to be held accountable for adopting OSH, environmental, social, and governance (ESG) practices, as has been increasingly emphasized in other countries.

4. **Prioritize the Ratification of ILO Chemicals Convention No. 170**

The government must reaffirm its commitment to ensuring the health and safety of workers exposed to hazardous chemicals. A significant step in this direction would be the ratification of the International Labour Organization (ILO) Chemicals Convention (No. 170) and its accompanying Recommendation (No. 177), which have been in place since 1990.

The failure to ratify these crucial international labor standards raises concerns about the government's dedication to protecting workers in high-risk industries. This issue must be prioritized, and urgent action should be taken to push for ratification.

5. **Advocate for Living Wages and Hazard Pay in High-Risk Industries**

There is a pressing need to advocate for living wages and hazard pay for workers in high-risk industries, including those at MEC. Living wages and adequate financial protection for workers exposed to occupational hazards are essential to ensuring their well-being and improving overall working conditions.

These measures are essential steps toward ensuring that workers' health, safety, and rights are protected. These actions can help pave the way for a future where all workers, regardless of industry, can perform their jobs in environments that are health .

REFERENCES

Bagaoisan, A. (2022, October 15). *Many small businesses fail to observe occupational safety standards: DOLE*. ABS-CBN. https://news.abs-cbn.com/news/10/15/22/many-small-businesses-fail-to-observe-occupational-safety-standards-dole

Bureau of Working Conditions. (2023). *Annual Report 2022*. Department of Labor and Employment. https://bwc.dole.gov.ph/wp-content/uploads/2024/07/BWC-Annual-Report-2022.pdf

Chemscape. (2025, March 4). *Workplace chemical hazards & reproductive health*. https://www.chemscape.com/resources/the-reproductive-system

Chinese Center for Disease Control and Prevention. (2023, March 3). *Occupational health poisons*. en.chinacdc.cn/health_topics/occupation_health_poisons/202203/t20220323_2578907/html
Source no longer available.

Electronics Watch. (2020, November 27). *How to Protect Workers from Chemical Hazards in Electronics Supply Chains, Guidance for Public Buyers V. 1.0*. https://electronicswatch.org/how-to-protect-workers-from-chemical-hazards-in-electronics-supply-chains-guidance-for-public-buyers-v-1-0-november-2020_2582525.pdf

Electronics Watch, & Center for Trade Union and Human Rights. (2016, December). *Regional Risk Assessment in Semiconductor and Electronic Industry, Philippines*.

Figa-Talamanca, I. (2006). Occupational risk factors and reproductive health of women. *Occupational Medicine*, *56*(8), 521-531. https://doi.org/10.1093/occmed/kql114

HSS Team. (2023). *Safety and Health Tips*. Health and Safety Solutions. https://hssphilippines.com/blog/safety-and-health-tips/

Hwang, S. (2024, January 25). *Construction law international – January 2024 – Country updates: South Korea*. International Bar Association. https://www.ibanet.org/country-updates-clint-january-2024-south-korea

Institute for Occupational Health and Safety Development. (2023, December). *Survey and Assessment of Health and Working Conditions of Workers in High Risk Industries Using Chemicals [Unpublished manuscript]*.

Institute for Occupational Health and Safety Development. (n.d.). *Adverse Reproductive Outcomes on Women Workers Exposed to Chemicals,*

Radiation, and Physical Stress [Unpublished manuscript].

Kumar, S. (2004). Occupational exposure associated with reproductive dysfunction. *Journal of Occupational Health*, *46*(1), 1-19. https://doi.org/10.1539/joh.46.1

Lu, J. L. (2022). State and trends of occupational health and safety in the Philippines. *National Institutes of Health - University of the Philippines Manila*, *56*(1). https://doi.org/10.47895/amp.v56i1.3865

National Institute for Occupational Safety and Health. (2025, January 3). *About solvents and reproductive health*. https://www.cdc.gov/niosh/reproductive-health/prevention/solvents.html

Oloffons, O. (2020, June 23). *Toxic Tech: Occupational Poisoning in ICT Manufacturing*. SwedWatch. https://swedwatch.org/wp-content/uploads/2021/03/mictfbriefing210120-fin.pdf

Patinio, F. (2022, November 22). *Labor inspections suspended this December: DOLE*. Philippine News Agency. https://www.pna.gov.ph/articles/1189138

Safety International. (2022, September 5). *The 5 Levels of the Hierarchy of Controls Explained*. https://www.safety-international.com/posts/hierarchy-of-controls/

Sherriff, L. (2021, June 1). *Are chemicals poisoning the world's female workers?* Foreign Policy. https://foreignpolicy.com/2021/06/01/chemicals-are-poisoning-the-worlds-female-workers/