



Occupational Safety & Health Practices in Automobile & Parts Industries in Punjab 2021

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**Under ADP Scheme Capacity Building of Occupational Safety and Health (OSH)
Regime to Promote Safer Working Conditions at Workplaces)
Centre for the Improvement of Working Conditions & Environment
Directorate General Labour Welfare Punjab
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List of abbreviation

ACGIH	American Conference of Governmental Industrial Hygienists
ADP	Annual Development Programme
ASHRAE	American Society of Heating, Refrigerating and Air-conditioning Engineers
BMI	Body Mass Index
COVID-19	Corona Virus Disease, 2019
ILO	International Labour Organisation
L&HR	Labour & Human Resource
NIOSH	National Institute for Occupational Safety and Health
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PAAPAM	Pakistan Association of Automotive Parts & Accessories Manufacturers
PEL	Permissible Exposure Limit
PEQS	Punjab Environmental Quality Standards
PPEs	Personnel Protective Equipment's
REL	Recommended Exposure Limit
SAACIWCE	Saeed Ahmed Awan Centre for the Improvement of Working Conditions & Environment

adequate resources and implementation of safety activities [11]. All activities require risk assessment and safe systems of work.

2. Significance:

The significance of this sector is wide-ranging as it has its impact on the economy and plays a supportive role for other industries' performance that is mainly dependent upon the mode of transport, whether it is the transport of raw materials, labour, machines, goods, etc. In short, all the industries are dependent on this industry when it comes to mobility. Moreover, the entire distribution infrastructure of other industries is dependent on this industry. Thus, the automobile sector plays a pivotal role in developing a country through revenue generation, foreign exchange, employment creation, and technology transfer. Moreover, the industry in Pakistan contributes to the creation of allied industries that provided jobs and contributed significantly to the national exchequer.

Pakistan Association of Automotive Parts and Accessories Manufacturer: “The automobile industry has always been part of the backbone of any economy and continues to play an integral part in its success or failure. This is because the automobile industry is one of the few in the world that utilized practically all technologies available to the time”(PAAPAM).

3. Objectives:

The main objectives to carry out this study program were as follows:

- i. To conduct occupational safety and health risk assessment in automobile and parts manufacturing units in the province,
- ii. To formulate an analysis report on occupational diseases and to suggest control measures.

4. Methodology:

The methodology used for hazard identification is as follow:

- i. Automobile & Parts industrial visits by sector specialists for hazard risk assessment and testing
- ii. Site visit/questionnaires/checklists – documentation of the tasks
- iii. Hazard and operability study – proper evaluation, control measures

Following testing performed in enterprises:

- i. Audiometry Testing of the workers
- ii. Spirometry Testing of the workers

- iii. Monitoring of total dust (Personnel Exposure)
- iv. Noise Level Testing
- v. Illumination Testing
- vi. Stack Emission Testing

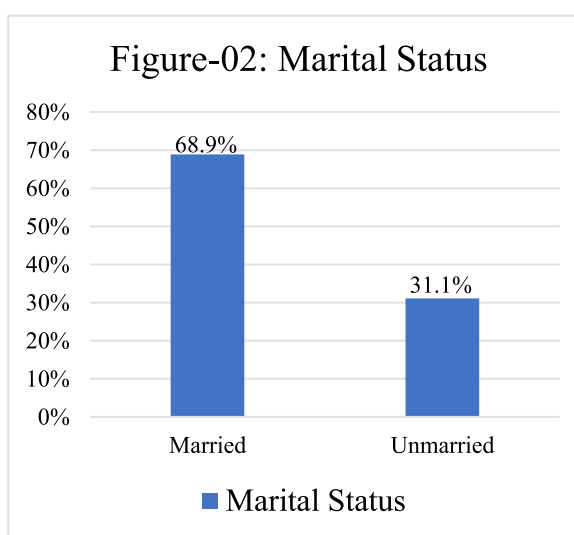
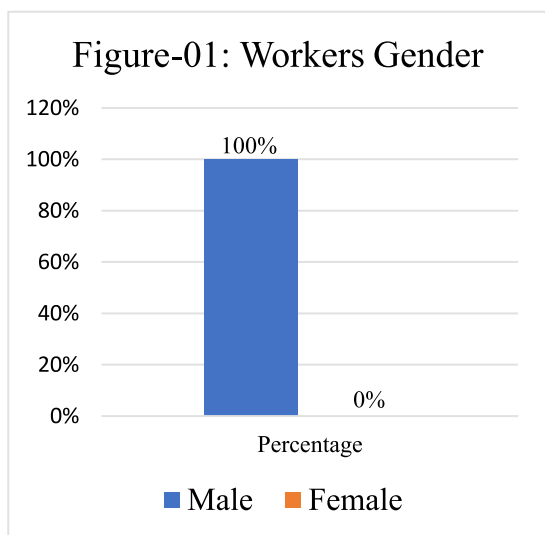
5. Visited Industries in Punjab:

Following automobile and parts sector industries visited:

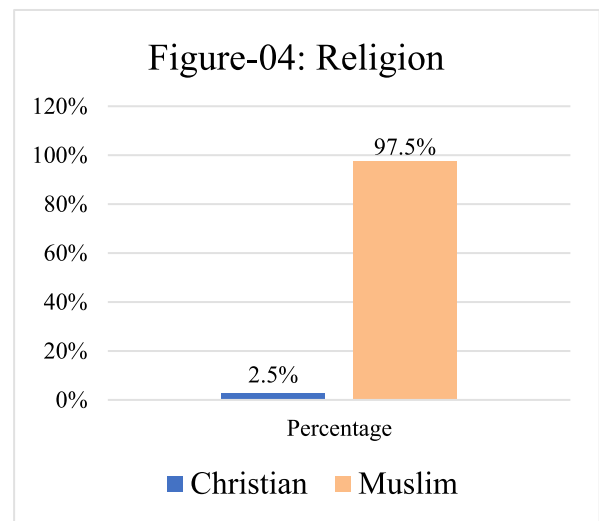
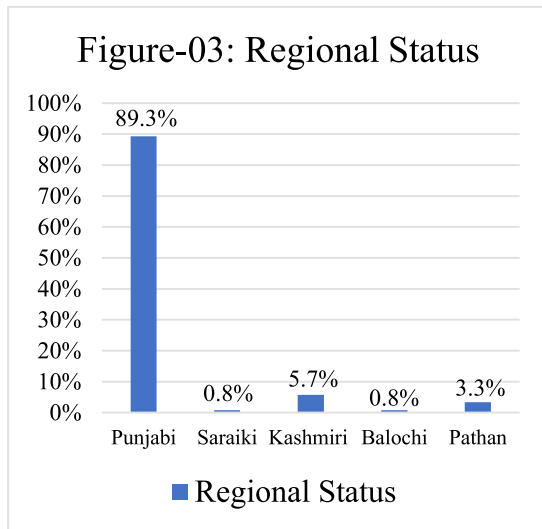
- i. Atlas Honda, Sheikhpura 26-27 KM Lahore Road, Sheikhpura.
- ii. AJR Metals Fabricators (Pvt.) Ltd, Karian wala, Sheikhpura.
- iii. Jodhala Complex Pvt. Ltd. Morr Eminabad, Gujranwala.
- iv. Midson Industry Ltd. near Khiali Road, Small Industrial Estate, Gujranwala.
- v. Butt Metal Works, near Khokhawala bazar, Gujranwala.
- vi. Qadcast Pvt. Ltd. Sundar, Lahore.
- vii. Hope Field International Pvt. Ltd. Sundar Industrial Estate, Lahore.

6. Demographics:

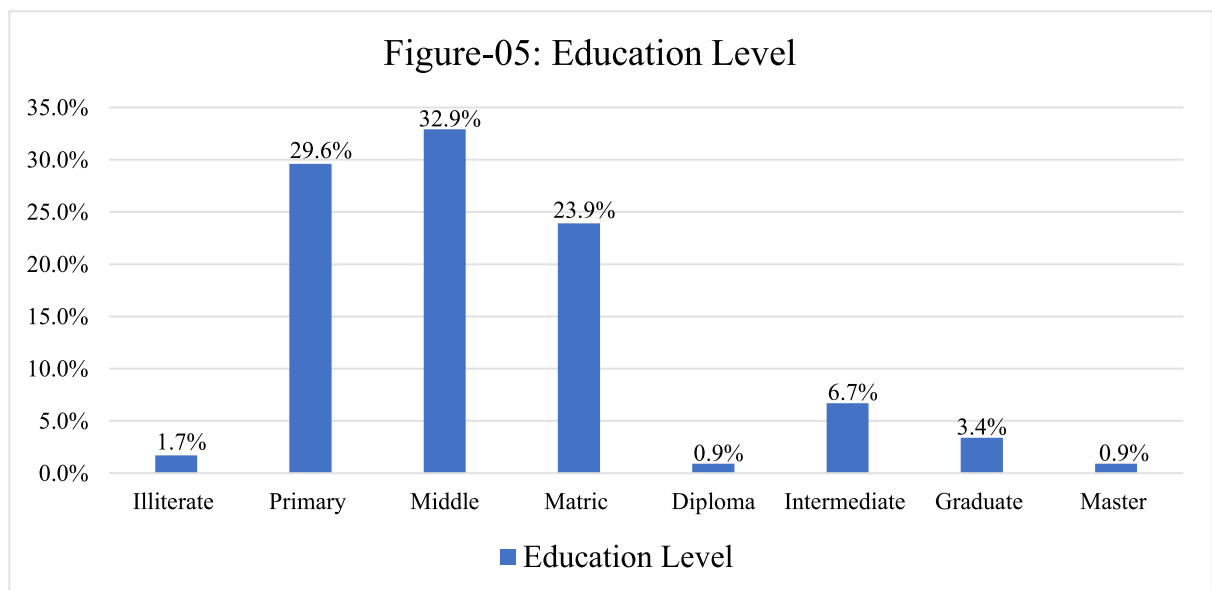
In the automobile sector, self-explanatory interviews of 122 workers of different departments were conducted as a demographic questionnaire to explore occupational diseases. The data shows that the overwhelming majority of the interviewed worker's gender was male 100% (122) shown in **Figure-01**. In addition, 68.9% (84) workers are married, and 31.1% (38) are unmarried, as shown in **Figure-02**.



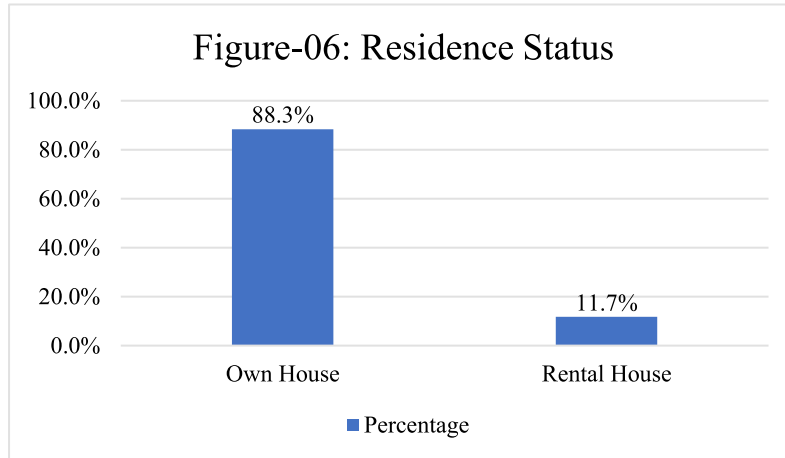
Social status of workers (**Figure-03**) shows 89.3% (109) workers were Punjabi, 0.8% (01) Saraiki, 5.7% (7) Kashmiri, 0.8% (1) Balochi and 3.3% (04) Pathan. Religious status (Figure-04) shows 2.5% (3) workers were Christian and 97.5% (119) Muslim.



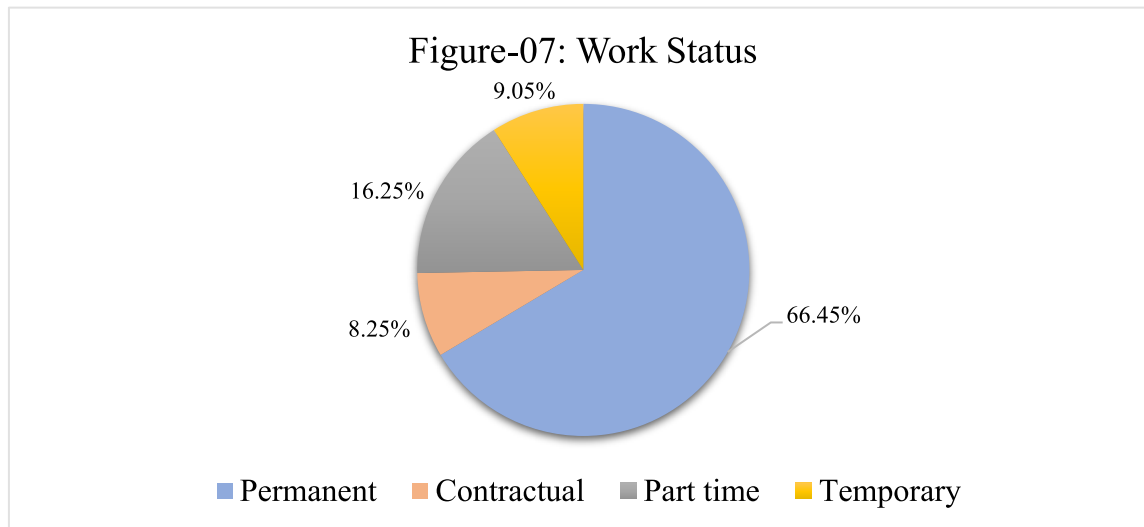
Education level (**Figure-05**) shows 1.7% (2) workers were illiterate, 29.6% (36) Primary, 32.9% (40) Middle, 23.9% (29) Matric, 0.9% (01) DAE, 6.7% (8) Intermediate, 3.4% (04) Graduate, 0.9% (01) Master.



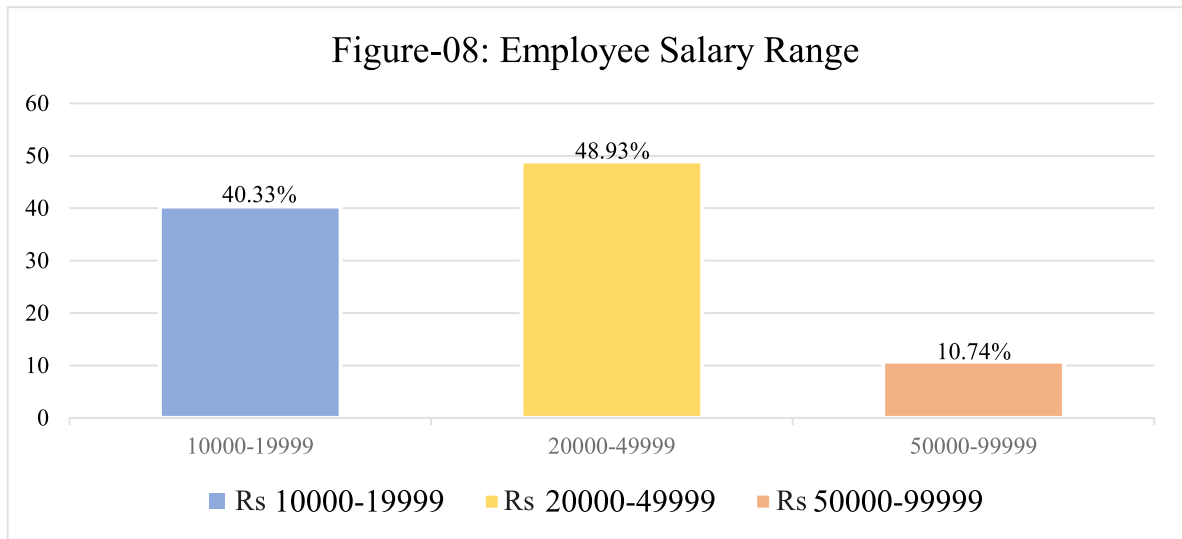
Residence status (**Figure-06**) shows that 88.3% of workers had their own residence while 11.7% lived in a rental facility.



Professional work status (**Figure-07**) shows 66.45% of workers' job status is on a permanent basis, 8.25% on a contract basis, 16.25% on a part-time basis, and 9.05% temporarily.



Employee salary range (**Figure-08**) shows 40.33% workers salary range was Rs. 10,000-19,999, 48.93% salary range was Rs. 20,000-49,999 and 10.74% salary range Rs. 50000-99,999.



About respiratory problems (**Figure-09**) shows 3.3% (4) workers having cough, 7.4% (9) workers having phlegm, 2.5% (3) feeling wheezy, 3.3% (4) feel breathlessness when walking, 0.16% had asthma history and 1.25% workers having chest illness disease.

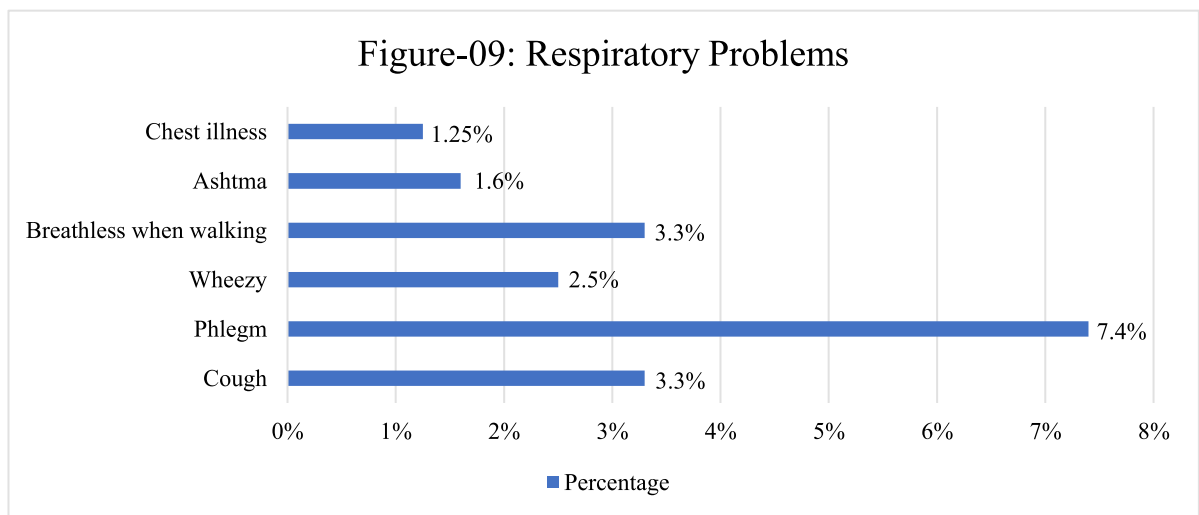
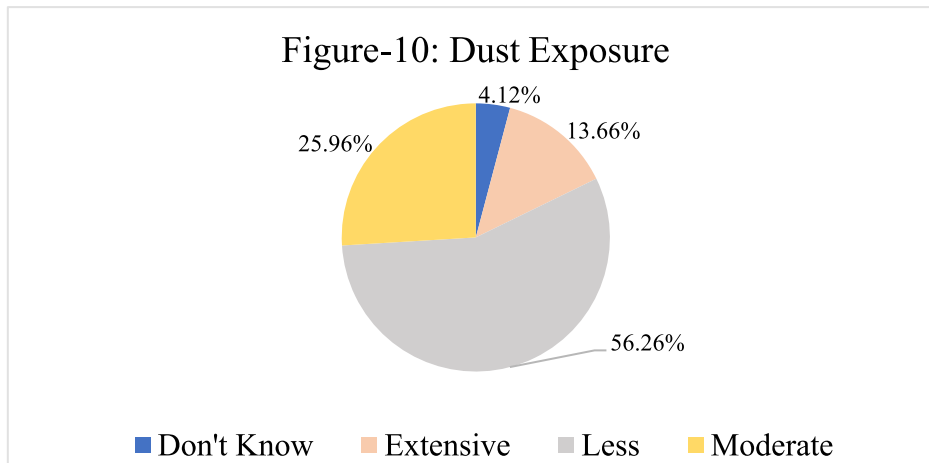
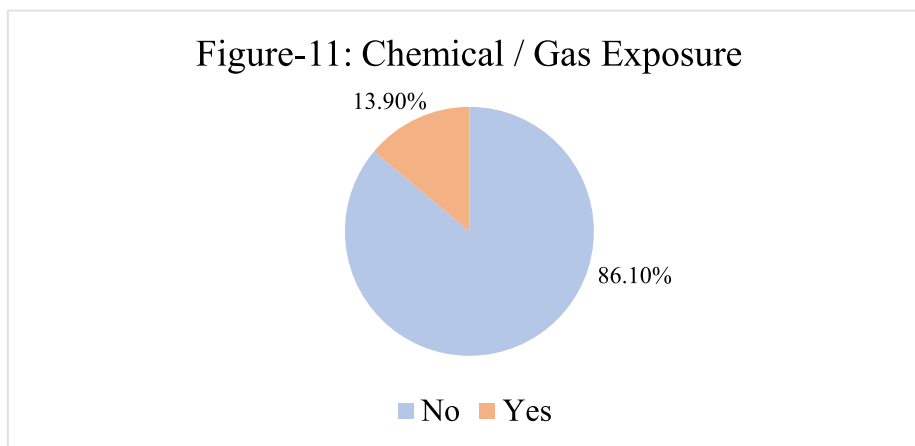


Figure-10 shows the percentage distribution of dust exposure, 56.26% of workers have less dust exposure, 25.96% moderate dust exposure, and 13.66% extensive dust exposure.



13.9% (17) workers had chemical/gas exposure, as presented in **Figure-11**.



About musculoskeletal disorders, **Figure-12** shows 20.5% (25) workers had musculoskeletal problems, 18.8% (23) had backache, 9.8% (12) felt difficulty while fully moving arms and legs, 14.8% (18) workers complained about pain and stiffness while leaning forward-backwards and 11.5% (14) had trouble while moving head up-down. In addition, data shows 11.4% (14) workers had back injury, 13.9% (17) felt difficulty while squatting ground, 9% (11) had head movement problems (side to side), 11.5% (14) felt difficulty while knee bending, and 9.8% (12) felt difficulty carrying a load of more than 12Kg while climbing stairs.

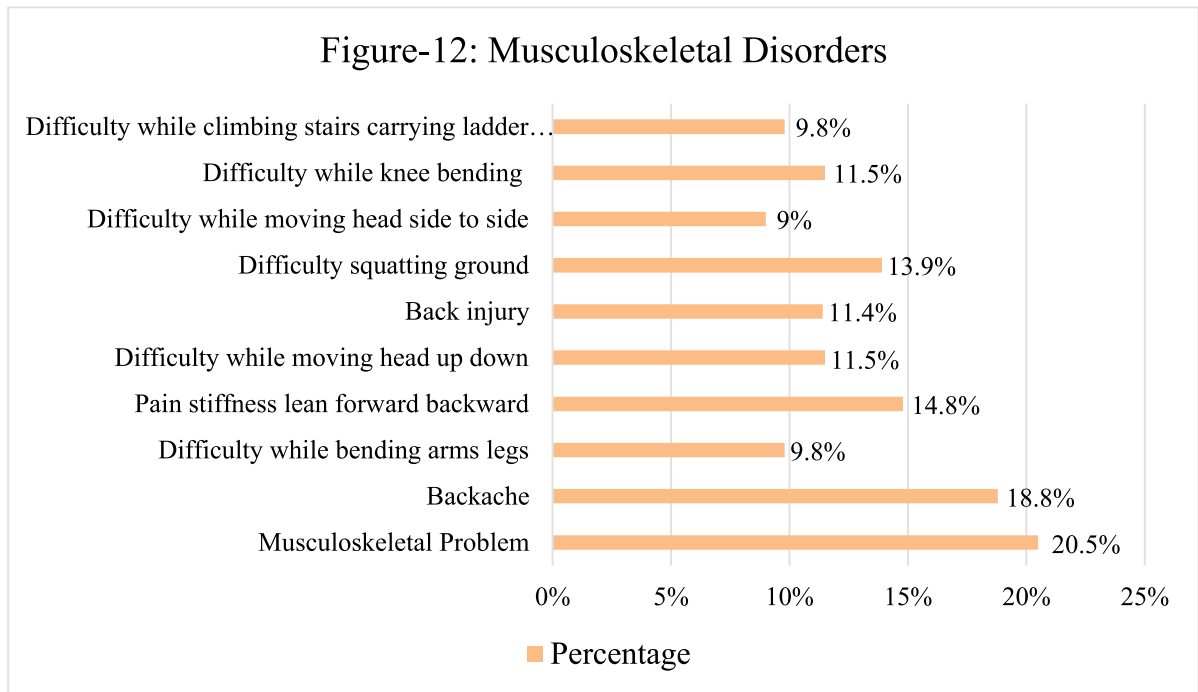
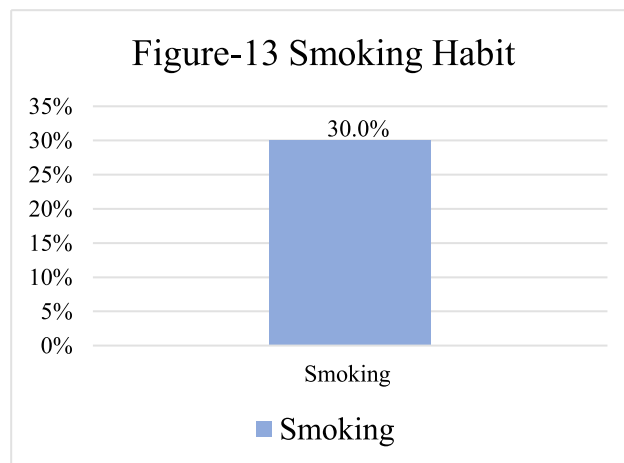
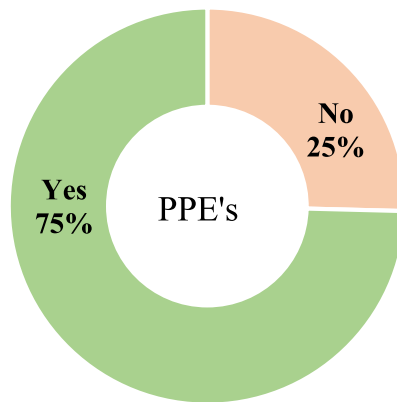


Figure-13 shows 30% workers were having smoking habits.



When asked about personnel protective equipment (PPEs) provided by the employer, 75% had PPEs as shown in **Figure-14**.

Figure-14 PPEs



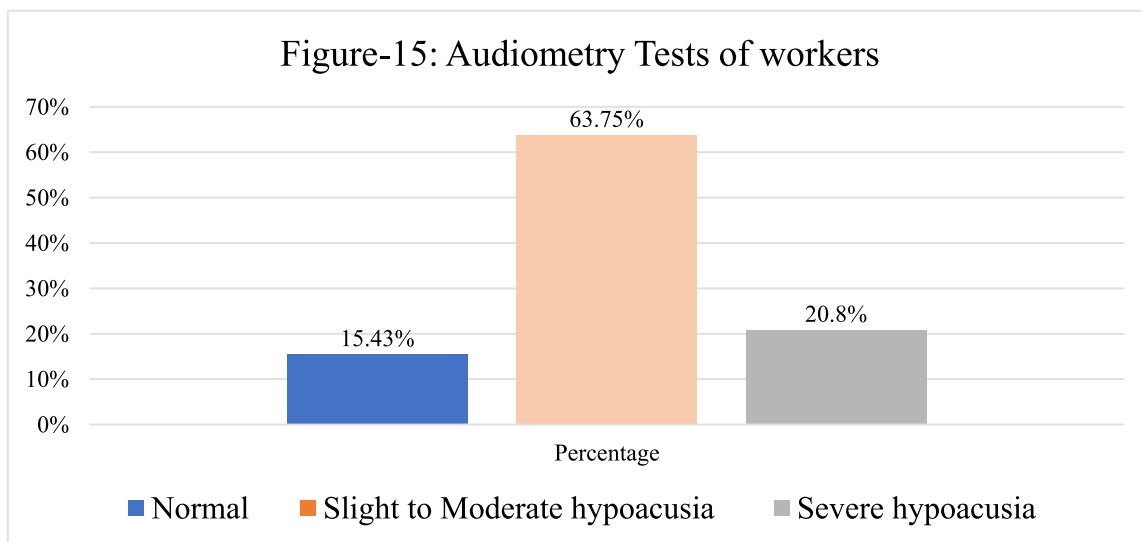
7. Field Testing & Monitoring:

All instruments calibration was ensured before conducting the tests. Following tests were conducted in the automobile sector:

(i). Audiometry Testing:

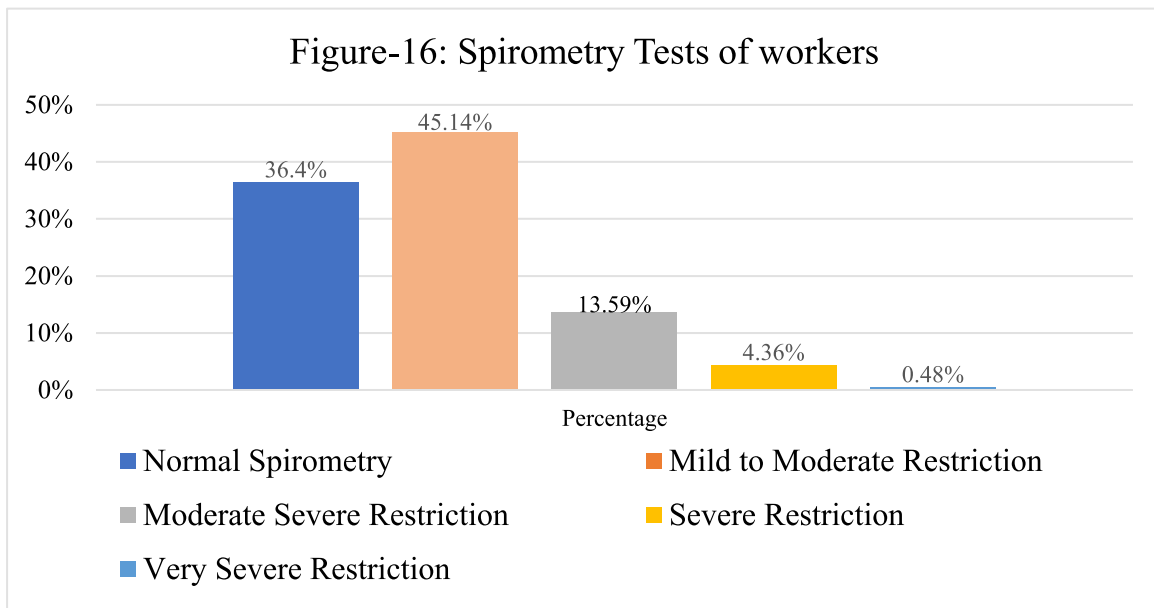
Audiometry tests were conducted in the target industries using a Sibelmed Audiometer of randomly selected 149 workers from different sections to diagnose hearing loss because workers had noise exposure at the workplace. Audiometry tests indicate that some of the workers had slight to severe Hypoacusia. **For example, figure-15** shows 15.43% (23) workers had normal audiometry, 63.75% (95) of workers had slight to moderate Hypoacusia, while 20.8% (31) workers had severe Hypoacusia.

Figure-15: Audiometry Tests of workers



(ii). Spirometry Testing:

Spirometry testing of randomly selected 206 employees from various enterprises sections was performed using MIR Spirodoc Spirometer to assess respiratory ailment among the target groups. Spirometry tests of workers showed that some of the workers have mild to very severe respiratory problems that may be due to smoking or exposure to chemicals/dust. **Figure-16** shows 36.4% (75) workers had normal spirometry, 45.14% (93) mild to moderate restriction, 13.59% (28) moderate severe restriction, 4.36% (9) severe restriction, while 0.48% (01) had very severe restriction.



Spirometry testing of workers



Audiometry testing of workers

(iii). Monitoring of total dust (Personnel Exposure):

Exposure monitoring of total dust (personnel exposure) was carried out in different sections of the enterprises using a dust sampler as workers are exposed to dust and fumes during their routine activities. The summary of test results (Table I) is summarized below:

Table I: Personnel Dust Exposure					
Sr.	Departments/ Sections	Avg. Total Dust (mg/m³)	Sr. No.	Departments/ Sections	Avg. Total Dust (mg/m³)
1.	Press Shop	1.84	13.	Bearing Sleeve	1.107
2.	Welding Shop	3.03	14.	Drilling Machine	1.626
3.	Machine Shop	3.18	15.	BHD CD-70	3.190
4.	Dye Shop	1.53	16.	Forging Machine	0.905
5.	Chrome Shop	2.65	17.	IQC Buffing	1.513
6.	Paint Shop	1.78	18.	Press Area	2.68
7.	Polish	3.01	19.	Furnace Section	1.98
8.	Coil Assembly	4.95	20.	Washing Area	0.44
9.	Coil Fitting	2.07	21.	Cutting Area	0.43
10.	Starting Coil	4.07	22.	Melting Section	0.91
11.	L/T Wire cutting	5.65	23.	Loading Area	2.78
12.	Coil Soldering	14.52	24.	Production Hall	2.89

*As per ACGIH, the total dust threshold limit value is 10 mg/m³.

During the visit of automobile industries, dust samplers (having filter in cassette for collecting dust sample) were attached to 20 workers of different sections from each industry for two hours while they were working their job activity at the workplace. After two hours, dust samplers were removed from workers and samples collected from them. Dust concentration was then calculated in the laboratory for total dust exposure (mg/m³).

The maximum concentration value of total dust was observed in the Coil Soldering section with an average value of 14.52 mg/m³, which is higher than the threshold limit of 10mg/m³ as per

(iv). Noise Level Monitoring:

The noise level monitoring was carried out to find noise levels in the workplace and noise exposure to employees. Noise level measurements were carried out with Casella Precision Sound Level Meter Type 2100. Noise levels in different sections of enterprises are as below:

Table II: Noise Monitoring in Automobile Sector					
Sr#	Section	Noise level dB (A)	Sr#	Section	Noise level dB (A)
01.	Fuel Tank Area	85.9	16.	Near Furnace	100.7
02.	Paint Shop	75.5	17.	Near Press Machine	102.2
03.	Engine Plant	80.25	18.	Near Cutter	98.7
04.	Casting Hall	80.5	19.	Printing area	73
05.	Autoline	85	20.	Injection Coil Assembly Line	73
06.	Sub Assembly Area	103	21.	Core Assembly Line	72
07.	Spot Machine	90.7	22.	Assembly-1 Area near drill machine	79.1
08.	TSP Press (Engine Shop)	89	23.	Press Shop	101.2
09.	Honing Machine	84.1	24.	Pipe Shop	80.5
10.	Key Fitting (Autoline)	86	25.	Crush Shop near power press machine	97.2
11.	Inspection Station (Autoline)	84	26.	Deck Shop near cutter	99.6
12.	D-Casting Machine (HPDC)	79	27.	Deck Shop near drill machine	86.6
13.	Steering Handle (Sub Assembly)	100	28.	Dye Section near miller machine	83.1
14.	Steering Stem (Sub Assembly)	106	29.	Brake Pedal Shop	97.2
15.	Finishing Area	84.1	30.	Welding Shop	87.5

As there is no set value for noise exposure limit in local standards, OSHA standard was used to compare noise levels. The reference standard for OSHA permissible limit value is 85 dB(A) for an eight-hour work shift. Therefore, the yellow highlighted noise level in the above table exceeds the exceed the prescribed standard limit.

(v). Illumination Testing:

The light level measurement was conducted by Lux Meter (EXTECH, Color LED Light Meter LT-45). General and localized lighting were measured at the site. In addition, illumination level monitoring was conducted to find out the light intensity in different sections/areas of the target industrial units.

From the workers' perspective, inadequate lighting at the workplace can lead to eye strain, fatigue, headaches, stress, and accidents. On the other hand, too much light can cause safety and health problems such as "glare" headaches, and stress. Both can lead to mistakes at work, poor quality, and low productivity. Therefore, the section-wise light intensity was calculated as the average of values taken at the workplace [13].

Table III: Illumination Level in Automobile Sector					
Sr#	Section (Machine Specific)	Illumination Level (lux)	Sr#	Section (Machine Specific)	Illumination Level (lux)
1	Engine Plant		3-	Casting Plant	
a.	Fire Bush Machine	408	a.	Finishing Area	650
b.	TSP Press Machine	151	b.	Inspection Station	1070
c.	Timing Gear Press Machine	923	4-	HPDC	
d.	Timing Gear Press Machine-2	114	a.	Finishing Area	610
e.	Bench Drill	127	b.	Casting Machine	274
f.	Cam Leak Testor	108	5-	Finishing Section	36.71
g.	Cylinder Head (OP1 KIRA	721	a.	Furnace Area	12.9
2-	Auto Line		b.	Press Machine	158.7
a.	Inspection Station	1198		Cutter Section	45.2

Reference to the "Punjab Factories Act 1934" section 19 (Lighting) states that in every part of a factory where workers are working or passing, there shall be provided and maintained-

- (a) sufficient and suitable lighting, natural or artificial, or both; and
- (b) emergency lighting of special points in work-rooms and passages to function automatically in case the ordinary electric supply system fails.

Reference "The Punjab Factories Rules 1978" Lighting Section 19, 33-J: 39. (1) states that as long as any worker is present in a factory in latrines, passages, stairs, hoists, factory ground and other parts of the factory in so far as the entrance of the said places is not closed, shall be lighted in such manner that safety is fully secured in passing through or remaining in the same.

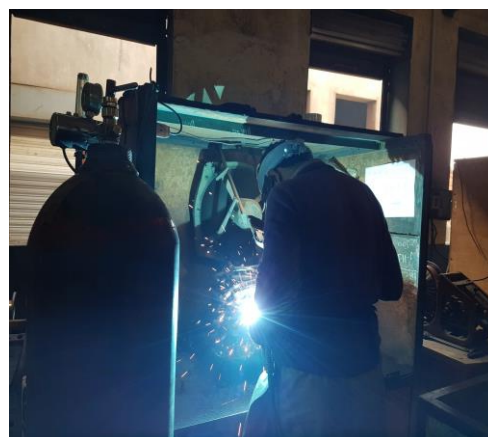
While 39 (2) (a) of the rules *ibid* states that the general illumination over these interior posts of the factory where persons are regularly employed shall not be less than 6 feet candles (64.58 lux) measured in the horizontal place at a level of 3 feet above the floor; and where work is actually being done the illumination shall not be less than 8 feet candles (86.11 lux) [14].

Table IV Illumination Level according to “The Punjab Factories Rules 1978”	
Illumination Level (feet candles)	Illumination Level (lux)
08	86.11

The reference standard DIN was used to compare illumination levels. Different countries and professional organizations recommend different levels of illumination in workplaces. In addition, a range of illumination levels is recommended for different kinds of activities. For example, precision work requires high illumination, while packing areas and corridors may need less illumination. The permissible limit for rough assembly work or machining, precise assembly work, or machining and bookkeeping/office work is 250 (lux), 1000 (lux) & 500 (lux), respectively, for eight hours work shifts [15].



Sufficient illumination level at workplace



Inadequate illumination level at workplace

(vi). Stack Emission Testing:

The stack emission monitoring was carried out during the general shift using calibrated Testo 350 Flue Gas Analyzer. The measurement was carried out by inserting the instrument's probe in the orifice of the stack of the generators. These values were taken per “Punjab Environmental Quality Standards” for industrial gaseous emissions [16].

Table V: Stack Emission Testing						
Sr. No.	Parameters	Unit	PEQS	Generator - I	Generator - II	KTA-38 Generator
1.	Capacity	kVA	--	250	100	750
2.	Load	--	--	Normal	Normal	300
3.	Fuel	--	--	Diesel	Diesel	Diesel
4.	O ₂	%	NGVS	14.51	16.38	13.52
5.	CO	mg/Nm ³	800	83.75	398.8	126.2
6.	NO _x	mg/Nm ³	600	303.7	171.9	320.79
7.	NO	mg/Nm ³	NGVS	303.7	159.2	313.0
8.	NO ₂	mg/Nm ³	NGVS	0.0	12.7	7.79
9.	CO ₂	%	NGVS	4.82	3.41	5.55
10.	SO ₂	mg/Nm ³	1700	0	0	0
11.	H ₂ S	mg/Nm ³	10	0.0	0.0	59.6
12.	Eff. N	%	NGVS	67.6	87.1	68.7
13.	Eff. G	%	NGVS	64.1	82.2	65.1
14.	Final Temp	°C	NGVS	304.4	102.6	319.2

*The sum of NO and NO₂ values used for the calculation of NO_x value.

**NGVS: No guideline value set for mixed fuel.

***PEQS: Punjab Environmental Quality Standards.

8. Hazards Identification & Risk Assessment

During the site visit, a risk assessment of the industries was carried out to identify various hazards at workplace. Risk assessment was carried out using prescribed proforma wherein the intensity of risks was categorized based on the International Risk Matrix. Recommendations were provided to minimize the risk(s) for the safety and health of workers and the environment. These reports were then shared with enterprises for improvement of the working conditions.

This industry includes Mechanics, Auto Electricians, Crash Repairs and Spray Painting, Wheel and Tyre Fitting, Engineering, Vehicle Manufacturing, Parts Manufacturing & Suppliers. People working with vehicles are at greater risk of sustaining injuries due to body stressing, slips, trips, falls or being hit by moving vehicles or items of the plant. Forklift incidents are an example.

Employees and workers in the automobile industry encounter a variety of hazards daily. A brief of different identified hazards and their control measures are summarized below:

- i. Manual handling: Worker actions of bending, reaching, stretching, pulling, lifting, working in cramped positions, and repetitive motions were observed. If workers bend over

an engine bay, they may hold a fixed posture for an extended period. Using excessive force with hand tools can also cause injuries.

- ii.** Being hit by or trapped between objects: It was observed that during grinding, working under vehicles and cleaning parts, particles emitted may affect the eyes and other body parts. Doors, bonnets and other parts, tools and equipment may slip or move while performing work, i.e. slipping or falling of object or tool on a worker, while making adjustment or tightening the object, while assembling the object, rules for safe lifting and lowering the vehicle are not followed, being contact with the grinder, usage of high-pressure gun for cleaning or spray, falls from ladders, stairs, elevated platforms etc. and falls into inspection pits, an injury may be caused due to collapse of jacking, lifting or hoisting equipment, and vehicles falling from lifting equipment.
- iii.** Slips, trips and falls: Slippery oil floors were observed at sites that caused slip, trip and fall hazards at the workplace. During assembling/service or maintenance, workers have contact with greasy parts of vehicles that may cause falling of parts on workers. Also, there are chances of tripping over tools and equipment.
- iv.** Exposure to noise, vibrations, fire and other hazardous conditions: Noise and vibrations can result in deafening of the ears. Workers are also exposed to hazardous substances and chemicals, petrol, solvents, acids, lead particles, degreasers, paints and other cleaning products.
- v.** High noise levels were observed in Process Shop, Electro Plating Area, Brake Pedal Shop, Dyeing Shop, Packing Shop, Cutter section, Furnace Hall, Sub Assembly Area, Spot Machine, TSP Press (Engine Shop), Steering Handle (Sub Assembly).
- vi.** High noise and high vibrations of the shot blasting machine and power press were observed on the floor.
- vii.** Fumes in electroplating/welding areas. Vapours of molten metal and metal dust.
- viii.** Melting aluminium vapours in the dye casting section.
- ix.** Adhesive/sealant chemical was in use by using cotton gloves.
- x.** Fumes of soldering and circuit dipping processes were observed in Ignition coil assembly lines, Core assembly lines, and Circuit assembly. In addition, inadequate suction of fume hoods was observed.
- xi.** Fire hazards were observed in different sections, i.e. Mechanical Workshop, Waste Material Area, Dye Shop, Packing Shop, Electroplating Shop, Warehouse, Paint Shops, Burner Water Box, Brake Pedal Shop.



Chemical exposure of workers in electroplating section



Chemical exposure of workers in acidic section

i. Unguarded machines & power transmission apparatus:

Some of the machines and power transmission apparatus were found unguarded, which may cause amputation or severe crushing injury. In addition, conveyor belt/rollers were found unguarded that might cause entanglement, draw-in, or trap hazards between rollers and belt. Machine safeguarding must be ensured to minimize the risk of accidents of machine-operator contact. Workers can be struck and injured by moving parts of machinery or ejected material. Body parts can also be drawn in or trapped between rollers, belts, pulley drives, gears, chains, and sprockets.

Sharp edges can cause cuts and severe injuries, sharp-pointed parts can cause stabbing or puncture the skin, and rough surface parts can cause friction or abrasion.



Cutter Machine blade found unguarded. Adequate PPEs were in use by the machine operator.



Machine belt found unguarded; Protecting shield was not installed for controlling cutting oil splashes.



Power Press machine belts/flywheel found unguarded. Additionally, the Operator was wearing a loose dress—PPEs non-compliance.



Oven Machine chain/sprockets/rollers found unguarded.

ii. Hot surface contact:

Hot surface machines were observed having no safeguards or partial guards at the workplace. Burns may cause harm due to contact with hot surfaces, exhaust pipes or hot-melt chemicals; sudden release of hot water and steam lines, radiator and cooling system pipes; soldering, brazing and welding operations etc.



Hot surface machines with partial guards



Molten slag / Furnace with no safeguard

iii. Flammable/Explosive substances:

Fires and explosions of spilt or leaked flammable/explosive substances, or by ignition of hydrogen released from batteries, or during flame cutting and welding operations, etc.

iv. Improper stacking of cylinders:

Improper stacking of Cylinders was observed in welding sections.

v. PPEs Non-Compliance:

Workers were not wearing personal protection equipment.



Non-compliance of PPEs while performing grinding activity. The worker was observed standing on an electric cable.



Direct contact of Operator's hands with hot cutting oil adjacent to revolving spindle without hand protection while machining objects.

vi. Inadequate illumination:

Inadequate illumination was observed in different sections, i.e., Process Shop, Electro Plating, Brake Pedal Shop, Dyeing Shop, Packing Shop (near Press Machine), Welding shop.

vii. Damaged electric cables:

Damaged electric cables were observed in different sections. Insulation of cables laying on the ground may get damaged due to passing by workers. This may result in electric shock as wires will be exposed from insulation. Also, if there is water on the floor, then a severe electrocution condition may occur.



Damaged electric cables of machines. No conduits/cable tray for cables. No copper connector has been used on cable joints.

viii. Outdated stools (no back & footrest) & improper workstation height:

Outdated stools (no back & footrest) and improper workstation height were observed in some sections, i.e., Lathe Machine, Power Press, Hydraulic Press, Drilling Machine, Oven Machine, Electroplating Machine, Process Shop, Brake Pedal Shop, Dyeing Shop, Packing Shop, Welding, Cutting Area.



Outdated Stools (no back and footrest) & Improper workstation height

9. Occupational Safety and Health Trainings:

Based on risk assessment activity at the worksites, a training session regarding occupational safety and health were carried out wherein the shortcoming with appropriate solutions were discussed with the management to rectify them.



Occupational Safety and Health training session at the enterprise

10. COVID-19:

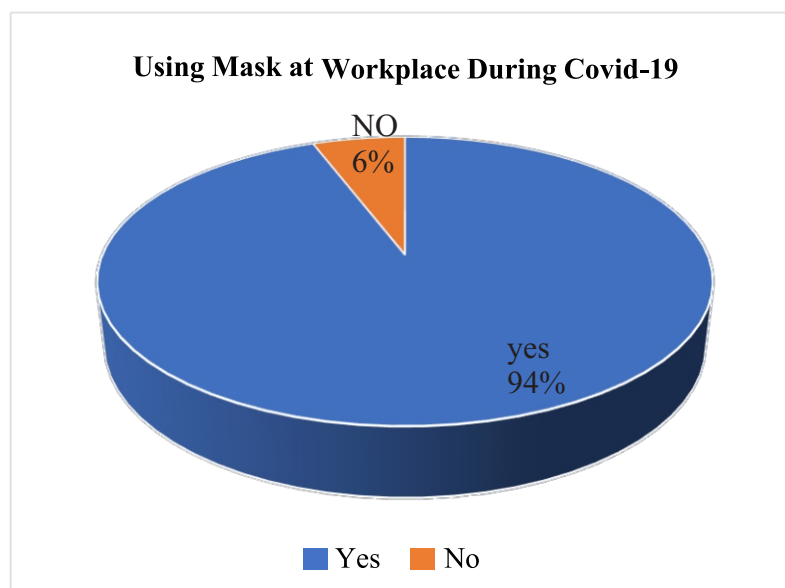
The COVID-19 pandemic has changed the world. As the science revealed that the COVID-19 virus was spreading via airborne droplets, public health and safety and health experts recommended the use of face coverings or respirators when around other people. COVID-19, which started in 2020 and is continuing into 2021, the SAA Centre for the Improvement of Working Conditions & Environment (SAACIWCE), Directorate General Labour Welfare Punjab, Labour & Human Resource Department received multiple requests for COVID-19 related trainings and follow-ups of standard operating procedures and performed several compliance assistance activities on respiratory protection at workplaces. As a result, SAACIWCE provided valuable information about occupational safety and health, risk assessment activities and personal protection to groups of employers, workers, and future workers during the pandemic.

It is the obligation of the employers, workers, and their organizations to collaborate with health authorities to prevent and control COVID-19. Cooperation between management and workers and their representatives is essential for workplace-related prevention measures. Workers are responsible for following measures for occupational safety and health, infection prevention and control established for their workplace, and participating in training provided by the employer. Workers should immediately report to their supervisor any situation which may present an imminent and severe

danger to their life or health. Even workers have the right to remove themselves from any workplace that they reasonably believe presents an imminent and serious threat to their life or health and should be protected from any undue consequences as a result of exercising this right (POSH Act 2019).

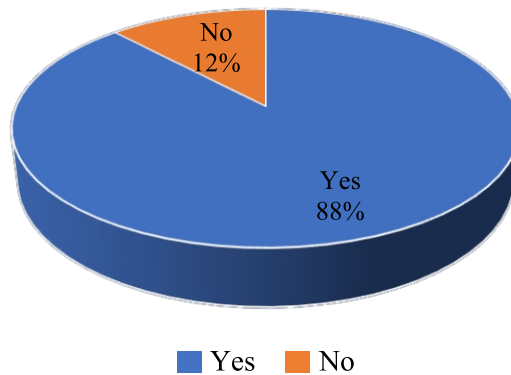
The pandemic has severely hampered the risk assessment activities on OSH during the field visits while maintaining the day-to-day guidelines issued by the Primary and Secondary Health Care Department, Government of the Punjab in accordance with the National Command Operation Centre (NCOC). During the OSH risk assessment activity, some questions related to the COVID-19 were also incorporated into the questionnaire. Analysis of the data showed that in the Automobile sector, as handwashing facilities were provided to the workers, on average, every worker washed their hands ten times daily. In these times of the pandemic, wearing a mask at the workplace is mandatory.

Around 94% of workers responded they were using a mask at the workplace. An average of Rs.304/- per month was being spent on purchasing them by the employer.



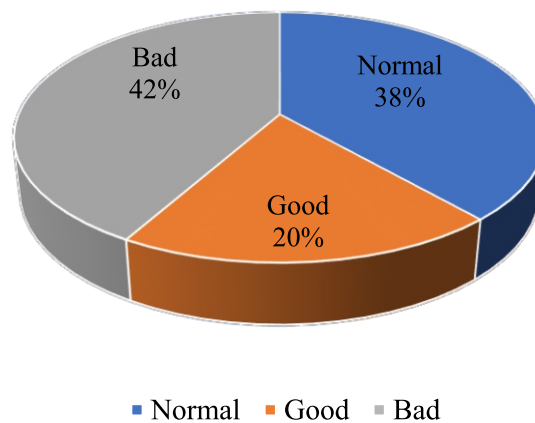
The data showed that around 88% of the workers and their co-workers maintained social distancing while at work. By applying statistical tools on the data, it was evident that the respiratory problems among the workers were more who were repeatedly using the mask due to non-availability of sufficient financial resources or carelessness in using them. These results are in agreement with the research studies conducted by the University of Health Sciences Lahore.

Maintaining Social Distance During Covid-19



Workers were asked about the psychological behaviour during the covid-19 times. 20% of the workers responded to the behaviour as good, 38% normal, while 42% bad.

Psychological Behaviour of People During Covid-19 at Workplace



11. Recommendations as per risk assessment:

Detail recommendations are given below against each identified hazard, as discussed above, to mitigate their effect on the workers and improve the work environment.

- Engineering control measures must be adopted to control the vibration hazards at the workplace. Limit the time spent by workers on a vibrating surface. Mechanically isolate the vibrating source or surface to reduce exposure.
- Periodic training and supervision must be provided to workers for awareness about occupational safety and health (OSH).
- Workers in high noise areas must be rotated and allowed to work in less noisy areas for at least half of their shift.
- Periodic medical examination of the workers must be ensured in the light of Labour Laws.
- Machines must be well maintained and lubricated to stem the unnecessary noise and vibration.
- The employer must provide appropriate hearing protection in the high noise areas to workers. In addition, it must be ensured that proper size and type of ear protectors are provided to the workers for maximum effectiveness.
- Machines must have adequate safeguards to protect operators and other employees in the immediate work area from hazards. For example, all rotating parts should be effectively guarded. In addition, all components of mechanical systems which transmit energy, including flywheels, pulleys, belts, connecting rods, coupling, spindles, chains and gears, must be guarded.
- Lockout/Tagout (LOTO) procedures must be implemented if any machine guard is removed or before any maintenance or repairs are conducted.
- Safeguards must be fully covered on hot surface machines to avoid direct contact with workers/visitors. Visible “Hot Surface” signs must be displayed on safeguards.
- Cylinders should not be placed in exit/access. In addition, they should be carried through a suitable cylinder trolley, appropriately chained, and transported in an upright position. Ensure the last date of cylinder testing is mentioned on the cylinder. Verify for correct content as per colour code.
- A training program must be implemented to instruct employees on safe methods of machine operation.
- Extreme caution should be exercised when using any type of welding equipment. Injury can result from fire, electric shock, explosions or harmful agents.
- Nitrile gloves must be preferred for adhesive/sealant chemicals handling.
- All workers, visitors and staff members must be aware of the escape routes. Make sure that emergency exit doors are not wedged open. Combustible material must not be stored near emergency exit doors/escape routes.
- Minimum fire protection requirements such as fire alarm, fire extinguishers, emergency response plans and fire drills must be in place as soon as possible.

- Install fire sprinkler system and other firefighting equipment to control the fire early as many stocks are stored in different sections.
- Follow all electrical safety precautions so that short circuit hazards can be eliminated. Damaged electric wires must be replaced.
- Administrative control can be used to reduce the awkward body postures and movements of the workers. As far as Machine Shop Areas are concerned, there must be quality stools with back and footrest to prevent them from musculoskeletal disorders.
- Lifting equipment must be thoroughly examined regularly before putting it into service.
- Workstation height must be improved. Manual handling can be reduced through automation or engineering control with training.
- Workers/Visitors who are wearing loose dresses must not be allowed to enter the machines section.
- A fume extractor must be used to remove harmful fumes caused by soldering, and proper ventilation must be ensured.
- It must be ensured that air respirators are provided to all workers in hazardous chemical /dusty sections to avoid respiratory hazards.
- Employees must be well-trained in lifting activities and manual handling.
- Using mechanical load shifting devices (cranes, material hoists, hand trucks and forklifts) can avoid awkward loads. Also, avoid awkward body posture and movement whilst at work.
- Undertake risk assessments and pre-operational inspections of the workplace.
- A Permit-to-work system must be implemented to ensure that work is done safely and efficiently.
- Be sure that splash guards are in place and written risk assessments are conducted to identify hazardous substances and control the risks.
- Develop, implement and maintain a service regime. Preventive maintenance and inspection system must be implemented for machines/equipment/electrical appliances.
- Ensure good housekeeping at workplace.
- Care should be taken that the noise levels do not extend the OSHA standard exposure (beyond 85 dB(A), and audiometric tests are undertaken as and when required.
- Fire evacuation drills must be conducted annually/six monthly.
- While working alone or in case of emergency, there should be a system of communication in the organization.

Safety should be taught from day one, even before employees have a chance to get to grips with the actual manufacturing process. It should be ingrained in the minds of every worker who works in the industry. That being said, safety is not a one-time experience but an ongoing process that promises the health and well-being of an individual.

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Risk Assessment Checklist (Machine Safety)

Enterprise Name: _____

Date: _____

Sr #	Question	Yes	No	Remarks
1.	Is there a training program to instruct employees on safe methods of machine operation?			
2.	Is there adequate supervision to ensure that employees are following safe machine operating procedures?			
3.	Is there a regular program of safety inspection of machinery and equipment?			
4.	Are all machinery and equipment kept clean and properly maintained?			
5.	Is sufficient clearance provided around and between machines to allow for safe operations, set up and servicing, material handling and waste removal?			
6.	Are equipment and machinery securely placed and anchored to prevent tipping or other movements that could result in personal injury?			
7.	Is there a power shut-off switch within reach of the operator's position at each machine?			
8.	Are all pulleys and belts that are within 7 feet of the floor or working level properly guarded?			
9.	Are all moving chains, sprockets, gears, belts, flywheels, pulleys, shafts, spindles and chain drives properly guarded?			
10.	Are splash guards mounted on machines that use coolant to prevent the coolant from reaching employees?			
11.	Are methods provided to protect the operator and other employees in the machine area from hazards created at the point of operation, ingoing nip points, rotating parts, flying chips, and sparks?			
12.	Are machinery guards secure and so arranged that they do not offer a hazard in their use?			
13.	If special hand tools are used for placing and removing material, do they protect the operator's hands?			

14.	Are provisions made to prevent machines from automatically starting when power is restored after a power failure or shutdown?			
15.	If machinery is cleaned with compressed air, is air pressure controlled and personal protective equipment or other safeguards used to protect operators and other workers from eye and body injury?			
16.	Are Lockout / Tagout procedures followed for maintenance and repair?			
17.	Is starting and stopping devices clearly marked and within reach of operator?			
18.	If there is more than one operator, are separate controls provided?			
19.	Is Emergency lighting operable?			
20.	Are Machine vibrations controlled?			
21.	Are tools, instruments and machinery shaped, positioned and handled so that tasks can be performed comfortably?			
22.	Are protective goggles or face shields provided and worn where there is any danger of flying particles or corrosive materials?			
23.	Are protective gloves, aprons, shields, or other means provided against cuts, corrosive liquids and chemicals?			
24.	Are hard hats provided and worn where danger of falling objects exists?			
25.	Is appropriate foot protection provided where there is the risk of foot injuries from hot, corrosive, poisonous substances, falling objects, crushing or penetrating actions?			

Name & Designation of Assessor: _____

day, 4 or more days out of the week?

C. Do you usually cough at all on getting up, or first thing in the morning? 1. Yes ___ 2. No ___

D. Do you usually cough at all during the rest of the day or at night? 1. Yes ___ 2. No ___

IF YES TO ANY OF THE ABOVE (7A, 7B, 7C, OR 7D), ANSWER THE FOLLOWING:
IF NO TO ALL, CHECK DOES NOT APPLY AND SKIP TO 8A.

E. Do you usually cough like this on most days for 5 consecutive months or more during the year? 1. Yes ___ 2. No ___
8. Does not apply ___

F. For how many years have you had this cough? _____
Number of years
88. Does not apply ___

=====

PHLEGM

8A. Do you usually bring up phlegm from your chest? 1. Yes ___ 2. No ___
(Count phlegm with the first smoke or on first going out-of-doors. Exclude phlegm from the nose. Count swallowed phlegm)
[If no, skip to 8C.]

B. Do you usually bring up phlegm like this as much as twice a day, 4 or more days out of the week? 1. Yes ___ 2. No ___

C. Do you usually bring up phlegm at all on getting up or first thing in the morning? 1. Yes ___ 2. No ___

D. Do you usually bring up phlegm at all during the rest of the day or at night? 1. Yes ___ 2. No ___

IF YES TO ANY OF THE ABOVE (8A, B, C, OR D),
ANSWER THE FOLLOWING:
IF NO TO ALL, CHECK DOES NOT APPLY AND SKIP TO 9A.

E. Do you bring up phlegm like this on most days for 3 consecutive months or more during the year? 1. Yes ___ 2. No ___
8. Does not apply ___

F. For how many years have you had trouble with phlegm? _____
Number of years
88. Does not apply ___

=====

EPISODES OF COUGH AND PHLEGM

9A. Have you had periods or episodes of (increased*) cough and phlegm lasting for 3 weeks or more each year? 1. Yes ___ 2. No ___
*(For individuals who usually have cough and/or phlegm)

IF YES TO 9A:

B. For how long have you had at least 1 such episode per year? _____
Number of years
88. Does not apply ___

WHEEZING

10A. Does your chest ever sound wheezy or whistling:

- | | |
|-----------------------------------|------------------------|
| 1. When you have a cold? | 1. Yes ____ 2. No ____ |
| 2. Occasionally apart from colds? | 1. Yes ____ 2. No ____ |
| 3. Most days or nights? | 1. Yes ____ 2. No ____ |

IF YES TO 1, 2, OR 3 IN 10A:

B. For how many years has this been present?

Number of years
88. Does not apply ____

11A. Have you ever had an ATTACK of wheezing that has made you feel short of breath?

1. Yes ____ 2. No ____

IF YES TO 11A:

B. How old were you when you had your first such attack?

Age in years
88. Does not apply ____

C. Have you had 2 or more such episodes?

1. Yes ____ 2. No ____
8. Does not apply ____

D. Have you ever required medicine or treatment for the(se) attack(s)?

1. Yes ____ 2. No ____
8. Does not apply ____

=====

BREATHLESSNESS

12. If disabled from walking by any condition other than heart or lung disease, please describe and proceed to Question 14A.

Nature of condition(s): _____

13A. Are you troubled by shortness of breath when hurrying on the level or walking up a slight hill?

1. Yes ____ 2. No ____

IF YES TO 13A:

B. Do you have to walk slower than people of your age on level because of breathlessness?

1. Yes ____ 2. No ____
8. Does not apply ____

C. Do you ever have to stop for breath when walking at your own pace on the level?

1. Yes ____ 2. No ____
8. Does not apply ____

D. Do you ever have to stop for breath after walking about 100 yards (or after a few minutes) on the level?

1. Yes ____ 2. No ____
8. Does not apply ____

E. Are you too breathless to leave the house or breathless on dressing or undressing?

1. Yes ____ 2. No ____
8. Does not apply ____

=====

CHEST COLDS AND CHEST ILLNESSES

14A. If you get a cold, does it usually go to your chest? (Usually means more than 1/2 the time)

1. Yes ____ 2. No ____
8. Don't get colds ____

15A. During the past 3 years, have you had any chest illnesses that have kept you off work, indoors at home, or in bed?

1. Yes ____ 2. No ____

IF YES TO 15A:

- B. Did you produce phlegm with any of these chest illnesses? 1. Yes ___ 2. No ___
8. Does not apply ___
- C. In the last 3 years, how many such illnesses, with (increased) phlegm, did you have which lasted a week or more? _____ Number of illnesses
_____ No such illnesses
_____ Does not apply

=====

PAST ILLNESSES

16. Did you have any lung trouble before the age of 16? 1. Yes ___ 2. No ___
17. Have you ever had any of the following:
1A. Attacks of Bronchitis? 1. Yes ___ 2. No ___
- IF YES TO 1A:
B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___
- C. At what age was your first attack? _____ Age in years
88. Does not apply ___
- 2A. Pneumonia (include bronchopneumonia)? 1. Yes ___ 2. No ___
- IF YES TO 2A:
B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___
- C. At what age did you first have it? _____ Age in years
88. Does not apply ___
- 3A. Hayfever? 1. Yes ___ 2. No ___
- IF YES TO 3A:
B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___
- C. At what age did it start? _____ Age in years
88. Does not apply ___
- 18A. Have you ever had chronic bronchitis? 1. Yes ___ 2. No ___
- IF YES TO 18A:
B. Do you still have it? 1. Yes ___ 2. No ___
8. Does not apply ___
- C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___
- D. At what age did it start? _____ Age in years
88. Does not apply ___
- 19A. Have you ever had emphysema? 1. Yes ___ 2. No ___
- IF YES TO 19A:
B. Do you still have it? 1. Yes ___ 2. No ___
8. Does not apply ___
- C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___
- D. At what age did it start? _____ Age in years
88. Does not apply ___
- 20A. Have you ever had asthma? 1. Yes ___ 2. No ___

- IF YES TO 20A:
- B. Do you still have it? 1. Yes ___ 2. No ___
8. Does not apply ___
- C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___
- D. At what age did it start? ___ Age in years
88. Does not apply ___
- E. If you no longer have it, at what age did it stop? ___ Age stopped
88. Does not apply ___

21. Have you ever had:

- A. Any other chest illnesses? 1. Yes ___ 2. No ___
If yes, please specify _____
- B. Any chest operations? 1. Yes ___ 2. No ___
If yes, please specify _____
- C. Any chest injuries? 1. Yes ___ 2. No ___
If yes, please specify _____

22A. Has doctor ever told you that you had heart trouble? 1. Yes ___ 2. No ___

IF YES to 22A:

- B. Have you ever had treatment for heart trouble in the past 10 years? 1. Yes ___ 2. No ___
8. Does not apply ___

23A. Has a doctor ever told you that you have high blood pressure? 1. Yes ___ 2. No ___

IF YES to 23A:

- B. Have you had any treatment for high blood pressure (hypertension) in the past 10 years? 1. Yes ___ 2. No ___
8. Does not apply ___

=====

OCCUPATIONAL HISTORY

24A. Have you ever worked full time (30 hours per week or more) for 6 months or more? 1. Yes ___ 2. No ___

IF YES to 24A:

- B. Have you ever worked for a year or more in any dusty job? 1. Yes ___ 2. No ___
8. Does not apply ___

Specify job/industry: _____ Total years worked ___
Was dust exposure 1. Mild ___ 2. Moderate ___ 3. Severe ___ ?

- C. Have you ever been exposed to gas or chemical fumes in your work? 1. Yes ___ 2. No ___
8. Does not apply ___

Specify job/industry: _____ Total years worked ___
Was dust exposure 1. Mild ___ 2. Moderate ___ 3. Severe ___ ?

- D. What has been your usual occupation or job -- the one you have worked at the longest?

1. Job-occupation: _____
2. Number of years employed in this occupation: _____
3. Position-job title: _____
4. Business, field, or industry: _____

=====

TOBACCO SMOKING

- 25A. Have you ever smoked cigarettes? (NO means less than 20 packs of cigarettes or 12 oz. of tobacco in a lifetime or less than 1 cigarette a day for 1 year. 1. Yes ____ 2. No ____

IF YES to 25A:

- B. Do you now smoke cigarettes (as of 1 month ago)? 1. Yes ____ 2. No ____
88. Does not apply ____

- C. How old were you when you first started reg- ____ Age in Years
cigarette smoking? 88. Does not apply ____

- D. If you have stopped smoking cigarettes com- ____ Age stopped
pletely, how old were you when you stopped? Check if
still smoking ____
88. Does not apply ____

- E. How many cigarettes do you smoke per day now? ____ Cigarettes/day
88. Does not apply ____

- F. On the average of the entire time you smoked, ____ Cigarettes/day
how many cigarettes did you smoke per day? 88. Does not apply ____

- G. Do or did you inhale the cigarette smoke? 1. Does not apply ____
2. Not at all ____
3. Slightly ____
4. Moderately ____
5. Deeply ____

- 26A. Have you ever smoked a pipe regularly? 1. Yes ____ 2. No ____
(YES means more than 12 oz tobacco in a lifetime.)

IF YES to 26A:

- B1. How old were you when you started to ____ Age
smoke a pipe regularly?

2. If you have stopped smoking a pipe com- ____ Age stopped
pletely, how old were you when you stopped? Check if still
smoking pipe ____
88. Does not apply ____

- C. On the average over the entire time you ____ oz per week (a stan-
smoked a pipe, how much pipe tobacco did dard pouch of tobacco con-
you smoke per week ? tains 1 1/2 oz)
88. Does not apply ____

- D. How much pipe tobacco are you smoking now? ____ oz per week
88. Not currently smoking a pipe ____

- E. Do or did you inhale the pipe smoke? 1. Never smoked ____
2. Not at all ____
3. Slightly ____
4. Moderately ____
5. Deeply ____

- 27A. Have you ever smoked cigars regularly? 1. Yes ____ 2. No ____
(Yes means more than 1 cigar a week for a year).

IF YES to 27A:

- B1. How old were you when you started smoking cigars regularly? _____ Age
2. If you have stopped smoking cigars completely, how old were you when you stopped? _____ Age stopped
Check if still smoking cigars _____
88. Does not apply _____
- C. On the average over the entire time you smoked cigars, how many cigars did you smoke per week? _____ Cigars per week
88. Does not apply _____
- D. How many cigars are you smoking per week now? _____ Cigars per week
88. Check if not smoking cigars currently _____
- E. Do or did you inhale the cigar smoke?
1. Never smoked _____
2. Not at all _____
3. Slightly _____
4. Moderately _____
5. Deeply _____

FAMILY HISTORY

28. Were either of your natural parents ever told by a doctor that they had a chronic lung condition such as:

	FATHER			MOTHER		
	1. YES	2. NO	3. DON'T KNOW	1. YES	2. NO	3. DON'T KNOW
A. Chronic bronchitis?	_____	_____	_____	_____	_____	_____
B. Emphysema?	_____	_____	_____	_____	_____	_____
C. Asthma?	_____	_____	_____	_____	_____	_____
D. Lung cancer?	_____	_____	_____	_____	_____	_____
E. Other chest conditions?	_____	_____	_____	_____	_____	_____

29A. Is parent currently alive?

B. Please Specify:
 _____ Age if living
 _____ Age at death
 8. Don't know _____

C. Please specify cause of death.

چیک لسٹ (خطرہ تشخیص) برائے مشین سیفیٹی

نام فیکٹری

تاریخ

نمبر شمار	سوال	ہاں	نہیں	عملی اقدامات
1.	کیا ملازمین کو مشین پر کام کے لیے محفوظ طریقوں سے آگاہی کیلئے کوئی تربیتی پروگرام بنایا گیا ہے؟			
2.	کیا ملازمین کو مشین چلانے کے محفوظ طریقہ کار پہ یقینی عمل پیرا ہونے کیلئے مناسب نگرانی مہیا کی گئی ہے؟			
3.	کیا مشینری اور آلات کے حفاظتی معائنہ کا باقاعدہ پروگرام بنایا گیا ہے؟			
4.	کیا تمام مشینری اور آلات صاف اور مناسب طریقے سے برقرار ہیں؟			
5.	کیا مشینوں کو چلانے و مرمت کے لیے سامان کو رکھنے اور کچرے کو ٹھکانے لگانے کیلئے مشینوں کے گرد اور ان کے درمیان مناسب فاصلہ ہے؟			
6.	کیا سامان اور مشینری کو محفوظ طریقہ سے اور اچھی طرح نصب کیا گیا ہے تاکہ گرنے یا دیگر نقل و حرکت کی صورت میں ملازمین کو چوٹ سے بچایا جاسکے؟			
7.	کیا ہر مشین پہ پاور شٹ آف سوئچ آپریٹر کی پہنچ میں ہے؟			
8.	کیا تمام پلیاں اور بیلٹ جو کہ سطح زمین سے سات فٹ کی بلندی تک ہیں، ان پر مناسب حفاظتی حصار لگائے گئے ہیں؟			
9.	کیا تمام متحرک زنجیریں، گرایاں، بیلٹ، فلائی ویل، پلیاں، شافٹیں، سپنڈل پر مناسب حفاظتی حصار لگائے گئے ہیں؟			
10.	ایسی مشینیں جن میں کولنٹ کا استعمال ہے کیا ان پہ اسپلیش گارڈ (حفاظتی شیلڈ) نصب ہے؟			

11.	کیا مشین ایریا میں آپریٹر اور دیگر ملازمین کو کام کے دوران پیدا ہونے والے خطرات، نپ پوائنٹس، گھومنے والے پرزے، اڑتے ذرات اور چنگاریوں سے بچاؤ کیلئے طریقے کار مہیا کئے گئے ہیں؟		
12.	کیا مشین گارڈ (حفاظتی حصار) محفوظ اور بہتر طریقے سے لگائے گئے ہیں؟		
13.	اگر مواد رکھنے اور ہٹانے کیلئے خصوصی دستی اوزار استعمال کئے جاتے ہیں تو کیا وہ آپریٹر کیلئے محفوظ ہیں؟		
14.	کیا بجلی کے اچانک بند ہونے یا شٹ ڈاؤن کے بعد بجلی بحال ہونے پر مشینوں کو خود کاری سے روکنے کیلئے بند و بست ہے؟		
15.	اگر مشینری کو کپریسڈ ہوا سے صاف کیا جاتا ہے تو کیا کارکن اور اس کے ساتھیوں کو آنکھوں اور جسمانی چوٹ سے بچانے کے لئے خود حفاظتی آلات یا دیگر حفاظتی حصار استعمال کئے جاتے ہیں؟		
16.	کیا مشین کی سروس و مرمت کیلئے لاک آؤٹ / ٹیگ آؤٹ طریقہ کار کی پیروی کی جاتی ہے؟		
17.	کیا مشین کو چلانے و بند کرنے کے بٹن واضح طور پر نشان زدہ ہیں اور کارکن کی رسائی میں ہیں؟		
18.	اگر ایک سے زیادہ آپریٹر موجود ہیں تو کیا ان کو علیحدہ علیحدہ کنٹرول مہیا کئے گئے ہیں؟		
19.	کیا ایمر جنسی لائٹنگ لائق عمل ہے؟		
20.	کیا مشین کی تھر تھراہٹ قابو میں ہے؟		
21.	کیا اوزار، آلات اور مشینری کو اس طرح سے بنایا، رکھایا استعمال کیا گیا ہے کہ کام کو آرام دہ طریقے سے سرانجام دیا جاسکے؟		



**Under ADP Scheme “Capacity Building of Occupational Safety and Health (OSH)
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Centre for the Improvement of Working Conditions & Environment

Directorate General Labour Welfare Punjab

Labour & Human Resource Department Government of the Punjab

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