

## Occupational Health Hazards among Workers in Glass Manufacture Industries

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### Abstract

**Background:** An occupational hazard is a hazard experienced in the workplace, there are many occupational hazards may be include Physical hazard such as heat, cold, light, noise. **Aim** of this study was to assess occupational health hazards among workers in glass manufacture industries . **Research design:** A descriptive research design was used in this study. **Setting:** this study was conducted at two glass manufacture industries in Elnaser and Crystal Asfor industries at Benha city. **Sample:** systematic random sample was used to choose 25% of all worker in Elnaser and crystal Asfor industries. The total number of workers is 600 workers the sample include 150 workers. **Tools:** Two tools were used, I): An interviewing questionnaire was used to assess A) sociodemographic characteristics of the workers . B) characteristic of work. C) health problems of the workers during last 6month . D) worker's knowledge regarding occupational hazards related their work. II): An observational checklist that includes A) It was concerned with assessment work environmental of two industries. B) Concerned with assessment of the workers' practices regarding wearing protective measure. **Results:** 54.7% of workers had satisfactory total practices score regarding prevention of occupational health hazards , 48.7% of studied workers had good total knowledge score regarding occupational health hazards and 59.3% of studied workers had health problems. **Conclusion:** Shows that there was highly statistically significant relation between total practice level and their demographic characteristics as marital status, education level. **Recommendations:** Periodic check up of health status for workers for early detection of occupational hazards to monitor their health status and early case finding.

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**Key words:** Occupational hazards, Physical hazard, Workplace.

### Introduction:

The working environment plays important roles on both health and production at workplaces and in organizations. Workers are exposed to poor and unfriendly working environment, with resultant multiple work-related adverse health conditions, decreased motivation and low productivity. Despite these, the issue of psychosocial hazards

appears to receive little attention by management workplaces including the education and teaching sector, government and relevant regulatory persons. (Sarker, 2021)

Glass manufactures industries that make glass and glass products from raw materials. These products include flat glass, such as window and plate glass; pressed glass items, such as glass dishes; blown glass items,

such as light bulbs and many kinds of bottles; and various special products, such as glass blocks used in building construction, safety glass windshields, and glass for optical instruments (Freestone, 2021).

Occupational health nurses work with employers and workers to identify health and safety needs in the workplace and to meet those needs, occupational health nurses coordinate and deliver services and encourage workers to take responsibility for their own health through health education and disease management programs, such as smoking cessation, exercise/fitness, nutrition and weight control, stress management, control of chronic illnesses and effective use of medical services. Occupational health nurse monitor the health status of workers, worker populations and community groups. (Thornberry et al, 2020)

### **Significance of the study**

According to the International Labour Organization (ILO) there are 2.0 million work related deaths per year. World Health Organization (WHO) estimates that there are only 10-15% of workers who have access to a basic standard of occupational health services. Occupational injuries represent 0.9 % (13.1 million) of the global disability adjusted life years (DALY) loss. Workplace fatalities, injuries and illness result in an enormous and unnecessary health burden, suffering and economic loss. The burden of illness resulting from occupational exposures is likely to be considerable but remains unidentified (Piňosová et al, 2021).

### **Aim of the study**

The aim of this study was to assess occupational health hazards among workers in glass manufacture industries.

### **Research questions**

- What are glass workers' knowledge regarding occupational health hazards related to their work?
- What are glass workers practices regarding using of protective measure?
- Is there relationship between demographic characteristic and the workers' knowledge?
- Is there relationship between practices and workers' knowledge?

### **Subjects and Method**

#### **Research design:**

A descriptive research design was used to conduct this study.

#### **Setting:**

The study was conducted at two glass manufacture industries at Qalyobia Governorate. These industries are Elnaser and Crystal Asfour factories. Elnaser industries are stock company constructed since 1932, divided into four small factories; the first is a manual factory to produce shisha, the second is an automatic factory to produce the cups and compose large number of the workers, the third is automatic factory to produce the flat glass, the fourth is decoration factory. All employees under medical insurance. There are medical clinics in the company which consist of two clinics for medical examination and wounds dressing. Crystal Asfour industries was established in 1961 by engineer Hassan

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Asfour. Crystal Asfour is a factory for the manufacture of chandeliers and crystals.

### **Sampling:**

Systematic random sample was used to choose one worker every 4 workers in Elnaser and Crystal Asfor industries. The total number of study sample is (600) workers the sample was including 150 workers' only.

### **Tools of data collection:**

Two tools were used in this study to collect the data.

**I: -Structured interviewing questionnaire:** this questionnaire was developed by the investigator and based on reviewing related literatures and written in Arabic language. It consisted of four parts:

**The first part:** was consisted of

**A-** Socio demographic characteristics of the workers and included of six questions as (age, sex, marital status, residence, level of education, monthly income).

**B-** Smoking habits of the workers and included of four questions as (smoking habit, if smoking, smoking times per day, years of smoking)

**The second part:** was consisted of

**A-** Characteristic of work and included of five questions as (Nature of work, Current job, years of experience, working hours, training courses).

**B-** Dangerous department and included of three questions as (the most dangerous department, stress that faces the worker, types of accidents exposure in the work).

**The third part:** was concerned with the health problems of the workers during last 6 month and included of two questions as (presence of health problems, types of health problems).

**The fourth part:** was concerned with the workers' knowledge regarding occupational hazards related their work and included of eleven questions as (meaning of occupational hazards, chemical hazards, physical hazards, mechanical hazards, biological hazards, psychiatric hazards, health problems in work, most common diseases in industry, prevention of health hazards, protective equipment, importance of equipment).

### **Scoring system:**

Knowledge score for each answer was given as following:

2 = Correct and complete answer.

1 = Correct and incomplete answer.

0 = Don't know.

The total knowledge score regarding occupational hazards related their work was considered good if the score of the total knowledge > 75% (> 16 points), considered average if it is equal 50- 75% (11- 16) and considered poor if it was < 50% (<11 points).

### **II: - Observational check list:**

**A-** Assess work environment and included of nine questions as (area of work, Floor, health clinic, emergency exit, fire protection, material handling, storage area, machines guarding, employee facilities).

**Scoring system:**

The scoring system for the industries environment was scored as following:

1 = Present.

0 = Not present.

The total industries environment score was considered safe if the score  $\geq 90\%$  ( $\geq 8$  points) and considered unsafe if it was  $< 90\%$  ( $< 8$  points).

**B)** Assessed workers' practices regarding wearing protective equipment and included of seventeen questions as (Wear overall uniform, wear head cover, wear face glass shield, wear eye goggles, wear asbestos gloves, wear protective apron, wear safety boots, wear respiratory mask, wear ear muff, eye contact with chemical, reich's entry in the eye, skin contacts with chemical, swallowing a portion of the toxic substance, fall of a worker from the top, asphyxia, worker's bleeding, fire).

**Scoring system:**

The scoring system for the workers practices was scored as following:

1 = Done.

0 = Not done.

The total practices score was considered satisfactory if the score  $\geq 60\%$  ( $\geq 10$  points) and considered unsatisfactory if it was  $< 60\%$  (10 points).

**Content validity:**

Tools of the study were given to group of 3 experts in the field of Community Health Nursing to test for clarity, relevance, comprehensiveness, applicability and easiness

for implementation and according to their opinion minor modifications were carried out.

**Reliability test:-**

Reliability was applied by the investigator for testing the internal of tool, by administration of the same tools to the same subjects. Cronbach's Albia reliability for knowledge was 0.754 and for practice were 0.702.

**Ethical consideration:**

Approval and an informed oral consent from all study participants were obtained after explaining the purpose of the study to gain their trust and cooperation. Each worker had a choice to continue or withdraw from the study. Privacy and confidentiality were assured. Ethics, values, culture, and beliefs was respected.

**Pilot study:**

The pilot study was carried out on 10% of the total study sample (15 workers) to test the clarity, objectivity, feasibility and applicability of tools, as well as to estimate the time needed for data collection. According to the results obtained from data analysis, items correction, modification, omission and addition were done as needed.

**Field work:**

The field work started from the beginning of August 2020 to the end of February 2021 and data were collected over a period of 7 months. Workers were interviewed during study time of the industry from 10.00 Am to 1.00 Pm on 3 days/week (Saturday, Monday, Tuesday). Average time taken to complete interview ranged from 20- 30

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minutes and average workers' number ranged between 2- 3 workers day.

### **Statistical analysis:**

All data collected were organized, tabulated and analyzed using appropriate statistical test. The data were analyzed by using the Statistical Package for Social Science (SPSS) version 20, which was applied to calculate frequencies and percentages as well as test statistical significance and associations by using chi-square test and person correlation test to detect the relation between the variables for (p value).

### **The observation differences and associations were considered as the following:**

Highly significant (HS)	$p < 0.001$
Significant (S)	$p \leq 0.05$
Not significant (NS)	$p > 0.05$

### **Results:**

**Table (1):** Shows that 30.7% of studied workers aged from 20 years to less than 30 with mean age  $36.87 \pm 10.99$ , 52% of them were males and 52% were married and only 52.7% of them had primary education. In addition, 54.7% of studied workers lived in rural area and 68.7% of them didn 't have enough income.

**Figure (1):** Shows that 80.7% of workers had source of information from friends and 44% of workers had source of information from training courses and 17.3 from previous studies.

**Figure (2):** Shows that 48.7% of studied workers had good total knowledge score regarding occupational health hazards and 37.3% of studied workers had average total knowledge score regarding occupational health hazards while 14% of workers had poor total knowledge score regarding occupational health hazards.

**Figure (3):** Shows that 50% of studied industries had safe working environment while 50% of studied industries had unsafe working environment for workers.

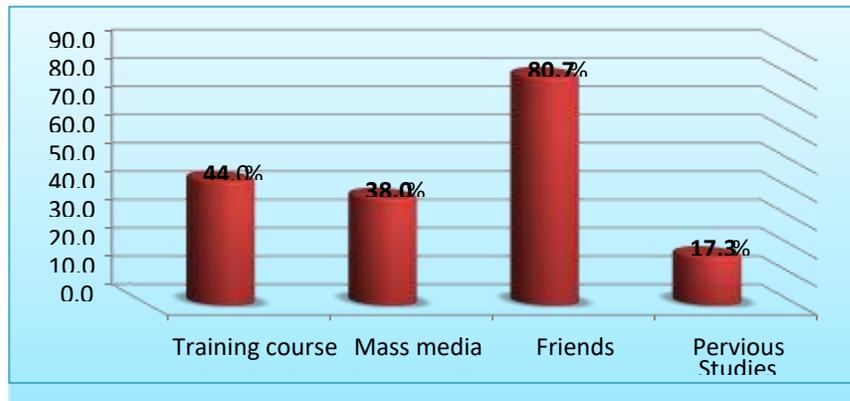
**Figure (4):** Shows that 54.7% of workers had satisfactory total practices score regarding prevention of occupational health hazards while 45.3% of workers had unsatisfactory total practices score regarding prevention of occupational hazards

**Table (2):** Shows that there was highly statistically relation between total knowledge level and their demographic characteristics as age, marital status, education level (p-value  $< 0.001$ ). There was statistically significant relation between total knowledge level and their demographic characteristics as sex, monthly income (p-value  $< 0.05$ ). While there wasn't statistically relation between total knowledge level and their demographic characteristics as residence.

**Table (3):** Shows that there was a statistically significant positive correlation between total knowledge and the total practices of studied workers (p- value  $< 0.05$ ).

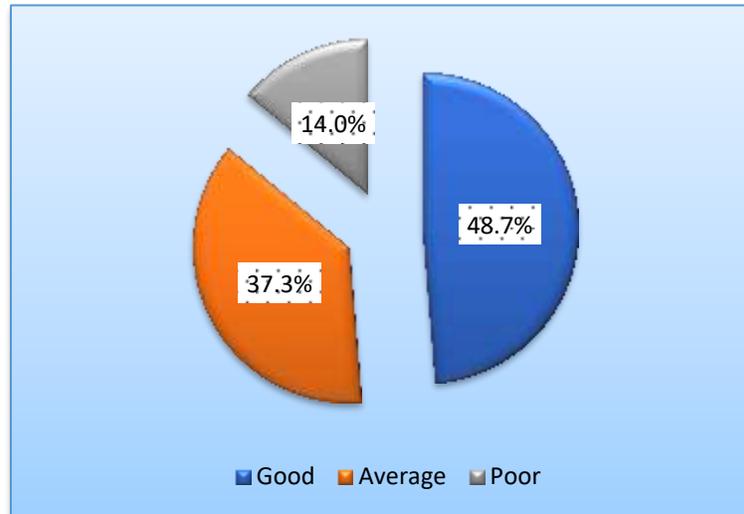
**Table (1): percentage distribution of studied workers regarding socio- demographic characteristics (n=150).**

<b>Socio-demographic characteristics</b>	<b>No</b>	<b>%</b>
<b>Age</b>		
20-	46	30.7
30-	41	27.3
40-	26	17.3
50-	37	24.7
Mean $\pm$ SD 36.87 $\pm$ 10.99		
<b>Sex</b>		
Male	78	52.0
Female	72	48.0
<b>Marital status</b>		
Single	46	30.6
Married	78	52.0
Divorced	13	8.7
Widowed	13	8.7
<b>Residence</b>		
Rural	82	54.7
Urban	68	45.3
<b>Educational level</b>		
Can't read and write	15	10.0
Primary education	79	52.6
Technical education	46	30.7
University education	10	6.7
<b>Monthly income</b>		
Enough	47	31.3
Not enough	103	68.7

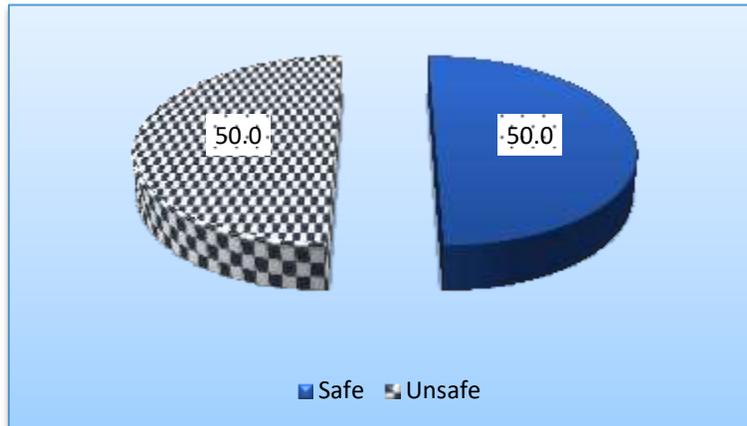


**Figure (1): Percentage distribution of studied workers regarding source of information**

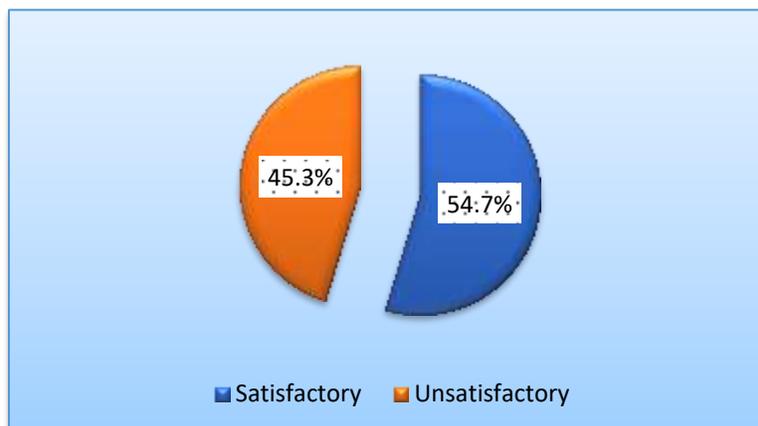
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**Figure (2): Percentage distribution of studied workers regarding their total knowledge score**



**Figure (3): Percentage distribution of studied industries regarding their safety environment**



**Figure (4): Percentage distribution of studied workers' total practices score regarding prevention of occupational health hazards (n=150).**

**Table (2): Statistically relation between total knowledge level among studied workers and their demographic characteristics**

items	Poor (N=21)		Average (N=56)		Good (N=73)		X2	p-value
	No	%	No	%	No	%		
<b>Age</b>								
20-	11	52.4	22	39.3	13	17.8	20.69	0.002*
30-	5	23.8	12	21.4	24	32.9		
40-	5	23.8	11	19.6	10	13.7		
50-	0	0.0	11	19.6	26	35.6		
<b>Sex</b>								
Male	15	71.4	20	35.7	27	37.0	9.14	0.010*
Female	6	28.6	36	64.3	46	63.0		
<b>Marital status</b>								
Single	2	9.5	17	30.4	27	37.0	33.80	0.000**
Married	8	38.1	31	55.4	39	53.4		
Divorced	3	14.3	3	5.4	7	9.6		
Widowed	8	38.1	5	8.9	0	0.0		
<b>Residence</b>								
Rural	14	66.7	32	57.1	36	49.3	2.202	0.332*
Urban	7	33.3	24	42.9	37	50.7		
<b>Educational level</b>								
Illiterate	8	38.1	5	8.9	2	2.7	26.76	0.000**
Primary education	8	38.1	29	51.8	42	57.5		
Technical education	5	23.8	20	35.7	21	28.8		
Universery education	0	0.0	2	3.6	8	11.0		
<b>Monthly income</b>								
Enough	10	47.6	20	35.7	17	23.3	5.285	0.071*
Not enough	11	52.4	36	64.3	56	76.7		

\* Statistically significant difference  $P < 0.05$

\*\* Highly statistically significant difference  $P \leq 0.001$

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**Table (3): Correlation between total knowledge and total practices among studied workers**

Items	Total Knowledge	
	r	p-value
	0.671	0.035*

\* Statistically significant difference  $P < 0.05$

### **Discussion:**

The occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupation (Mossburg, 2019).

Regarding to socio demographic characteristics of workers at glass manufacture industries, the present study revealed that, less than third of workers aged 20 years or more with the mean age  $36.87 \pm 10.99$  years. This finding was in the same line with Potdar et al. (2019), who performed a study on " Study of occupational health problems among workers in a glass manufacturing" in Poland and reported that more than two thirds (68.34%) age ranged from 20-39 years, with the mean age  $28.54 \pm 7.24$  years. This might due to different of the sample which the sample of other study was bigger than the present study.

Related to the gender of worker, the present study revealed that, around half of studied workers were males. This finding was agreed with Deshmukh et al. (2021), who performed a study on " Morbidities in the Glass factory workers of central India " in India and reported that the most of workers (92.8%) were males. This might due to most of the factory departments were dangerous and hard so need more men than women.

In relation to the marital status, the present study clarified that, around half of workers were married. This finding was accordance with Abbate (2016), who

performed a study on " Changes induced by exposure of the human lung to glass fiber-reinforced plastic" in New York and reported that more than half of workers (50.7%) were married.

Concerning residence of workers, the present study showed that, more than half of workers were lived in rural area. This finding was agreed with Minamoto et al. (2020), who performed a study on " Skin problems among fiber glass reinforced plastics factory workers" in Jaban and reported that more than one third of workers (38%) were lived in rural area. This might due to the income of rural areas is lower and the standard of living is lower.

Also, regarding to the educational level of workers, the present study appeared that, more than half had primary education. This finding is accordance with Allendorf (2019), who performed a study on " Research needs for coatings on glass summary of U.S. department of energy road mapping workshop Occupational" in United States and reported that all most of workers (91.3%) had primary education. Regarding to monthly income of studied workers the present study revealed that, more than two thirds of studied workers didn't had enough income. This finding was in agreement with Allendorf (2019), who reported that more than half of studied workers (55.3%) had enough income.

Regarding to total practices level of studied workers, the present study revealed that more than half of workers had satisfactory practices regarding prevention of occupational

health hazards. This finding was disagreed with **Liu et al. (2020)**, who reported that more than three fifths (64.4%) of workers had satisfactory practices regarding prevention of occupational health hazards. This might due to protected the workers from work accidents and from the dangers of chemicals, glass dust and other damages that may affect them according to the nature of their work.

The results of the current study appeared that there was statistically relation between total knowledge level among studied workers and their demographic characteristics and age, sex, residence, monthly income. While there was highly statistically significant relation between total knowledge level among studied workers and their demographic characteristics and marital status, education level. This finding was agreed with **Artamonova & Zhuravskaya, (2016)** who reported that were statistically relation between total knowledge level among studied workers and their socio-demographic characteristics.

The results of the current study showed that there were statistically significant positive correlation between the worker total knowledge and the total practices, This finding was agreed with **Minamoto (2020)**, who reported that were correlation between total knowledge and total practices among studied workers.

### **Conclusion:**

There was highly statistically significant relation between total practice level and their demographic characteristics as marital status, education level (p-value <0.001). There was statistically relation between total practice level and their demographic characteristics as age, sex (p-

value <0.05) and shows that there was a statistically significant positive correlation between total knowledge and the total practices of studied workers (p- value < 0.05).

### **Recommendations:**

- Important application of international standard (OHSAS) in field work to improve occupational health and safety performance for workers' safety.
- Periodic check up of health status for workers for early detection of occupational hazards to monitor their health status and early case finding.
- Periodic educational training and workshops for all workers working in the glass industry about the specific occupational hazards, emphasize on the importance and usefulness of personal protective equipment, right way for using it and first aid.
- Promotion of personal fitness of the workers by health promotion programs including educational and motivational strategies as well as a systematic plan for monitoring and evaluating the program.
- Workers should have access to all information relevant to the occupational hazards through mass media as video tape in easy language to meet most workers level of education and information relevant to safe working environment.
- Increasing the role of occupational health nurse in the industry.

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## مخاطر الصحة المهنية بين العاملين في مصنع الزجاج

امل عادل حسبو- محبوبة صبحي عبدالعزيز – وفاء عطا محمد

تشكل السلامة والصحة المهنية نظاما يتعامل مع الوقاية من الإصابات والأمراض المتعلقة بالعمل فضلا عن حماية وتحسين صحة العمال . لذلك هدفت هذه الدراسة الي تقييم مخاطر الصحة المهنية بين العاملين في مصنع الزجاج. وقد أجريت الدراسة في اثنين من مصانع الزجاج بمحافظة القليوبية وهم مصنع النصر وكريستال عصفور على ١٥٠ عامل من هذه المصانع. حيث أظهرت النتائج بوجود علاقة ذات دلالة إحصائية بين المعرفة الكلية والممارسات الكلية للعمال. كما أوصت الدراسة باستمرارية تقديم دورات تدريبية حول مخاطر الصحة المهنية للعاملين بمصنع الزجاج لتحسين معرفتهم بها.