# Prevalence and determinants of respiratory problems among workers in El-Beheira Textile Companies

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## Abstract

Textile industry workers are exposed to different hazards in the various sections of textile manufacturing. The major health problems associated with cotton dust are respiratory problems. **Aims:** this study was conducted to determine the prevalence and identify the determinants of respiratory health problems among textile workers in El–Beheira governorate. **Design:** A cross sectional descriptive study was adopted to carry out this study. The sample included 603 workers who were selected by proportional allocation technique from different departments and by systemic random sampling within the department. Data was collected using three tools (Textile companies' workers health profile, safety and health at work observational check list, Work place stress scale).**Results:** less than half (47.8%) of the workers had experience of 30 years or more (mean was 27.2 ± 6.6.). All workers reported that the personal protective equipment weren't available. Moreover, all workers mentioned that there are no health education programs. The highest prevalence of respiratory problems found among spinning workers followed by dyeing workers, weaving workers, and polyester staple fiber. **Conclusion,** The significant prevalence and associated factors of respiratory problems should alert the factory, governmental and non-governmental organizations working on Occupational Health and Safety. **Recommendations**: Periodic inspection of working environment by industrial hygienist through regular measurement of cotton dust concentration.

***Keywords: Prevalence, Respiratory Problems, Determinants & textile Industry .***

## Introduction

Textile enterprise has the finest contribution to the Egyptian economy, accounting for 5% of the overall gross domestic product and 26.4 % of business manufacturing **(Massoud et al., 2009)**. Following the ultra-modern census of institutions of CAPMAS in 2013, the textile industry absorbs around 20% of the commercial hard work pressure **(CAPMAS 2013)**.

The interaction amongst man and his workplace may prompt to the improvement of well-being when work is completely adjusted to human needs or to sick well-being if work stresses are beyond human tolerance (**Gulani 2008**). Work related illness and injuries result from particular exposures at work, which may bother certain sicknesses or be a figure of shifting significance, bringing on ailments of various etiology (**Park 2007**).

Productivity at work is directly influenced by the health status of the workers. An unhealthy workforce is an impediment to increasing workplace productivity, thus affecting the overall national productivity. Poor occupational health and reduced working capacity of the workers may cause an economic loss of up to 10-20% of the Gross National Product (GNP). The cost to society has been estimated at 2-14% of the GNP in different studies, in different countries. The WHO estimates that only 10-15% of the workers have access to basic occupational health services (**Lodpey et al., 2009**)

Occupational illness results from interaction of complex different risk factors. The main causes of occupational diseases globally include exposure to physical, mechanical and chemical hazards, and unsafe practices. Additionally, socio-demographic characteristic of laborers, work environment and psychosocial factors are other potential factors associated with work related illness (**Morassaei et al., Berecki et al., 2013, Tadesse & 2007, Serkalem et al., 2014, Yiha & Kumie. 2010)**.

Cotton dust is characterized as dust present in the air during the handling or preparing of cotton, which may contain a blend of numerous substances, including ground up plant matter, fiber, microorganisms, soil, pesticides, non-cotton plant matter and different contaminants which may have accumulated with the cotton during the growing ,collecting and subsequent processing or storage periods .Any dust present during handling and preparing of cotton through the weaving or sewing of

textures, and dust present in different operations or manufacturing process utilizing crude or waste cotton fibers and cotton fiber byproducts from textile mills are considered cotton dust within this definition (**Douwes et al., 1995** ) .

Cotton dust can be categorized into inhalable dust which is a term used to depict dust that is hazardous when deposited anyplace in the respiratory tree including the mouth and nose. While thoracic dust is characterized as those materials that are risky when deposited anyplace within the lung airways and the gas exchange region. On the other hand, respirable dust is characterized as that fraction of dust reaching the alveolar region of the lungs (**Sangeetha et al., 2013** ) .

The laborers engaged in the preparing and spinning of cotton are exposed to a large amount of cotton dust and other particles that prompts to respiratory problems. Symptoms of short-term exposure (acute) incorporate the feeling of chest tightness, coughing, wheezing, sputum, weakness, fever and breathing trouble. These symptoms occur during the exposure period and vanish by the end of the exposure of the laborers. On the other hand, symptoms of long-term exposure (chronic) incorporate chronic bronchitis and byssinosis. Other impacts incorporate skin and nose itching and irritation because of continuous handling of cotton **(OSHA 2003)** .

Use of personal protective equipment (PPE) is one of the important measures to safeguard workers from exposure to occupational hazards, especially in developing countries where conventional occupational safety control principles remain a challenge to implement **(Malik et al., 2010**). Workers use of PPE is affected by socio-demographic, behavioral and work environment factors **(Kamal et al., 2007**).In textile factory they use different protective devices at different production sections. For example, they need to wear respirator, gloves, goggle, boot shoes, ear plugs and mask at spinning section **(Akintayo 2013** ) .

The occupational health nurse has an important role in preventing industrial hazards. Her role includes determining workers health problems, identify industrial health hazards and dangerous conditions to health, plan and promote workers health by providing appropriate treatment (**WHO 2001**). She participates in implementing a safety plan to prevent or minimize accidents and injuries that occur during daily activities. In educational health program, she assess worker's needs, develop appropriate educational program by using formal and informal presentation. Also she has a role in training workers to use preventive measures during working, encourage workers to use health services, evaluate the effectiveness of workers response to nursing actions and control of environmental factors which cause a disease **(Guzik 2013)**.

Globally, work related accidents and occupational illness result in more than 2.3 million deaths every year. In 2010, there were over 350,000 catastrophic occupational accidents and over 1.9 million fatal occupational diseases. Consequently, nearly 6,300 people expire daily due to these causes; work related accidents killed over 960 workers and approximately 5,400 died from occupational diseases. Serious work related accidents have expanded in 2010 compared to the previous estimation for the year 2008.However; the rate of fatal occupational accidents (per 100,000 persons in labor force) remained nearly the same with just slight increment. The number of lethal occupational illness remained nearly the same with a little decrease in 2011 contrasted with 2008. Additionally, there were more than 313 million non – fatal work related accidents (with at least four days absence) in 2010 implying that work related occupational accidents cause injury or illness for around 860,000 worker daily . The number and rate of non-fatal occupational accidents have remained nearly the same in 2010 with just little decrease since 2008 (**Takala et al., 2014**).

A study conducted by **Refaat et al (2015)** in El Minia revealed that 95% of carding and blowing workers (high exposed groups to cotton dust) suffered from chronic cough compared to 56.8% of the low exposed workers (workers of twisting and spinning department). Similarly, dyspnea was higher among high exposed than low exposed workers (85% and 62.5% respectively). On the other hand, expectoration and wheeze were slightly higher among high exposed than low exposed workers. Moreover, it was found that the pulmonary function tests were lower among high exposed workers than that among the low exposed workers (**Refaat & kamel 2015**).

## Significant of the study

In Egypt little has been documented on the prevalence of byssinosis or other occupational lung diseases among cotton textile workers. Therefore, this study was conducted to determine the prevalence and identify the determinants of respiratory health problems among workers in El–Beheira Textile Companies.

## Materials & Method

### Materials

### Research design

A cross-sectional descriptive design was adopted to carry out this study.

### Setting:

The study was conducted in all Textile Companies in El-Beheira governorate that includes: Kafr El- Dwar

Textile Companies, (namely:" Miser Spinning and Weaving Company,El-Beda Dyeing Company, and El- Harir Polyester Staple Fibers Company") Kom Hamada Spinning Company,and El-Mahmoudeya Spinning and Weaving Company.

**Subjects**

- A sample of 603 workers out of 5236 of Textile Companies was required to estimate an average prevalence of health problems = 50 % with precision of 7%, alpha error = 0.05
- $n = Z^2 \frac{P(1-P)}{d^2}$
- n=sample size
- Z= 1.96
- P=prevalence for unknown population (50%)
- d= precision
- The sample size was calculated using Epi-Info 7 software.
- Workers were selected by systematic random sampling (using workers lists) from the different selected companies using the proportional allocation technique for companies and from each section within the same company.

**Tools for data collection**

Three tools were used by the researcher in order to collect the necessary data from the workers.

**Tool I: Textile Companies' workers health profile** it was developed by the researcher after reviewing the recent literature in order to collect data from the studied workers. It included the following parts:

**Part I: Personal data**

**This part included the following data as**

- Age, sex, level of education, marital status, income, place of residence, and crowding index.

**Part II: Occupational data**

**It included the following data like**

- Department, working hours per day, taking breaks and how often, years of experiences, work schedule, absenteeism, In-service training programs about occupational health hazards, personal protective devices and first aid.

**Part III: Worker's health status**

**It included the following parts**

a) **Past health history as:** history of chronic diseases and infections, history of surgical operations, prior hospitalizations, lab investigations done within the last 6 months, work injuries.
b) **Family history e.g.** presence of any diseases as diabetes mellitus, heart disease, hypertension, and asthma**.**
c) **Current health status (self-reported data) such as current complaints including**

- Respiratory problems like chest tightness, dyspnea, cough, sputum, allergic rhinitis, and bronchial asthma.

**Tool II: Workplace stress scale**

Workplace Stress Scale was adopted by the researcher in order to measure job stress levels. It was developed by **Marline Company and the American Institute of Stress in 2009**. Each item was rated on 5 points lickert scale ranging from 1 to 5.The first 5 statements are negative statements that's why never took 1 and very often took 5.on the other hand, the last 3 statements were positive statements that's why never took 5 and very often took 1.

The items were scored, then coded and interpreted as following:

**Scoring System of the Workplace Stress Scale**

| Score | Stress level |
|---|---|
| ≤15 | Calm |
| 16-20 | Low stress |
| 21-25 | Moderate stress |
| 26-30 | Severe stress |
| 31-40 | Very severe stress |

**Method**

**Administrative process**

- Official letter was directed to the director of each company to inform him about the study objectives and to obtain his permission to conduct the study.

**Preparation of the study tools**

- **Tool I** was developed by the researcher after reviewing of the recent literatures to assess workers health profile**.**
- **Tool II** Workplace Stress Scale that consists of (8) items was adopted by the researcher to measure job stress levels. It was developed by the Marline Company and the American Institute of Stress in (2009).
- Content validity of the study tools **(I,II,)** was tested by a jury of five experts in the field of community health from the Faculty of Nursing. Necessary modifications were done based on their recommendations such as (remove unnecessary details and change the way of some questions to be suitable with all workers' levels).
- Reliability of tools was done using Cronbach's Alpha reliability correlation coefficient. The result for tool II (workplace stress scale), was r = 0.854.

**Pilot study**

- After the development of the tools, a pilot study was conducted before starting data collection on a random sample of 60 workers (10% of the estimated sample). They were obtained from Kar El Dawar Company.

**Process of data collection**

- The interviews were carried out individually during the break time after a brief explanation of the purpose of the study.
- Workers were selected by systematic random sampling (using workers lists) from the different selected companies using proportional allocation technique for companies and from each section within the same company
- Each interview took approximately 30 minutes using tool I and III.
- The data were collected during the period from (May 2016 to October 2016).the workers were interviewed from Saturday to Thursday and number of the workers vary according to the work circumstances.

**Statistical analysis**

Data were coded and transferred into specially designed formats to be suitable for computer feeding. Following data entry, checking and verifying process were carried out to avoid any errors during data entry. Frequency analysis, cross tabulation and manual revision were all used to detect any errors.

- Data was analyzed using PC with statistical package for social science (SPSS) version 20.
- The level of significance selected for this study was p equal or less than 0.05.

**The following statistical measures were used**

- The descriptive measure included: count, percentage, arithmetic mean, standard deviation.
- Analytical statistical tests included: Fisher Exact Test using Mont Carlo exact probability (MCP), chi square test ($X^2$), and logistic regression analysis was also used.
- Graphical presentation included bar graph.

**VI. Ethical consideration**

- Oral and written consent was obtained from the workers after explanation of the aim of the study.
- Confidentiality and anonymity of the individual's response were guaranteed during the interview.

## Results

**Table (1): Distribution of textile workers according to their personal data.**

| Personal data | Textile workers (n=603) | |
|---|---|---|
| | No. | % |
| Age (in years) | | |
| - 25 <30 | 36 | 6.0 |
| - 30<40 | 157 | 26.0 |
| - 40<50 | 364 | 60.4 |
| - 50 <60 | 46 | 7.6 |
| Mean ± SD | 46.7 ± 6.5 | |
| Education | | |
| - Illiterate | 37 | 6.1 |
| - Read and write | 143 | 23.7 |
| - Primary education | 236 | 39.1 |
| - Preparatory education | 147 | 24.5 |
| - Secondary/university education | 40 | 6.6 |
| Marital status | | |
| - Married | 599 | 99.3 |
| - Single | 3 | 0.5 |
| - Divorced | 1 | 0.2 |
| Residence | | |
| - Rural | 419 | 69.5 |
| - Urban | 184 | 30.5 |
| Crowding index | | |
| - ≤ 1.5 (Not Crowded) | 8 | 1.3 |
| - > 1.5 ( Crowded) | 595 | 98.7 |

**Table (2): Distribution of textile workers according to their occupational history.**

| Occupational history | Textile workers (n=603) | |
|---|---|---|
| | No. | % |
| **Years of experience** | | |
| - <15 years | 33 | 5.5 |
| - 15- | 54 | 8.9 |
| - 20- | 228 | 37.8 |
| - 30+ | 288 | 47.8 |
| Mean ± SD | 27.2 ± 6.6 | |
| **Work schedule** | | |
| - Fixed | 52 | 8.6 |
| - Rotated | 551 | 91.4 |
| **Daily working hours** | | |
| - 7 hrs/day | 32 | 5.3 |
| - 8 hrs/ day | 571 | 94.7 |
| Mean ± SD | 7.95 ± 0.22 | |
| **Absenteeism From Work** | | |

| | | |
|---|---|---|
| -No | 398 | 66.0 |
| -Yes | 205 | 34.0 |
| -Frequency **(n=205)** | | |
| • Once/6months | 45 | 21.9 |
| • Twice/6 months | 110 | 53.7 |
| • Three times /6 months | 50 | 24.4 |
| -Reasons **(n=205)** | | |
| • Health problems | 76 | 37.1 |
| • Social problems | 129 | 62.9 |

**Table (3): Distribution of Textile Workers According to Safety Measures Available at Companies.**

| Safety measures | Textile workers (n=603) | |
|---|---|---|
| | No. | % |
| First aid | | |
| -Presence of First aid box in the workplace | | |
| • Yes | 17 | 2.8 |
| • No | 586 | 97.2 |
| -Responsible person | | |
| • Nurse | 586 | 97.1 |
| • Worker | 17 | 2.9 |
| Received training programs | | |
| - Received | 0 | 0.0 |
| - Not received | 603 | 100 |
| Availability of Personal protective equipment | | |
| - Yes | 0 | 0.0 |
| - No | 603 | 100 |

**Table (4): Distribution of textile workers regarding their health problems related to work exposure.**

| Health problems related to work exposure | Departments | | | | | | | | Test of significance (MCP) |
|---|---|---|---|---|---|---|---|---|---|
| | Polyester staple fiber (n=24) | | Spinning n=(419) | | Weaving n=(108) | | Dyeing n=(52) | | |
| | No | % | No | % | No | % | No | % | |
| Respiratory problems | | | | | | | | | |
| Chest tightness | | | | | | | | | |
| No | 24 | 100 | 148 | 35.3 | 108 | 100 | 23 | 44.2 | 0.92 |
| Yes | 0 | 0.0 | 271 | 64.67 | 0 | 0.0 | 29 | 55.77 | 0.001* |
| Aggravating factors | | | | | | | | | |
| Exposure to dust | 0 | 0.0 | 161 | 59.40 | 0 | 0.0 | 0 | 0.0 | |
| Chemicals inhalation | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 29 | 100 | 12.69 |
| Inhalation of cotton fluff | 0 | 0.0 | 110 | 40.59 | 0 | 0.0 | 0 | 0.0 | 0.001* |
| Cough | | | | | | | | | |
| No | 18 | 75 | 19 | 4.5 | 83 | 76.8 | 8 | 15.4 | 5.89 |
| Yes | 6 | 25 | 400 | 95.4 | 25 | 23.1 | 44 | 84.6 | 0.001* |
| Type of cough | | | | | | | | | |
| Productive | 3 | 50 | 250 | 62.5 | 15 | 60 | 30 | 68.18 | 14.80 |
| Dry | 3 | 50 | 150 | 37.5 | 10 | 40 | 14 | 31.81 | 0.001* |
| Severity of cough | | | | | | | | | |
| Mild | 3 | 50 | 333 | 83.25 | 10 | 40 | 12 | 27.27 | |
| Moderate | 2 | 33.33 | 47 | 11.75 | 10 | 40 | 20 | 45.45 | 12.5 |
| Severe | 1 | 16.66 | 20 | 5 | 5 | 20 | 12 | 27.27 | 0.001* |

*MCP: Mont Carlo exact probability* ** P ≤ 0.05 (significant)*

**Table (4): (Conte.)**

| Health problems related to work exposure | Departments | | | | | | | | Test of significance (MCP) |
|---|---|---|---|---|---|---|---|---|---|
| | Polyester staple fiber (n=24) | | Spinning n=(419) | | Weaving n=(108) | | Dyeing n=(52) | | |
| | No | % | No | % | No | % | No | % | |
| ▪ Color of sputum | | | | | | | | | |
| • Yellow greenish | 3 | 100 | 100 | 40 | 5 | 33.33 | 10 | 33.33 | |
| • Transparent White | 0 | 0.0 | 50 | 20 | 10 | 66.66 | 10 | 33.33 | 5.57 |
| • Gray | 0 | 0.0 | 50 | 20 | 0 | 0.0 | 10 | 33.33 | 0.001* |
| • Brown | 0 | 0.0 | 50 | 20 | 0 | 0.0 | 0 | 0.0 | |
| ▪ Aggravating factors for cough | | | | | | | | | |
| • Dust exposure | 0 | 0.0 | 254 | 63.5 | 0 | 0.0 | 0 | 0.0 | |
| • Inhalation of cotton fluff | 0 | 0.0 | 146 | 36.5 | 25 | 100 | 0 | 0.0 | 15.94 |
| • Inhalation of chemicals | 6 | 100 | 0 | 0.00 | 0 | 0.00 | 44 | 100 | 0.001* |
| Dyspnea | | | | | | | | | |
| • No | 24 | 100 | 144 | 34.36 | 108 | 100 | 40 | 76.9 | 3.90 |
| • Yes | 0 | 0.0 | 275 | 65.60 | 0 | 0.0 | 12 | 23.10 | 0.001* |
| ▪ Time of occurrence | | | | | | | | | |
| • On exerting extra effort | 0 | 0.0 | 84 | 30.5 | 0 | 0.0 | 3 | 25 | |
| • On exerting moderate effort | 0 | 0.0 | 113 | 41. 09 | 0 | 0.0 | 4 | 33.33 | 4.88 |
| • On exerting simple effort | 0 | 0.0 | 78 | 28.36 | 0 | 0.0 | 5 | 41.66 | 0.001* |

| Health problems related to work exposure | Departments | | | | | | | | Test of significance (MCP) |
|---|---|---|---|---|---|---|---|---|---|
| | Polyester staple fiber (n=24) | | Spinning n=(419) | | Weaving n=(108) | | Dyeing n=(52) | | |
| | No | % | No | % | No | % | No | % | |
| | | | | | | | | | |
| Aggravating factors | 0 | 0.0 | 275 | 100 | 0 | 0.0 | 0 | 0.0 | 7.70 |
| Dust exposure<br>Inhalation of chemicals | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 12 | 100 | 0.001* |

*MCP: Mont Carlo exact probability* ** P ≤ 0.05 (significant)*

**Table (4): (Conte**

| Health problems related to work exposure | Departments | | | | | | | | Test of significance ($^{MC}$P) |
|---|---|---|---|---|---|---|---|---|---|
| | Polyester staple fiber (n=24) | | Spinning n=(419) | | Weaving n=(108) | | Dyeing n=(52) | | |
| | No | % | No | % | No | % | No | % | |
| **Allergic rhinitis** | | | | | | | | | |
| No | 18 | 75.0 | 192 | 45.8 | 108 | 100.0 | 21 | 40.4 | 4.75 |
| Yes | 6 | 25.0 | 227 | 54.2 | 0 | 0.0 | 31 | 59.6 | 0.001* |
| Aggravating factors | | | | | | | | | |
| Dust exposure | 0 | 0.0 | 227 | 100.0 | 0 | 0.0 | 0 | 0.0 | 2.89 |
| Inhalation of chemic | 6 | 100.0 | 0 | 0.0 | 0 | 0.0 | 31 | 100.0 | 0.001* |

**Table (5) Logistic Regression for the Determinants of Respiratory Problems**

| Variables | B | S.E | Sig | Exp(B) | 95% C.l.for EXP(B) | |
|---|---|---|---|---|---|---|
| | | | | | lower | Upper |
| **Residence** | **.057** | **.041** | **.000** | **2. 58** | **.977** | **5.140** |
| **Income** | **-1.000** | **.041** | **.000** | **.868** | **.518** | **.629** |
| Department | | | | | | |
| Polyster staple fiber department | -.535- | .458 | .243 | .586 | .239 | 1.438 |
| **Spinning department** | **-4.380** | **.746** | **.000** | **1.468** | **1.709** | **5.140** |
| Weaving department | 2.360 | 2.330 | .995 | 1.600 | .850 | 9.650 |
| Dyeing department | -2.487 | .899 | .166 | 1.083 | .014 | .484 |
| Daily working hours | -2.487- | .032 | 156 | 2.964 | .396 | .521 |
| **Years of experience** | **2.3** | **297** | **.000** | **2.011** | **.128** | **3.054** |
| **Smoking** | **-12.1** | **-.561** | **.000** | **2.964** | **.408** | **.536** |
| Sleeping problems | -2.487- | .041 | .296 | 2.964 | .003 | .047 |
| Stress | -1.000 | .032 | .166 | .368 | .408 | .536 |

*-B: Regression coefficient* *- S.E: Standard error of estimate*
*- C.I: Confidence interval* *-*Significant at P<0.05*

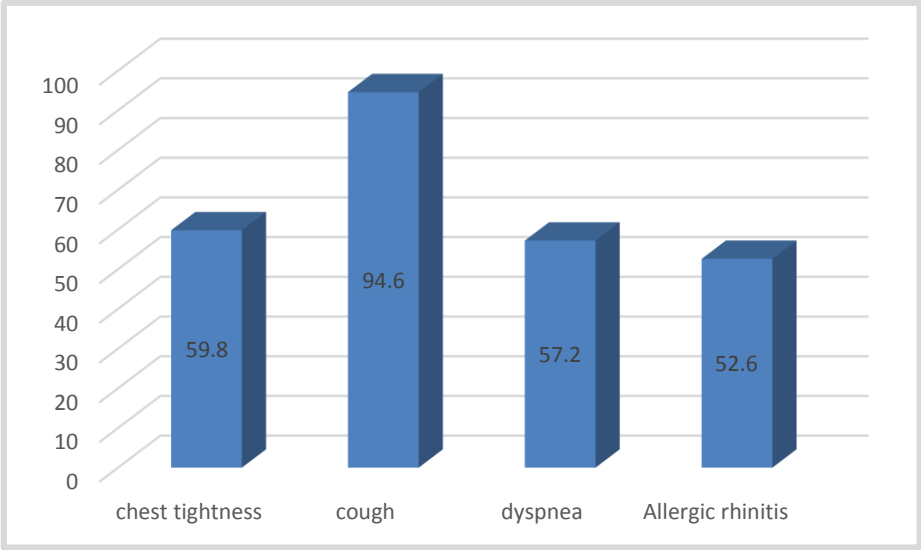


**Figure (I) illustrates the overall prevalence of respiratory problems among textile workers: cough was the commonest complain (94.6%); while allergic rhinitis was reported by 52.6 %.**

**Table (1):** Illustrates the personal data of textile **workers.** Regarding age, about three-fifth (60.36) of the workers was in the age group ranged from 40 to less than 50. While more than one-quarter (26.03%) of the workers were in the age group ranged from 30 to less than 40.Only 5.9 % of the workers were in the age group ranged from25 to less than 30. The rest of the workers (7.62%) were in the age group ranged from 50 to less than 60. While the mean age group was 46.7 ± 6.5.

With respect to educational level, more than one-third of the workers (39.1%) had primary education, and nearly one- quarter (24.37 %) had preparatory education, while more than one-fifth (23.71%) could just read and write . Moreover, 6.1% were illiterate, 6.63 % had secondary and university education

Concerning marital status, the vast majority of workers (99.33) were married.

Pertaining to worker's residence, the table depicts that more than two third (69.48 %) of them were living in rural areas, while the rest of them (30.51%) were living in urban areas.

The table also shows that the vast majority of workers (98.7%) live in crowded houses and only 1.3% lives in not crowded houses.

**Table (2):** Shows the distribution of textile workers according to their occupational history Concerning years of experience, more than two- fifth (47.8%) of the workers had experience of 30 years or more, and 5.5% of them had experience of less than 15 years. Years of experience mean and standard deviation was 27.2 ± 6.6 years.

With respect to daily working, the table illustrates that the vast majority of workers (94.7%) was working 8 hours per day. While the rest of them (5.3%) were working 7 hours per day. The mean and SD was 7.95 ± 0.22 hours.

As regards to worker absenteeism from their work, more than one–third (34.0%) of them were absent from work during the last 6 months. Moreover, it was found that more than half of them (53.7%) were absent twice during the last 6 months. While, about one-quarter (24.4 %) were absent three times. Concerning the reason for absenteeism, it was found that nearly two–third (63.0 %) of the workers were absent due to social problems such as death of relatives, while the rest of them (37.0 %) were absent due to health problems.

**Table (3):** Shows distribution of textile workers according to safety measures available at companies Concerning the availability of first aid box in the workplace,the minority of workers (2.8%) only reported that it was available at the workplae.furthermore, when asked about the responsible person for first aid, the vast majority (97.1%) of the workers stated that the nurse is the responsible one, and only (2.8%) reported that a well trained worker is the responsible person.

Regarding training programs , all workers mentioned that they didn't attend or participate in any occupational health programs.

With respect to availability of personal protective equipment, all workers stated that it weren't available since 2006.

**Table (4):** Illustrates distribution of textile workers regarding their health problems related to work exposure Concerning respiratory problems, the table reveals that respiratory problems reported by textile

workers were chest tightness, cough, dyspnea, and allergic rhinitis. In relation to chest tightness, the table shows that more than two-third (64.67%) of spinning workers had chest tightness , compared to More than half (55.77 %) of dyeing workers. Significant difference was found between departments (MCP= 0.92, P = 0.001). Furthermore, when asked about aggravating factors, more than half of spinning workers (59.40%) mentioned that it was aggravated by exposure to dust, and more than one-third (40.59 %) of them stated that it was aggravated by inhalation of cotton fluff. On the other hand, all dyeing workers stated that it was aggravated by chemicals inhalation. significant difference was found between departments (MCP=12.69, P = 0.001).

As regards to cough, the highest prevalence was found among spinners (95.4%), followed by dyers (84.6%), polyester staple fiber workers (25%), and weaving workers (23.1%).Significant difference was found between departments (MCP=589,p=0.001). Additionally, when asked about the type of cough, it was found that productive cough was common than dry cough as it was reported by (68.18%, 62.5%, 60%, 50% respectively) by dyers, spinners, weavers, and polyester staple fiber workers. Significant difference was found between departments (MCP=14.80, p=0.001). Concerning severity of cough, the majority of spinners (83.25%) stated that it was mild, compared to half of polyester staple fiber workers (50%), compared to more than one third of the weavers (40%), compared to (27.27) of the dyers. While, more than one third of the dyers (45.45%), 33.33% of polyester staple fiber workers, 40% of the weavers, and only 11.75% of spinners mentioned that the cough was moderate. However, severe cough was reported by (27.27%, 20%, 16.66%, 5%) of dyeing workers, weaving workers, polyester staple fiber workers, spinning workers) respectively. significant difference was found between departments (MCP=12.5, P= 0.001).

With respect to the workers with productive cough, when asked about the color of sputum, all workers of polyester staple fiber mentioned that it was yellow-greenish, compared to more than one-third (40%) of spinning workers, compared to equal percent (33.33%) of both weaving and dyeing workers . On the other hand, transparent white sputum was reported by more than two – third (66.66%) of weaving workers , corresponding to more than one-third ( 33.33%) of dyeing workers , corresponding to less than one – quarter (20%) of spinning workers . Additionally, 33.33%, 20% of dyeing and spinning workers respectively mentioned that sputum color was gray. Only one-fifth (20%) of spinning workers stated that sputum color was brown. Significant difference was found between departments (MCP=5.57, p=0.001).

In relation to aggravating factors of cough, all polyester staple fiber workers reported that it was aggravated by inhalation of organic chemicals such as ethylene glycol and purified terfethelic acid. On the other hand, the majority of spinning workers (63.5%) stated that it was aggravated by dust exposure and minority (36.5%) of them stated that it was aggravated by inhalation of cotton fluff. While all weaving workers mentioned that it was aggravated by inhalation of cotton fluff. Besides, all dyeing workers mentioned that it was aggravated by inhalation of chemicals. Significant difference was between departments (MCP=15.94, P =0.001).

Regarding dyspnea, the table shows that nearly two third of spinning workers (65.60%) had dyspnea, compared to less than one quarter (23.10%) of dyeing workers. Significant difference was found between departments. (MCP=3.90, p=0.001,). Furthermore, when asked when it occurs, nearly one third (30.5%) of spinning workers reported that it occurs when exerting extra effort, compared to (25%) of dyeing workers. On the other hand, more than one third of spinners (41.09%), compared to 33.33% of the dyers. Additionally , more than one- quarter (28.36 %) of spinning workers mentioned that it occur on exerting simple effort , compared to (41.66%) of dyeing workers .Significant difference was found between departments (MCP=4.88, p=0.001). Moreover, when asked about aggravating factors, spinners mentioned that it was aggravated by dust exposure, while dyers stated that it was aggravated by inhalation of chemicals such as chlorine and different types of dyes. Significant difference was found between departments (MCP=7.70, p=0.001).

Pertaining to allergic rhinitis, the table portrays that more than half of dyeing workers (59.6%) had allergic rhinitis, compared to (54.2%) of spinning workers ,compared to one-quarter (25.0%) of polyester staple fiber workers. Significant difference was found between departments (MCP=4.75, p=0.001).Furthermore, when asked about aggravating factors, all spinning workers mentioned that it was aggravated by dust exposure. On the other hand, both dyeing and polyester staple fiber workers reported that it was aggravated by inhalation of chemicals. Significant difference was found between departments (MCP= 2.89,p=0.001).

**Table (5):** Shows Logistic Regression for Respiratory Problems Based on the findings, the enter regression model was statistically significant (overall percentage is 79.5 %) which is a good percentage for prediction of respiratory problems. The model included (residence, crowding index, department, daily working hours, years of experience, smoking,

sleeping problems, and stress) risk factors among which residence, income, crowding index, spinning and dyeing department, years of experience, and smoking were found to be statistically significant.

As regard to residence, workers who live in rural areas have increased risk for having respiratory problems by 2.5 times compared to those living in urban areas.(OR=2.58**;**95% C.l,**(**.977-5.140). Concerning crowding index, workers who live in crowded household places have 3 times increased risk for developing respiratory problems compared to those who live in spacious household places.(OR=3.031; 95% C.l,( .414-.537).

Considering department, spinners have 1.4 times increased risk for developing

respiratory problems compared to workers of other departments. (OR=1.468; 95% C.l, (1.709-5.140).Regarding years of experience , increased years of experience by one year is associated with increased probability by 2.011 times for having respiratory problems .(OR=2.011; 95% C.l,( .128-3.054).

With respect to smoking, smokers have 2.9 times increased risk for having respiratory problems compared to non- smokers.(OR=2.964; 95% C.l, (.408-.536).

## Discussion

Work is an integral part of the life of most people, providing challenging and worthwhile experiences that evolve and change over time. On average, employed adults spend about one third of their time at work. Health risks are inherent in every industry, and as the workplace changes, the risk that workers will experience adverse health effects related to employment also changes **( Gail & Rosanna 2012).**

States of work and the workplace may have either a positive or dangerous effect on wellbeing and prosperity. Capacity to take part in the working life opens the individual potential outcomes to complete monetarily free life, build up his or her working abilities and social contacts. On the other hand, various reviews have given persuading proof regarding a positive relationship between wellbeing, prosperity, efficient work and a sound workplace where security and wellbeing are considered and where conditions helpful for one's expert and social improvement are given (**Gulani 2008)** .

Globally, the ILO estimates that around 4 percent of the world's gross domestic product (GDP), or about US $2.8 trillion, is lost annually in direct and indirect costs owing to occupational accidents and occupational diseases **(WHO 1994).** According to the U.S. Bureau of Labor Statistics, the rate of non-fatal occupational injury and illness cases was112 cases per 10,000 full-time workers in 2012, down from 117 in 2011, in which 34 percent of the injuries and illnesses were musculoskeletal (ILO 2013). Textile industry was the second largest sector with a high percentage of occupational injuries and illness, following the metal industry and machinery in Turkey (**Bureau of Labor Statistics 2013**).

It was noticed in the present study that the majority of the textile workers were in the age group of 40 to less than 50 years and the minority were in the age group of 25 to less than 30 years. The mean age was 46.7 ± 6.5 years, ranging from 25-58 years. These results were contrasted with other studies conducted by **Khan et al., (2015)** & **Parimalam et al., (2007).** The study conducted by **Khan et al., (2015)** in India revealed that the majority were found in the age group of 16-20 years and the least were found in the age group of 41-45 years. The mean age was 23.30±6.92 years, ranging from 11-45 years. Likewise, Age profile by **Parimalam et al., (2007)** in Bangladesh showed that two thirds of the workers belong to the age group of 16-25 years. The mean age was 28.2±6.8 years.

Adults with higher levels of education are less likely to engage in risky behaviors, such as smoking and drinking, and are more likely to have healthy behaviors related to diet and exercise. The impact of education on health behaviors likely stems from education's impact on skills as well as socioeconomic status **(Cutler and Lleras-Muney 2010)**. It was evident that, nearly two fifth of the workers had primary education, and only 6.1% were illiterate. More or less similar picture was found in a study conducted by **Khan et al., (2015)** who found that the maximum number of respondents (43.3%) were educated up to primary school ,while a few number of the respondents (5.3%) were illiterate. However, different picture was reported by **Gebremichael et al., (2015)** as more than half of the textile workers had secondary education, more than one third were highly educated, and only 0.9% of them were unable to read and write.

In general, married persons are preoccupied with different marital, psychosocial and economic problems, which may prone them to occupational injury **(Monda et al., 2015)**. The present study illustrated that the vast majority of the workers were married .This comes in line with the results of **Khan et al., (2015)** who reported that more than half of the studied sample was married .Otherwise, the current study is contradicted with the study conducted by **Monda et al., (2015)** who found that the vast majority of the workers were unmarried and the minority were married.

The residence may give an idea about the circumstances in which the workers live. The present

study highlighted that more than two third of the textile workers were living in rural areas and the rest of them were living in urban areas. These results disagreed with the study conducted by **Mahmoud et al., (2004)** who indicated that the maximum number of the workers were living in urban areas and the least were living in rural areas.

Crowding has been linked with poorer physical health, especially rates of infectious disease transmission, poorer mental health, poorer educational outcomes for children, and poorer social outcomes. The evidence for links between crowding and physical health are strongest but there is evidence showing links between household crowding and all these areas of concern (**Ross 1995 & Winkleby 1992**).

The present study demonstrated that the vast majority of the textile workers were living in crowded houses, and the minority were not living in crowded houses. Similar findings were reported by **Jaiswal in India (2011)** who found that more than two third of the workers were living in crowded houses and the rest of them were not living in crowded houses .

The present study showed that nearly half of the textile workers had more than 30 years of experience, while the mean for years of experience was (27.2 ± 6.6). These results was inconsistent with other studies. The study conducted by **Singh (2015)** in India indicated that the mean years of experience was 6.2± 0.8 years with a range of 1-20 years. Another study conducted by **Mansouri et al., (2016)** in India revealed that the mean years of experience was 9.24±3.68.

Concerning working schedule, the current findings portrayed that the vast majority of the textile workers had rotated schedule, and the minority had fixed schedule. This agree with the study conducted at Ethiopia by **Gebremichael et al., (2015)** who reported that more than two third of the textile workers had rotated schedule and the rest of the workers had fixed schedule .

First aid requirements will vary from one workplace to the next, depending on the nature of the work, the type of hazards, the workplace size and location, as well as the number of people at the workplace **(OSHA 2013 )** . The present study illustrated that the vast majority of workers reported that the first aid box wasn't available in the workplace. It is advisable for the employer to give a specific person the responsibilities for choosing the types and amounts of first-aid supplies and for maintaining these supplies. The supplies must be adequate, should reflect the kinds of injuries that occur, and must be stored in an area where they are readily available for emergency access (**Robert et al., 2012**). It was evident that the vast majority of the workers mentioned that the nurse was the responsible person for first aid, and the minority of them reported that first aid was the responsibility of a well-trained worker.

Training and education of the staff is the corner stone of an effective facility wide program from the prevention and control of occupational hazards. The results of the present study revealed that none of the textile workers had neither attended nor participated in occupational health programs. This comes in line with the study done at Assiut by **Mahmoud et al., (2004)** who reported that 99.3% of the textile workers didn't attend occupational health and safety programs. However, this was contradicted with the study conducted at Ethiopia by **Gebremichael et al (2015)** who found that more than one third of the studied workers had attended occupational health and safety programs. This variation could be explained as the workers in the current study reported that only their supervisors attend these programs without including them.

Use of personal protective equipment (PPE) is one of the important measures to safeguard workers from exposure to occupational hazards, especially in developing countries where conventional occupational safety control principles remain a challenge to implement **(Malik et al., 2010)** . Workers use of PPE is affected by socio-demographic, behavioral and work environment factors. In textile factory they use different protective devices at different production sections **(Kamal 2007)** . For example, they need to wear respirator, gloves, goggle, boot shoes, overall, ear plugs and mask at spinning section, and while reflector and helmet are worn in addition at engineering section **(Akintayo 2013)** .

The current findings portrayed that all textile workers reported that personal protective equipment were not available since 2006 due to in availability of fund .Contrast findings were reported by **Tadesse et al., (2016)** who reported that personal protective equipment were available and utilized by 80% of the textile workers .

It was evident from the results that textile workers were exposed to different occupational hazards that predispose them to different health problems.

The current findings illustrated that the overall prevalence of the respiratory symptoms was 83.3 %.This result was slightly different to other studies by **Osibogun et al., (2006), Nagoda et al., (2012), & Mansouri et al., (2016)** as they reported lower prevalence of respiratory symptoms (63%,38%,51% respectively ) .

Regarding the respiratory complaints, the results demonstrated that cough was the commonest complaint reported by the textile workers. These

results were comparable with a study conducted by **Mansouri et al., (2016) ,Hinson et al., (2016), El Zayat (2008) & Mahmoud et al., (2004)**. Contrast findings were reported by **Nagoda et al., (2012)** who found that cough was the least common respiratory symptoms reported by the textile workers.

With respect to chest tightness the present study revealed that more than half of the textile workers had chest tightness. These findings were slightly lower than that reported by **Mahmoud et al., (2004)** as chest pain was reported by (68.3%, 57.6%, and 64.9% respectively) of blending, carding, and spinning departments . However, the current findings were higher than that reported by **El Zayat (2008)** who found that 16.5% of spinners and 7.3% of weavers had chest tightness [(56).] Similar findings were reported by **Mansouri et al., (2016)** who illustrated that 12% of the textile workers had chest tightness.

Concerning occupational rhinitis, **Slavin (2003)** defined occupational rhinitis as the presence of nasal symptoms associated with exposure to agents of high or low molecular weight and/or irritating substances in the workplace. Aerosol agents in the environment may clearly aggravate and even trigger the signs and symptoms of rhinitis. The current findings revealed that more than half of the textile workers had allergic rhinitis. These findings comes in line with the study conducted by **Dantas et al., (2013)** as they mentioned that more than half of the textile workers had rhinitis symptoms .

With respect to dyspnea, the results portrayed that more than half of the textile workers had dyspnea. These findings were higher than that reported by **Hinson et al., (2016)** & **Mahmoud et al., (2004)** as the prevalence was (17.3%, 11.1%) respectively.

The higher prevalence rates of respiratory problems in the present study may be attributed to higher dust exposure and poor ventilation in the workplace. In addition, lack of personal protective equipment's. Furthemore,the higher prevalence of respiratory problems among the dyers may be explained by the fact that they were exposed to both allergens (e.g. reactive dyes) and irritants (e.g. H2S, SO2 and nitrogen oxides) that trigger respiratory problems .Moreover, inhalational exposure of chemicals by polyester staple fiber workers contribute to respiratory problems .

## Conclusion

The present study revealed that cough was the commonest, followed by chest tightness, dyspnea and allergic rhinitis.

**Recommendation**

- Periodic inspection of working environment by industrial hygienist through regular measurement of cotton dust concentration
- Training and health education programs should be provided to all workers from the start of work to enhance the awareness of the workers regarding the risk factors and methods of prevention of occupational hazards in textile industry.
- Personal protective equipment must be provided for all workers.
- There should be proper ventilation at the place of work.

## References


1. **Akintayo W., (2013):** Knowledge, attitude and practice on the use of personal protective equipment by traditional resist Fabrics workers in Abeokuta, Nigeria. Kuwait Rev Chapter Arabian J Bus Manag Rev. vol.(2), No (7) ,Pp. 31–3.
2. **Akintayo W., (2013):** Knowledge, attitude and practice on the use of personal protective equipment by traditional resist Fabrics workers in Abeokuta, Nigeria. Kuwait Rev Chapter Arabian J Bus Manag Rev.vol (2), No (7), Pp. 31–3. **Available** at:https://www.osha.gov/Publications/OSHA3317first- aid.pdf **Available from** http://www.academicjournals.org/ijsa.
3. **Berecki- Gisolf J., Tawatsupa B., McClure R., Seubsman S., Sleigh A., (2013):** Determinants of workplace injury among Thai Cohort Study participants. BMJ Open; vol 3 No (7). pii: e003079.
4. **Central Agency for Public Mobilization and Statistics, Statistical Year Book [Internet]. (2013**): [cited 16 April 2017]. Available from: http://www.capmas.gov.eg/pdf/Electronic%20Static%20Book2013/arabic/weather/ untitled1/weather.aspx
5. **Cutler D., Lleras- Muney A., (2010):** Understanding differences in health behaviors by education. J Health Econ ,vol (29) ,No (1),Pp. 1–28.
6. **Dantas, I., de P., Valera, F., Zappelini, C., & Anselmo-Lima, W., (2013):** Prevalence of rhinitis symptoms among textile industry workers exposed to cotton dust. International Archives of Otorhinolaryngology,vol (17),No (1), Pp.26–30. Available from: http://doi.org/10.7162/S1809-97772013000100005
7. **Douwes J., Versloot P., Hollander A., Heederik D., Doekes G (1995):** Influence of

various dust sampling and extraction methods on the measurement of airborne endotoxin. Appl Environ Microbiol, vol. (61), No. (5), Pp. 1763-9.

8. **El-Zayat O., (2008):** Occupational hazards affecting workers' health in misrshebin el-kom spinning and weaving company. Unpublished Master thesis of Community health Nursing, Faculty of Nursing, Ain Shams university.
9. **Gail A., Rosanna F., (2012):** Community and public health nursing: evidence for practice; London, pp:488.
10. **Gebremichael G., Kumie A., Ajema D., (2015):** The Prevalence and associated factors of occupational injury among workers in Arba Minch Textile Factory, Southern Ethiopia: A Cross Sectional Study. Occup Med Health Aff,vol( 3),No(6),Pp. 3-222.
11. **Gulani K., (2008):** Community Health Nursing.;3rd edition , chapter 5:. Delhi: Kumar Publishing House.
12. **Guzik A., (2013):** Essentials for occupational health nursing. 1st ed. USA: John Wiley, Sons, Inc.
13. **Hinson A., Lokossou V., Schlünssen V., Agodokpessi G., Sigsgaard T., Fayomi1 B., (2016):** Cotton dust exposure and respiratory disorders among textile workers at a textile company in the southern part of benin. Int J Environ Res Public Health, vol (13),No(9),Pp. 895.
14. **Hinson A., Lokossou V., Schlünssen V., Agodokpessi G, Sigsgaard T., Fayomi1 B., (2016):** Cotton dust exposure and respiratory disorders among textile workers at a textile company in the southern part of benin. Int J Environ Res Public Health, vol ( 13),No (9),Pp. 895.
http://www.who.int/occupational_health/publications/globstrategy/en/index2.html
15. **Jaiswal A., (2011):** A study of the occupational health function among female textile workers. International Journal of Sociology and Anthropology, vol (3), No (3), Pp.109-114.
16. **Kamal A., Sayed M., Massoud A., (2007):** Usage of personal protective devices among Egyptian industrial workers. Am J Ind Med.,vol .( 13 ) ,No (6) ,Pp. 706–16.
17. **Kamal A., Sayed M., Massoud A., (2007):** Usage of personal protective devices among Egyptian industrial workers. Am J Ind Med.,vol ( 13),No (6),Pp. 706–16.
18. **Khan N., Dipti T., Ferdousi S., Hossain M., Ferdousi S., Sony S., Ahmed S., Paul N., Islams (2015):** Occupational health hazards among workers of garment factories in Dhaka City, Bangladesh.,vol.( 24),No.(1),Pp. 36-43.
19. **Mahmoud T., Abd El-Megeed H., Alaa El-Din S., Fahmy H., (2004):** A study of occupational health hazards among assiut spinning factory workers. Ass Univ Bull Environ Res ,vol ( 7) ,No (1), Pp. 63-76.
20. **Malik N., Mean A., Pasha T., Akhtar S., AIi T., (2010):** Role of hazard control measures in occupational health and safety in the textile industry of Pakistan. Pak J Agri Sci.,vol. ( 47), No. (1) ,Pp 72–6.
21. **Malik N., Mean A., Pasha T., Akhtar S., AIi T., (2010):** Role of hazard control measures in occupational health and safety in the textile industry of Pakistan. Pak J Agri Sci. vol (47),No(1),Pp. 72–6.
22. **Mansouri F., Pili J., Abbasi A., Soltani M., Izadi N., (2016):** Respiratory problems among cotton textile workers. Lung India,vol (33 ),No (3),Pp. 163-6.
23. **Marlin Company and the American Institute of Stress (2009):** The workplace stress scale: attitudes in the American workplace VII. American Institute of Stress 2009. Available from: http://americaninstituteofstress.org/wp-content/uploads/2011/08/2001Attitude-in-the-Workplace-Harris.pdf. [Accessed On: 4 Dec, 2015].
24. **Massoud N., Samiha F., (2009):**The future of Egypt's textiles and clothing exports in light of new international trading rules. Cairo, Egypt: Egyptian Center for Economic Studies;. ECES Working Paper, no. 86.
25. **Monda R., Paul S., Saha T., Akhtar R., Khan M., Banik P., (2015):** Prevalence of Musculoskeletal Disorders among the Bangladeshi Garments Workers. SMU Medical Journal, vol(2),No(1),Pp. 102 - 113.
26. **Morassaei S., Breslin F., Ibrahim S., Smith P., Mustard C., Shankardass K., (2013):** Geographic variation in work injuries: a multilevel analysis of individual-level data and area-level factors within Canada. Ann Epidemiol; vol. (23),No (5) , pp.260-6.
27. **Nagoda M., Okpapi J., Babashani M., (2012):** Assessment of respiratory symptoms and lung function among textile workers at Kano Textile Mills, Kano, Nigeria. Niger J Clin Pract,vol (15),No (2) ,Pp.373-9.
28. **Occupational Safety & Health Administration (OSHA) (2013):** Best Practices Guide: Fundamentals of a Workplace First-Aid Program.
29. **Occupational Safety and Health Administration (OSHA). Job hazard analysis. U.S. Department of Labor, OSHA**

**3071; (2002):** [cited10 March 2017]. Available from: http://www.osha.gov/Publications/osha3071.pdf

30. **Osibogun A., Osji M., Isah E., (2006):** Prevalence of Byssinosis and other respiratory problems among textile workers in Asaba Nigeria. Niger Postgrad Med J ,vol (13),No(1), Pp. 333-8.
31. **Parimalam P., Kamalamma N,, Ganguli A., (2007):** Occupational health problems among garment workers in Tamil Nadu, India. J Occup Health,Vol.( 49),No. (6) ,Pp.528-34.
32. **Park K., (2007):** Park's textbook of prevention & social medicine. 19th ed. Jabalpur: Banarsidas Bhanot; P. 12-5, 658.
33. **Refaat T., & Kamel E., (2015):** :Assessment of the impact of long exposure to cotton dust on respiratory health of workers in Minia city, Egypt. Glo Adv Res J Med Med Sci,vol.( 4) ,No. (3) ,Pp.143-49.
34. **Robert J., Gatchel , Izabela Z., Schultz (2012):** Handbook of Occupational Health and Wellness New York .
35. **Ross C., Wu C., (1995):** The links between education and health. Am Sociolo Rev; Vol (60),No(5),Pp. 719-45.
36. **Sangeetha B., Rajeswari M., Atharsha S., Saranyaa Sri K., Ramya S., (2013).** Cotton dust level in textile industries and its impact on human,vol .(3) ,No .(4) ,Pp 1-6.
37. **Serkalem Y., Haimanot M., Ansha A., (2014):** Determinants of occupational injury in Kombolcha textile factory, North-East Ethiopia. Int J Occup Environ Med;vol (5) No (2),pp. 84-93.
38. **Singh Z., (2015):** Health status of textile industry workers: prevalence and socioeconomic correlates of different health problems. Public Health and Preventive Medicine,vol ( 1),No(3) ,Pp.137-43.
39. **Slavin R., Occupational rhinitis (2003):** Ann Allergy Asthma Immunol,vol( 90),No (1) ,Pp. 2-6.
40. **Tadesse S., Kelaye T., ,Assefa Y., (2016):** Utilization of personal protective equipment and associated factors among textile factory workers at Hawassa Town, Southern Ethiopia. Journal of Occupational Medicine and Toxicology, vol ( 11),No (6),Pp. 1-6.
41. **Tadesse T., Kumie A., (2007):** Prevalence and factors affecting work-related injury among workers engaged in Small and Medium-Scale Industries in Ethiopia. Ethiop J Health Dev, vol (21) No (3), pp.25-34.
42. **Takala J., Kheng L., Yong E., Manickam K., Ling L., (2014):** Global estimates of occupational accidents and work-related illnesses. Workplace Safety & Health Institute. [Internet]. [Cited 20 January 2017]. Available from:https://www.wsh-institute.sg/files/wshi/upload/cms/file/Global%20Estimates%20of%20Occupational%20Accidents%20and%20Work-related%20Illness%202014.pdf.
43. **Bureau of Labor Statistics (2013):** United States Department of Bureau, Nonfatal occupational injuries and illnesses [Internet]. [cited on: 10 march, 2017]. Available from: https://www.bls.gov/iif/ .
44. **Winkleby M., Jatulis D., Frank E., Fortmann S., (1992):** Socioeconomic Status and Health: How Education, Income, and Occupation Contribute to Risk Factors for Cardiovascular Disease. Am J Public Health,vol( 82) ,No(6),Pp. 816-20.
45. **World Health Organization (WHO) (2011):** The role of the occupational health nurse in workplace health management. Report No. EUR/01/5025463. Geneva: Switzerland: WHO.
46. **World health organization (WHO):** Global strategy on occupational health for all. China:WHO;1994.Available from
47. **Yiha O., Kumie A., (2010):** Assessment of occupational injuries in tendaho agricultural development SC, afar regional state. Ethiop J Health Dev,Vol .(24) ,No (3),P p. 167-74.