National College of Business Administration & Economics Lahore

INVESTIGATING THE IMPACT OF SAFETY GADGETS ON WORKER'S HEALTH: A STUDY OF COTTON TEXTILE WORKERS IN FAISALABAD, PAKISTAN

BY

SHUMAILA NOUREEN

MASTER OF PHILOSOPHY
IN
ECONOMICS

MARCH, 2021

NATIONAL COLLEGE OF BUSINESS ADMINISTRATION & ECONOMICS

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BY

Shumaila Noureen

A dissertation submitted to Faculty of Social Sciences

In Partial Fulfillment oft he Requirements for the Degree of

**MASTER OF PHILOSOPHY
IN
ECONOMICS**

MARCH, 2021

بسم الله الرحمن الرحيم

In the name of ALLAH,
The Most Beneficial,
The Most Merciful,

NATIONAL COLLEGE OF BUSINESS ADMINISTRATION & ECONOMICS LAHORE

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Dissertation Committee:

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Chairman

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Member

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Member

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Director Research
National College of Business
Administration & Economics

DECLARATION

It is to declare that this research work has not been submitted for obtaining similar degree from any other university/college.

SHUMAILA NOUREEN
MARCH, 2021

DEDICATED TO

My prolonged commitment and hard work throughout the year for thesis should be dedicated to my parents who supported me in such times where I wanted to give up. Their infinite prayers and endless supports realized me to continue and Thanks to Allah Almighty for making it possible I want to dedicate my thesis to my parents with whole heartedly. I feel so lucky to have such parents who always encourage me and believe in me.

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RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis entitled **"Investigating the Impact of Safety Gadgets on Worker's Health: A Study of Cotton Textile Workers in Faisalabad, Pakistan"** has been carried out and completed by **Shumaila Noureen** under my supervision during her **M.Phil. Economics** Programme.

(Dr. Zahid Pervaiz)
Supervisor

SUMMARY

Textile workers are subject to many workplace risks that are detrimental to their health and safety in the textile industry. One of the most important hazardous component is exposure to airborne dust which causes respiratory impairments. These ailments impact on health of workers, their productivity, quality of life, thus in the long run, well-being very badly. However, these ailments and associated limitations like work absence and work performance can be reduced by use of safety gadgets. This study aimed to assess the impact of safety gadgets on the health of textile workers and absence of textile workers due to sickness.

To achieve study objectives, this study used data of SANDEE study titled “The Health Burden of Dust Pollution in the Textile Industry of Faisalabad, Pakistan”. The SANDEE study used multistage random sampling technique to identify 210 workers of textile spinning mills. Data were collected through questionnaire and health diary. The survey questionnaire elicited information on workers’ socioeconomic characteristics, occupational exposure, chronic diseases, etc. Health dairies have been intensively used in health studies in recent times as a data collection tool owing to its greater accuracy, fewer recall problems, improved ability to determine the order of events, and the ability to capture events of low salience. The diary contained detailed information on the health conditions of the worker and its implications.

The result of the present study shows that respiratory diseases are in a high proportion of textile workers. In spite of significant disease burden, the use of the mask is less in the present study. The findings indicate that most of the workers (63.8 percent) said that some time during work they put on face masks, 14 percent said that they often use mask during work. Despite trivial use of face mask, the result shows that use of face mask significantly reduce development of respiratory diseases among workers. For example, the marginal estimates show that use of mask decreases the probability of getting sick with cough by 26 percent, phlegm by 17 percent, and shortness of breath by 16 per cent among textile workers compared to non-users of face mask. In addition to reducing occupational health burden on textile workers, the use of safety masks was also linked with reducing illness associated work absence. The marginal estimates also indicate that probability of work absence decreases by 15 percent if worker use face mask during work. Study concluded that occupational diseases can be prevented by taking control measures in textile mills.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The International Labour Organization (ILO) evaluated that about 2.78 million workers die every year from accidents and illnesses at work around the globe (ILO, 2019). The aggregate numbers mark a global rise in the figure of fatalities related to work. The number goes from 2.33 million casualties in 2014 to 2.78 million casualties in 2017 (Hamalainen et al., 2017). The major part is attributed to work-related ailments, 2.4 million, and 0.38 million related to work place injuries. In developed countries, the part of fatalities caused by work place injuries and work related infectious ailments are very low while noninfectious ailments are the irresistible breed in those countries (Takala et al., 2014). Current figures indicate that agronomical factors, gases, noise, fumes, particulate matters and injury risk factors make the largest contributions to the overall burden of occupational ailments around the globe (Driscoll, 2018). The assessments of burden of illnesses show that of all deaths in developed economies, some 5 to7 percent is attributed to workrelated diseases and injuries (ILO, 2019; Christopher & Murray, 2016). In developing countries, this proportion is slightly lower but non-occupational health concerns have a larger part. The figure of workplace injuries has decreased in developed countries thanks to both better preventing and structural shifts, on the other hand they are evidently uplifted in developing countries primarily because of inadequate workplace safety and health system (Takala et al., 2014).

The occupational injuries are connected with significant economic and societal burden. The economic value merely is equal to 4 percent of annual global GDP, or US$ 2.8 trillion, and that is imputed to absence due to sickness, workers' indemnity, medical costs and disruption of production (ILO, 2019). Safe Work Australia projected that the burden of work-related ailments and injuries for Australian economy was Australian dollar 57.5 billion, an amount equal to 5.9% of GDP for the year 2005–06 (Government of Australia, 2009). About half of the cost (AU$ 26 billion) is due to absenteeism. The direct cost of absence from work alone amounted to more than GB£17 billion across the United Kingdom in 2010 (CBI, 2011). The Conference Board Canada estimated that Canadian economy faced more than US$15 billion absenteeism costs in 2013 (Conference Board Canada, 2013) and the losses resulting from absenteeism across 14 occupations in the USA in 2012 reached to US$84 billion (Witters & Liu, 2013).

The textile sector is a prominent labour- intensive industrial sector in many of the developing nations. Many researches from around the globe have stated on the association within lung ailments and work conditions in the textile sector (Alemu et al., 2010; Jaen et al., 2006; Mishra et al., 2004; Nafees et al., 2013; Ali et al., 2018). The textile sector could even be extremely contaminating and adds to indoor air-pollution (Memon et al., 2008; Farooque et al., 2008). The textile industry can be classified as ginning, spinning, weaving, finishing and garments units. The beginning course of textile handling releases a large volume of cotton dust in the air, and in the long run, disclosure can come out textile workers with breathing problems. Cotton workers are subject to airborne dust containing allergic, infectious, and poisonous substances (Oldenburg et al., 2007). Cotton workers, particularly in the spinning operation are disclosed to a great deal of dust with adverse impact on their pulmonary function (WHO, 2010).

A specific respiratory ailment in that sector is called byssinosis and Schilling was the first who intimated byssinosis based on respiratory syndromes (Schilling RS, 1950). Byssinosis, a disabling lung ailment basically connected with disclosure to contaminated air in textile mills (Bates et al., 2010). Higher frequency of byssinosis and respiratory syndromes along with reduced lung function capacity have been published in workers who are persistently disclosed to high denseness of cotton dust (Zuskin et al., 1991; Jannet & Jeyanthi, 2006; Paudyal et al, 2011). People who smoke and work in dusty sections undergo the most critical disability from byssinosis as the integration of dust/fibers and smoke both complicate the lungs and airways (Wang et al., 2003; Alemu et al., 2010). Workers suffering with asthma are also negatively affected by disclosure to cotton dust.

From medical perspective, at first, byssinosis is expressed by complaints reported as chest tightness which is sometimes connected with a continual cough, wheezing and dyspnea. These symptoms normally occur on the first day of the work week. At early stages of the disease, symptoms occur only occasionally and most often when the humidity is very high (grade 1/2 byssinosis). If exposure continues, symptoms advance to grade I byssinosis. The patients, at this stage complain from chest tightness on most workdays or at least on all first workdays of the week. Several years later, symptoms may develop to grade II byssinosis. At this stage, symptoms are present on days other than Monday and they still are generally worse at the beginning of the week, with many patients noting some degree of improvement at the end of the week. Improvement of the symptoms as the week progresses differentiates byssinosis from nonspecific airway reactivity in which symptoms worsen as the work week progresses. Symptoms of grade II byssinosis are reversible, if that exposure to dust is eliminated or significantly reduced. Otherwise, they progress to grade III byssinosis. Grade III byssinosis continues to worsen to the point where it is clinically irreversible. At this stage, significant chronic airway obstruction has developed (Greenberg, 2003).

There are differences in the incidence rates of byssinosis around the globe, fluctuating about 1 per cent to 50 per cent (Jiang CQ et al., 1995; Zuskin et al., 1991). It is acknowledged that cleaning and steaming out of untwisted cotton considerably decreases the denseness of bio aerosols and removes hydro soluble acids accountable for severe byssinosis. This course of action, that considerably decreases the biological function of byssinosis, implies the lowest incidence of byssinosis 1.1 per cent in few developed countries for example Australia, USA and UK (Baxter PJ et al., 2010). Moreover, other determinants for instance, variations in the levels of disclosure and period of disclosure to cotton dust, worker's habits of smoking, availability of exhaust ventilation system in the working environment, and whether workers use personal protective equipment (Dube KJ et al., 2013; Glindmeyer etal.,1991) also may explain, why byssinosis do not have an even spread around the globe.

The prevalence of byssinosis was very high in developed countries in the past as Roach and Schilling (1960) reported a high prevalence (63%)) in workers of Lancashire cotton mills UK. Similar findings have since been published from other countries where cotton is processed. For, example, Belin et al., (1965) reported a prevalence of 25-60% in Sweden. Prevalence of 88% was reported by Valic and Zuskin (1972) for Yugoslavia, 11% by Tuypens (1961) for Belgium, and 38.4% by Merchant et al., (1973) for the United States. However, after strict enforcement of hygiene standards, introduction of dust control technology and adoption of safety measures by workers in the textile mills of developed countries, the disease has shown a declining trending the last few decades e.g. 3% in UK in 1999(Raza et al., 1999).

In recent two decades, while the presence of byssinosis has fallen substantially in developed nations but the situation is completely different in mills of developing countries (Dube et al., 2013; Altin et al., 2002; Farooque et al., 2008; Jaiswal, 2004; Alemu et al., 2010). These researches have described that dusty work sites and less use of protective measures are the prime reasons of high rate of byssinosis (Ahmed & Smith, 2010; Howyida et al, 2012).

Study doneby Barjatiya (1990) found the frequency of occurrence of byssinosis in a mill that processes the raw cotton in Kishangarh, Rajasthan. Among 616 workers examined the prevalence of byssinosis found was blow room 28%, cardroom 30%, draw frame 26%, ring frame 20%, and winding

25%. Yohannes et al (1991) examined 322 men and 273 women randomly selected from a total of 1470 workers engaged in dusty operations of a textile mill in Sudan. Dust concentrations were 4-17 times higher than the permissible concentration of 0.2 mg/m3. Prevalence rates of byssinosis were blowing 43%, carding 38%, drawing 24%, simplex 24%, ring frame 17%, preparatory 11%, and weaving 4%. The prevalence of chronic bronchitis ranged from 18% to 48%. A high prevalence of bronchial asthma (11%) was a surprising finding not reported in other studies of byssinosis.

Various research studies from different developing countries stated the same results. For example, Alemu et al., (2010) reported the highest frequency of respiratory syndromes in the carding room. Where chest tightness, phlegm, cough and dyspnea were 62% 77%, 62%, 46% and 62% respectively. The Overall frequency of chronic bronchitis was 32% while the overall frequency of byssinosis was 38%; the highest even documented in the carding room about 84.6%. High risk to cotton dust reported among those in the carding and blowing room where the dust levels were 32.2 mg/m3 and 8 mg/m3, correspondingly. Study conducted in south Tehran, Iran, by Mehdi et al., (2006). The study reported considerably higher risk of respiratory syndromes among cotton workers (cough 30.8%, phlegm 53.8% and dyspnea 65%). The highest risk of respiratory syndromes was found in the carding section workers of textile industry than other department cough 77%, chest tightness 46%, phlegm 62%, and dyspnea 62%, while the risk of chronic bronchitis was32%.

The textile sector is the largest industrial sector in Pakistan. The industry provides employment to more than 40% of the manufacturing sector’s work force while contributing 9.5% to the GDP and constituting 55%of export earnings (ESP, 2019). In Pakistan’s textile industry, the emphasis is on the spinning activity while a major portion of the good quality yarn is exported (Malik et al, 2010; ESP, 2019). At present, as per record of Textiles Commissioner’s Organization (TCO), it comprises 517 textile units (40 composite units and 477 spinning units) with 13.414 million spindles and 198801 rotors installed and 11.338 million spindles and 126583 rotors in operation with capacity utilization of 84.55 percent and 63.67 percent, respectively (ESP, 2019). Despite the significant role that the textile industry plays in the economy, the Government of Punjab (2008) has identified it as one of the most polluting industries in the country. A survey by the Centre for Improvement of Working Conditions and Environment (CIWCE) has reported that most factories in the industry lack basic hygiene facilities and adequate exhaust filter which aggravate the situation (Government of Punjab, 2002).

Number of studies have produced facts on connections between the denseness of cotton dust in the work place and the incidence of respiratory syndromes in textile mill workers in Pakistan (Saadat et al., 2006; Nafees et al., 2013; Anjum et al., 2009; Memon et al., 2008; Farooque et al., 2008; Saleema et al., 2007). These studies have described medium to high (8-35%) levels of byssinosis in textile workers. All these research studies have centered the dose response relationships, where dose response function is observing the relationship between human health and air pollution and useful in associating an ailment to a particular agent (Khan et al, 2015).

The deduction of risks enhances the safety and quality of life for human and for the environment (Awan T, 2001). According to WHO (2010) Occupational Health Administration believes that workers are most important element in achieving full compliance with existing standards and reducing potential health hazards in the workplace. The costs of occupational illnesses can be cut, and productivity can be improved by effective preventive measures. Further, prevention measures are the most effective instrument to decrease diseases and accident rates in the workplace (Howyida et al., 2012). Utilization of personal protective equipment (PPE) is an essential step to protect workers from disclosure to hazards in the workplace, particularly in developing nations where regular workplace safety control principles remain a problem to execute (Malik et al., 2010; Akintayo, 2013). A work management approach utilizing personal protective equipment (PPE) approach is advised as an alternative and significant way for protecting safety and health of workers.

1.2 RESEARCH GAP AND STUDY RATIONALE

Number of studies have identified facts on connections between the denseness of cotton dust in the workplace and the incidence of respiratory syndromes in textile mill workers in Pakistan (Saadat et al., 2006; Nafees et al., 2013; Anjum et al., 2009; Memon et al., 2008; Farooque et al., 2008; Saleema et al., 2007). These studies have described medium to high (8-35%) levels of byssinosis in textile workers. All these research studies have examined the dose response relationships, where dose response function is observing the relationship between human health and air pollution and is useful in associating an ailment to a particular agent (Khan et al, 2021). However, studies are missing in the literature that investigates the relationship between use of safety gadget and health of the workers.

Further, according to WHO (2010) Occupational Health Administration believes that workers are most important element in achieving full compliance with existing standards and reducing potential health hazards in the workplace. The costs of occupational illnesses can be cut, and productivity can be improved by effective preventive measures. Furthermore, prevention measures are the most effective instrument to decrease diseases and accident rates in the workplace (Howyida et al., 2012). Utilization of personal protective equipment (PPE) is an essential step to protect workers from disclosure to hazards in the workplace, particularly in developing nations where regular workplace safety and control measures remain a problem to execute (Malik et al., 2010; Akintayo, 2013). A work management approach utilizing personal protective equipment (PPE) approach is advised as an alternative and significant way for protecting safety and health of workers. This is particularly important in developing countries striving for sustainable industrial development like Pakistan where promulgation of cotton dust standards seems unlikely to happen soon. Therefore, studies are needed to provide analysis of the relationship between the use of safety gadgets and worker's health in textile mills.

1.3 RESEARCH PROBLEM

Although specific guidelines are available regarding the use of respirators and face pieces by textile workers, there is lack of field-based studies testing their effectiveness (Renstrom et al., 2006). Surgical facemasks have been found to have 95% or greater efficiency in terms of providing effective protection against H5N1 associated outbreak of SARS (severe acute respiratory syndrome) (Li Y et al., 2006).A study found that facemasks may offer protection against flour dust exposure among bakers, demonstrating a reduction in inhalation of wheat allergens by up to 96% (Renstrom A et al, 2006).Whether these masks can be used in textile mills in developing countries as cost-effective alternatives in low resource settings needs to be assessed. Therefore, research study is required that investigate effect of masks on respiratory health of the textile workers. Given above, this study will be undertaken to address a critical gap in understanding the effectiveness of PPE for textile mill workers in Pakistan and contributes to the growing workplace safety research in low-income countries. Such studies may also help in developing evidence-based intervention strategies targeted at promoting worker's safety and health.

1.4 RESEARCH OBJECTIVES

Specifically, this study attempts to assess:

(a) What is the impact of safety gadgets on the health of textile workers?

(b) What is the impact of safety gadgets on the sickness absence of textile workers?

1.5 SCOPE AND ORGANIZATION OF THE STUDY

In chapter 2, a broad range of existing literature on the subject is provided. Specifically, the information includes literature on effect of cotton dust on health of workers, individual behaviour of adoption of safety gadget and influence of safety gadget on worker's health. Chapter 3 incorporates information about research methods. Specifically, it provides information about study area, sampling technique, selection of sample size and data collection. Chapter, 4 provides detailed information on study results. It first described data and then provided econometric analysis of the models along with discussion. In Chapter 5 the conclusion of this study is presented. The policy implications and future priority areas of research is also presented in this chapter.

CHAPTER 2

LITERATURE REVIEW

Respiratory ailments at the workplace are a major public health issue around the globe that consider for up to 30% of all recorded occupational illnesses and 10– 20% of fatalities are resulted by pulmonary diseases (ILO, 2011). Due to disclosure to occupational airborne particles, it is estimated that nearly 386, 000 fatalities and about 6.6 million disability adjusted life years (DALYs) has taken place amongst workers (Driscoll et al., 2005). World Health Organization revealed that eight hundred thousand workers in the rope and cotton manufacturing industries are affecting because of air pollution. So, in situation like that there is a high possibility of the frequency of the pulmonary and byssinosis illnesses (WHO,2010).

Textile is one of the most ancient industries on the face of this world. It is as old as human civilizations and is increasing every second day. Textiles are a primary human demand by the side of food. Textile sector is one of the most technology complicated of all industries and is a place of work where workers are disclosed to various safety risks, such as excessive noise, cotton dust, diseases and accidents (Rom W, 1998; Nafees et al., 2013). Banuri (1998) called it one of the most polluting industrial sectors. Different departments of textile industry like ginning, spinning and weaving produce great volume of cotton dust. Cotton dust comprises different kind and size of specks, for instance, fiber, ground-up plant matter, fungi, pesticides, soil, bacteria, non-cotton matter and other impurities (Rom W, 1998). Disclosure to cotton dust resulting in breathing concerns like chest tightness, difficulty in breathing, cough, wheezing, phlegm, byssinosis and chronic bronchitis (Altin at al., 2002).

Byssinosis, a chronic pulmonary ailment which is identified among textile workers that are exposed to cotton dust (Hinson et al., 2014). The name byssinosis was first time used by Proust (1877) and Oliver (1902). They stated a broad range of respiratory symptoms scaling from severe dyspnea attacks accomplishing cough and a feeling of chest tightness after disclosure to flax, cotton, and hemp through to constant respiratory ailment causing irreparable airway impediment. The kind and intensification of dust, period of exposure and biological factors are cooperating the ailments of the breathing function instigated by work-related dusts (Subbarao et al., 2009). Furthermore, workers operating in the sections where there is greater exposure of cotton dust for example spinning and weaving and being elderly were established to be the danger elements for respiratory concerns associated to cotton dust (Hinson et al., 2014).

While early respiration hindrance may be recoverable, afterwards, the destruction is irreversible and disabling. Aftereffect of this, firms, government and workers bear direct and indirect expenses associated to working place illnesses and injuries (Wang et al., 2005). The direct costs for firms comprise treatment and compensation expenses that need to be paid up to the injured employee, while the indirect expenses comprise production disruption expenses, lost time of disabled employee, time lost by executive or supervisors to take after the disabled employee, training expenses for new employees. The direct expenses for employees comprise discomfort and misery from the illness or injury, loss of income, loss of a job and health-care costs, while the indirect costs incorporate time lost by family members to take care of the injured worker and eventually economic turmoil and societal breakdown (Hinson et al., 2014). Exposure to cotton dust has also deep-rooted impact on respiratory function (Wang et al, 2005).

In recent decades, various studies investigated and recognized a wide scale of occupational risks (chemical, physical, biological, physiological and psycho-social) that may take to serious accidents (Hollmann et al., 2001). The correlation within the intensification of cotton dust in the work place and the commonness of respiratory syndromes has been confirmed by number of researches in the textile workers (Beck & Schachter, 1983; Schilling, 1964; Farooque et al., 2008; Ajeet et al., 2010). At present, the frequency of byssinosis has declined markedly in developed economies, but it is still stand high in mills of developing countries. Over the years, developed nations have performed well to decrease occupational injuries, despite having an increasingly complex environment (Hamalainen et al., 2017).

Most important consideration stated to research, enlargement of human resources and information approach have helped workers' health in the developed countries. New occupational hazards, such as job stress and ergonomic factors along with the traditional risks are took into account together in the developed countries. Protective measures have also assisted to reduce the frequency of byssinosis (Wang & Tao, 2012). However, change for better have not been appropriately accomplished in developing countries due to weak economies, malnutrition, infectious diseases, inadequate environmental sanitation, little information, and poor medical care (Khan, Moshammer, & Kundi, 2015). Most industries lack primary sanitation facilities, medical and first aid facilities, hazardous warning signs and emergency transportation in the developing countries. Most workers are not keen to use PPEs due to discomfort and irritation while performing different operations (Abbas, 2015).

However, the situation is quite different in developing nations, where byssinosis is yet to be found in a significant proportion of textile workers. Documented frequencies of byssinosis in Chines workers were 8 percent, 30 percent in Indonesia, 37 percent in Sudan, and up to 50 percent in Indian textile workers (Neil &Michael, 2005). Yohannes et al., (1991) carried out their study in Bahir Dar, Ethiopia and found that the frequency of byssinosis was higher among carders about 37.5 percent and blowers about 43percents against 4 to 24 percent among workers in other departments. Another study done by Abebe & Seboxa (1995) in Bahir Dar and documented even greater frequency of the disease at 45.5 percent, the highest of which was documented in carding department 57.9 percent where as in ring frame57.1 percent workers, while minimum in the weaving department 32.1 percent.

The world second largest industry is a textile industry next to agriculture. The textile industry in Pakistan also holds the leading role in the manufacturing industry sector. Further, Pakistan is the 8th largest exporter of textile products in Asia, 4th largest producer of cotton, with the third largest spinning capacity in Asia after China and India and contributes 5 percent to the global spinning capacity. This textile sector has an overwhelming impact on the growth and development of the Pakistan's economy (ESP, 2019). Textile industry is the most important source of employment for industrial workers in Pakistan and it has been estimated that nearly one and half million workers are employed in textile factories in Punjab (Government of Punjab, 2008). The working condition in most of the factories is known to be unhealthy.

It also pointed out that new acids and air pollution which contains dust, gases and smoke have raised the average of accidents and illnesses (Government of Punjab, 2002). The textile industry which is establishes the largest industrial activity in Pakistan is known to exhibit dangerous working conditions (Government of Punjab, 2008). The prevalence of workplace ailments and injuries are very high in Pakistan because a large proportion of workers are disclosed every day to harmful acids. The introduction of hazards technologies in industry has caused high number of accidents, workplace ailments, and unsafe work place conditions. Majority of the workers are uneducated and not ready to tackle with the risks placed by manufacturing and industrial operations. Therefore, a large proportion of workers will be in danger if no practical measures are taken to enhance OH&S (Ahsan & Partanen, 2001). Pakistan lags in allowing rules and regulations and infrastructure to promote workplace safety and health. A significant part of the workforce is uneducated (thus not aware of the risks of operations and products with which they deal) (Awan, 2002).

Frequency of byssinosis and other pulmonary ailments has been confirmed by many studies in Pakistan. Nafees et al., (2013) carried out their cross-sectional study in 15 textile mills of Karachi, among 372 male cotton workers that stresses the patterns of respiratory ailments and symptoms amongst the cotton workers of Karachi. Results indicate a high frequency of diverse respiratory ailments and syndromes including difficulty in breathing, chest tightness, byssinosis and others illnesses. Workers in the spinning department those who were Illiterate with long period of work and sindhi ethnical background were at greater risk of progressing one or more of the respiratory "problems.

In another study done by Anjum et al., (2009) reported that Cotton dust leads to a number of health risks. Study investigate that the facilities provided to the workers are not satisfactory to provide a convenient workplace atmosphere. Face masks can ensure the safety of workers from cotton induced dust, that can be the reason of tuberculosis as is evident from the present study that 6% workers were experiencing from tuberculosis because of cotton dust. Study found that 28% workers have the issue of continual headaches, 97% workers did not wear face mask during work, which instantly impact on their well-being in the form of cough 6%, asthma 6%, and tuberculosis 6%. But there is no pattern observed to encourage the workers to protect themselves by using PPE not either from the government or from the textile mill owners in Pakistan.

A study done by Farooque et al., (2008) in cotton spinning mill workers in Karachi, Pakistan. The study found that 19% of the representative worker reported the complain of byssinotic syndromes.16 % workers verified to be byssinotic in Pulmonary Function Test (PFTs). The relation of byssinosis in relation to worksites was considerably higher in Ring section accompanied by Carding. The relationship of byssinosis was also higher in those employees who didn't' utilize safety equipment and worked extra hours. Workers who wear personal protective equipment (masks) had a ratio around 75%. The motives imputed to this are, the percentage of literate workers was almost 90%, that might indicate better understanding of cotton dust being a risk as well as the factory administration imposed a fine of Rupees 100/= on that would not wear the face mask at work.

Work place illnesses and accidents are an awful calamity. We all know that sound workers are more efficient. The Maslow's Hierarchy of Needs stated the second corrugation of necessities is related with one's safety, like safety from hazard. If this corrugation of necessities is continued, workers' incitement can be raised (Hafsa, 2010). Workplace health is a key approach not just to safeguard well-being of workers, but also to improve product quality, productivity, work incitement, satisfaction and thus general standard of living or community (Hafsa, 2010). Since a few past years, there has been growing attention in the key preferences for workplace health research about efficient and financially viable interventions (Rosen stock et al., 2006). Use of safety gadgets can be helpful to make a barrier within disclosure to cotton dust and cotton workers. However, little consideration has been paid to PPE compliance and workplace risks in the textile sector. Up to now, there has not been a study carried out on PPE compliance among textile workers in Pakistan. Utilization of cost-effective interventions, such as facemasks to safeguard workers against cotton dust related lung diseases and mortality should be evaluated.

CHAPTER 3

RESEARCH METHODS

3.1 STUDY AREA AND DATA COLLECTION

The current research used data of a SANDEE[1] research study entitled "The Health Burden of Dust Pollution in the Textile Industry of Faisalabad, Pakistan" undertaken by Dr. Muhammad Khan, Assistant Professor, Department of Economics, COMSATS University Islamabad, Lahore Campus. [2]The SANDEE survey adopted multistage random sampling technique to identify 210 workers of textile spinning mills. During the first phase, 11 spinning mills were randomly selected by using the list retrieved from All Pakistan Textile Mills Association (APTMA). Finally, data of 207 workers is collected in August 2013. Sample copies of health diary and survey are given in the appendix.

3.2 MODEL OF THE STUDY

Given the objectives of the study, following two models are defined for estimation.

3.2.1 Relationship between Respiratory Illness and use of Safety Mask

The literature mentioned in the previous chapters clearly shows that the occupational illnesses can be cut by adopting preventive measures. Therefore, to examine whether use of safety masks reduce respiratory illness in textile mills in Faisalabad, following empirical model is constructed for estimation. In this model, the dependent variables are respiratory illnesses e.g. cough, shortness of breath (byssinosis) phlegm, asthma, and wheezing. The use of safety masks is independent variable. While, gender of the worker, age of the worker, marital status of the worker, smoking status of the workers, household monthly income and work section are control variables.

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[1]SANDEE refers to South Asian Network for Development and Environmental Economics.
[2]The output of this project is SANDEE working paper which is available at: https://www.sandeeonline.org/publicationdetails_disp.php?pcid=1&pid=1110
It is clarified that the analysis carried out here is different from SANDEE working paper. SANDEE working paper focuses on economic burden of health cost on the textile workers. The methodology is also different than my thesis. SANDEE working paper used health production function approach and it calculated dose response function, health production function, mitigating activities function and finally averting activities function. Whereas my thesis analyzed impact of mask on health and absenteeism.

Respiratory illnesses = f (safety mask, gender, age, marital status, smoking, work section, monthly income) **(1)**

Here respiratory diseases are dependent variables. All the dependent variables are defined as binary e.g.,1 if worker experience illness, 0 if worker did not experience illness (Khan, et al., 2021). Work section is an independent variable. Dummy variables are used to specify work sections of the spinning mill. Work sections include the opening section, blow room section, card room section, simplex section, ring frame section, and auto cone section (Mishra, et al., 2004; Jaiswal, 2004; Khan, et al., 2021). Autocone section is used as the base dummy as it is one of the comparatively less dusty sections. Use of facemask is also binary variable and equals to 1 for use of mask, 0 otherwise. Age measures the age of respondent and is defined in years (Memon, et al., 2008; Jaiswal, 2004; Khan, et al., 2021). Smoking is estimated in terms of the number of cigarettes smoked per day (Jaen, et al., 2006; Khan, 2017). Gender variable is binary e.g., 1 if respondent is male, 0 if respondent is female. Marital status is also a binary variable e.g., 1 if respondent is married, 0 if respondent is unmarried (Khan, 2017).

In this model, all dependent variables take the form of binary response variables; therefore, qualitative response models must be employed to study the relationship between independent variables and dependent variables. There are two broad options available for this purpose, logistic regression and probit regression. Probit model is preferable to logit because it allows the researcher to directly measure predicted probabilities and marginal effects (Canfield, 2003). The marginal effects explain the expected change in probability as a result of a change in the explanatory variable. Hence the binary response Probit models are used. The predicted probabilities from probit regression are always between 0 and 1 and therefore, probit model overcomes the challenges of linear probability regression due to binary nature of the dependent variable. The main advantage of the probit model is that it incorporates non-linear effect of independent variables.

$$b_j^* = X_j\beta + e_j \qquad \textbf{(2)}$$

Where b_j^* is a latent variable, X_j is vector of independent variables, β is a vector of parameters, e_j is independent of X_j, and $e \mid x \sim \text{Normal}(0, 1)$. Instead of observing $b_{j,}$ we observe only a binary variable indicating the sign of b_j^*: Here $b_{j,} = b_j^*$, if $b_j^* > 0$ and $b_j = 0$, if $b_j^* \leq 0$.

3.2.2 Relationship between Sickness Absence and use of Safety Mask

One may expect that if use of safety mask is linked with lower level of respiratory illness, it may also lead to reduce illness associated work absence. To investigate this relationship, we estimated a "sickness absence" model (equation 3) that measures relationship between use of safety masks and work absence. The dependent variable is "sickness absence "while use of safety mask is independent variables. Here we also include other independent variables e.g. gender of the worker, age of the worker, marital status of the worker, smoking status of the workers, household monthly income and work section.

Sickness absence = f (safety mask, gender, age, marital status, smoking, work section, monthly income) **(3)**

Sickness absence is a dependent variable and is defined as binary e.g.1 if worker is absent from work due to sickness, 0 if worker is not absent from work (Khan, 2017). Work section is an independent variable. Dummy variables are used to represent work sections of the spinning mill. Work sections include the opening section, blow room section, card room section, simplex section, ring frame section, and auto cone section. Auto cone section is used as the base dummy since it is one of the relatively less dusty sections. Use of facemask is a binary variable and equals to 1 for use of mask, 0 otherwise. Age measures the age of respondent and is defined in years. Smoking is estimated in terms of the number of cigarettes smoked per day. This variable is binary e.g. 1 if respondent is male, 0 if respondent is female. Marital status also a binary variable e.g. 1 if respondent is married, 0 if respondent is unmarried. Here the dependent variable sickness absence is specified as binary i.e. if a workday is missed due to illness in a given 15-day period is assigned 1 otherwise zero. The application of the Probit model is appropriate and, therefore, Probit model is used for estimation.

$$A_j^{*}= X_j\beta+e_j \qquad \textbf{(4)}$$

where A_j^* is latent variable, X_j is vector of independent variables, β is a vector of parameters, and e_j is an error term with $e \mid x \sim Normal\ (0, 1)$.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 DESCRIPTIVE STATISTICS

4.1.1 Worker's Demographic and Socio-Economic Characteristics

The survey was conducted in spinning factories for in depth understanding of health problems and use of protective measures among the workers in textile industry. The result shows that most of the workers (86%) were male. This is due to the fact that the females are not given equal opportunities in labor market. In Pakistan, females are not equally participating in economic activities rather they are mostly concentrated in houses for domestic chores. Therefore, women labor force participation in very low compared to men. Female labor force participation in textile industry is only 14.5 percent in Pakistan (ESP, 2019). The age of sample workers ranges between 15 years to 45 years with average age of approximately 28.35 years. The data indicate that female workers are relatively young when compared to male workers. The average age of the females is 24.2 years compared to males' average age of 29.01years. The data also point out that more than 60% respondents are married. This ratio is higher for males compared to females (65% male & 50% female).

With regards to worker's education, the data point out that majority of the workers (95%) are educated and their education levels are reasonably good with some of the workers, all are males having graduation (14 years & above education) degree as well. The main reasons of high level of education among workers are due to technical job requirement in textile mills or due to high unemployment rate among educated people in the country which ultimately force them to even accept low quality jobs (Khan, 2013). The education levels of females in comparison with education levels of males are low which is justifiable since females are not given equal chances of education in Pakistan. Further, most of the females are commonly employed for manual work in textile which requires either no or little education which is evident from the survey.

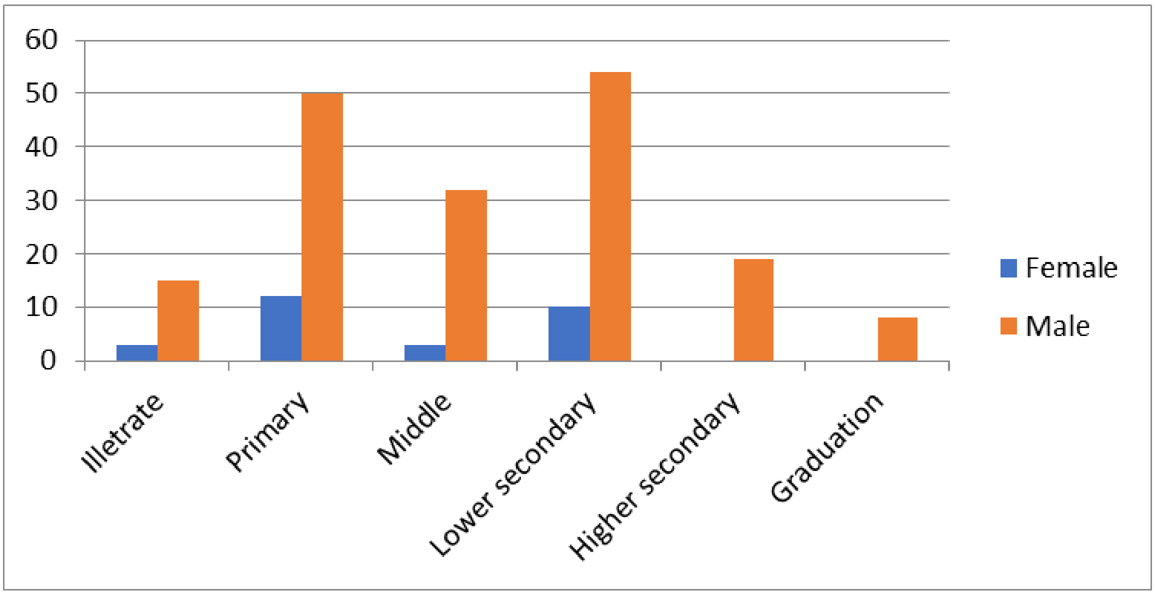

Figure 1: Education Level of Respondents by Gender

The average household size of sample workers is 6.10 members. The dis aggregated data by gender specify that female household size (6.36 members) is larger than male household size (6.06 members). Though marginally, this outcome explains the anatomy of Pakistan culture where female employment is not encouraged until or unless family direly needs their support. This argument is supported by household income data. The average household income (proxied by average household consumption) is rupees 20320 per month approximately. Disaggregated data by gender (female household average income is Rs. 19964 and male household average income is Rs. 20374) help posture the argument that despite large family size, the average household income of female workers is notably less than male counterparts. The wage data further pathetically explain this deportment. The average wages for female workers is Rs. 9857 and male workers are Rs. 13949. This analysis clearly illustrates that irrespective of work experience and education, female workers are getting 30% less wages than male workers. In 45% cases even the minimum wage law (Pakistan rupees 10,000) was not entertained. Most of the females are coming from poor families and their bargaining power is dismal and they tend to accept any wage offered to them.

Female mobility is also an issue which is closely tied to low wages and indecent jobs of females. Females are generally less mobile. They have a tendency to find less distance jobs from their houses and ultimately end up low paying jobs with no security (Khan & Fouzia, 2006). The analysis of this paper also makes comparable case where female worker's mean distance from house to factory is two times less than male workers.

4.1.2 The Workplace Characteristics and Employment Status

The spinning factory usually consists of 6 sections namely opening/mixing section, blow room section, card section, simplex section, ring frame section and autocone section. The figure 2 exhibits that the highest number of survey workers belongs to opening section (47) and lowest number of workers is coming from ring section (22). The data of female workers are skewed towards opening and auto cone section, since all the female workers are working either in opening section or in auto cone section. The work in opening and auto cone sections is typically manual and in fact this is the reason for female concentration in these sections. The other research also underscores that female workers in textile are employed for manual jobs in bale opening section under male supervision (Shafique, et al., 2004; Khan & Fouzia, 2006).

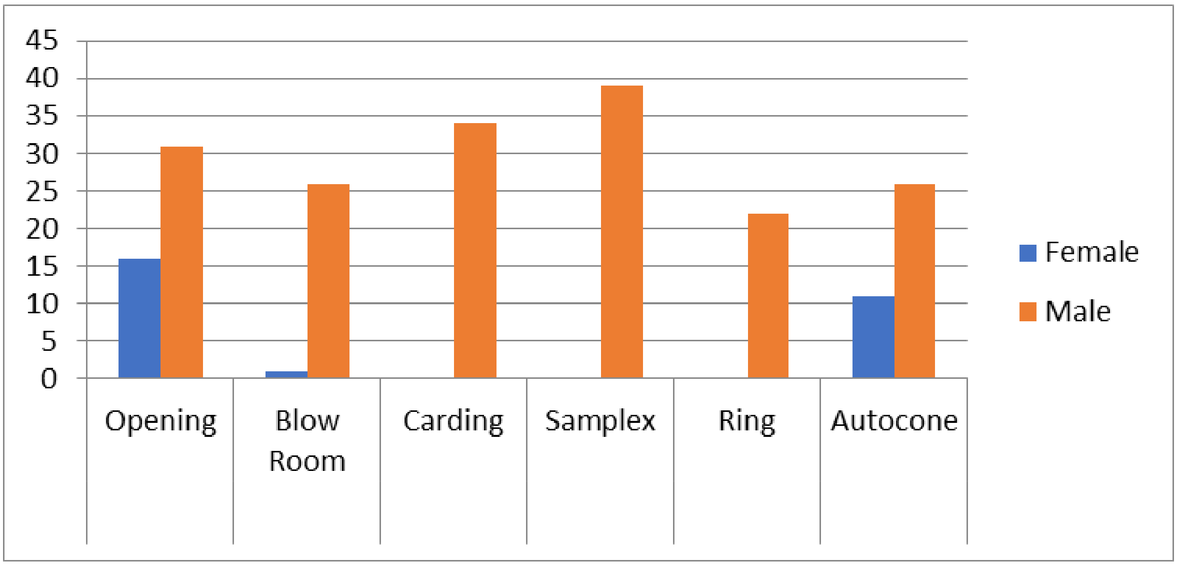

Figure 2: Distribution of Work Section by Gender

Typically, work in textile factories is undertaken in three shifts e.g. morning, afternoon and night and each shift of eight hours' duration. On average working hours are 48 hours per week. The survey shows that mean duration of work is 47 hours per week in the current sample. The reason of less than specified 48 working hours per week is due to electricity or natural gas shortfall which result many firms to close some shifts in certain days of week. Despite above, about 23 percent workers reported that they have worked overtime during given two weeks. The mean overtime work is 2.4 hours. Further, the data indicate that 30 percent workers (none of them is female) are regular paid employees with fixed wage, 53 percent are casual paid workers.[3] The data shows that about 66 percent females are casual paid employee. About 16.5 percent workers are paid on piece rate basis or daily wage.

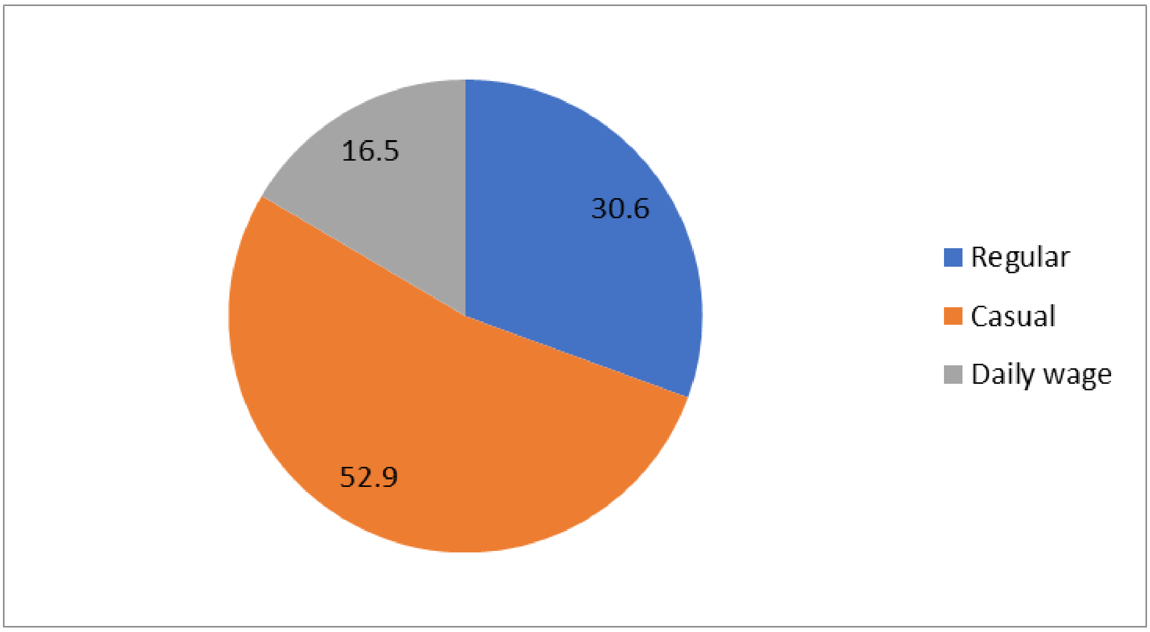

Figure 3: Employment Statuses of Respondents

4.1.3 Workplace and Safety Information

When textile workers get into work sections, they are naturally subject to cotton dust, excess heat and noise that can cause to range of health problem, conditional on the quantity inhaled. However, the adverse health effects can often be decreased substantially by preventive measures. Findings of the present study indicate that most of the workers (63.8 percent) said that some time during work they put on face masks, 14 percent said that they often use mask during work and 22.2 percent frankly accepted that they never used mask during work (see figure 4). These results are parallel to previous studies in Pakistan and other developing countries that undoubtedly clarify less use of safety gadgets among textile workers (Malik et al., 2010; Howyida et al., 2012; Tetemke et al., 2014). While the use of ear plugs is almost non-existent in our sample. About 97 percent workers said that they never used ear plug. Only a small proportion 3 percent told that they sometimes use ear plug during work.

[3]The workers with no job security, not entitled sick and parental leave and can be terminated without prior notice. Casual workers are entitled to some but not all the benefits given to permanent/regular workers

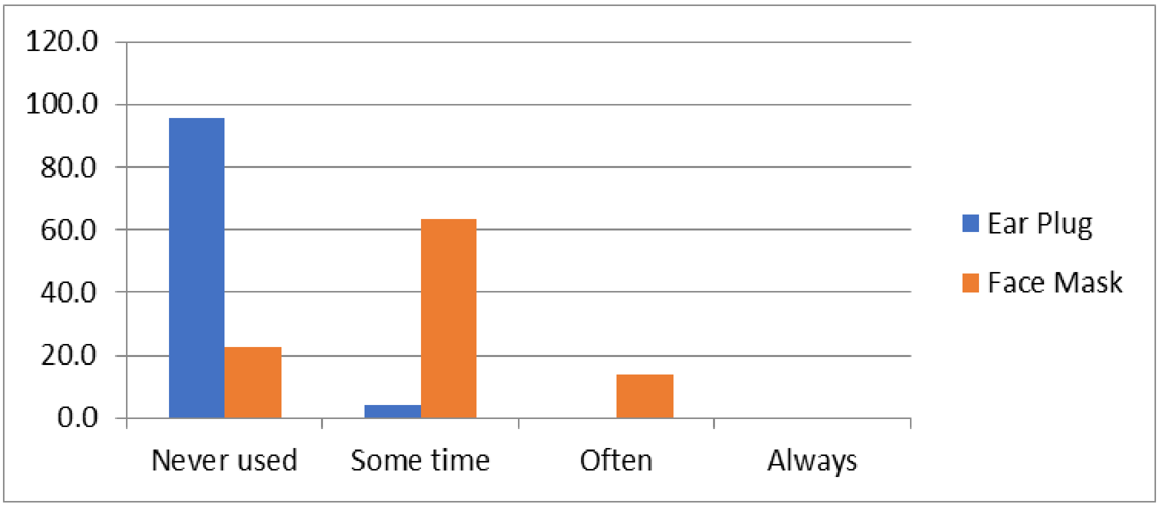

Figure 4: Use of Mask and Ear Plug among Workers

Table 1
Use of Mask by Education

	Use of mask			Total
	Never	Sometimes	Often	
Illiterate	4	9	5	18
Primary	16	38	8	62
Middle	8	21	6	35
Lower Secondary	9	45	10	64
Higher Secondary	5	13	1	19
Bachelor or Higher	3	5	0	8
	45	131	30	206

4.1.4 Health Effects

The survey also inquired from workers about adverse health effects because of disclosure to dust in the mills. The result revealed that more than 35 percent worker experienced dry cough, 18.9 percent reported experience of phlegm with cough, 22.3 percent claimed shortness of breath and 17 percent reported at least one episode of bronchitis. Further, 4.4 percent workers were suffering with asthma.

Table 2
The Health Effects Experienced by Sample Workers

Disease Name	Frequency	Percentage	Standard Deviation
Dry Cough	74	35.9	.48
Cough with phlegm	39	18.9	.39
Shortness of breath	46	22.3	.22
Bronchitis	35	17.0	.38
Asthma	13	6.3	.24

The overall result postulates that disease burden is significant. Given the trivial use of protective measures and dusty work environment, this result is not surprising. The data also delineates that prevalence of cough is higher in opening, blow room and card room sections with highest in blow room (53.8%) followed by card section (44.1%). The cough is less common in simplex, ring and auto cone sections relative to opening, blow room and card sections. The findings are parallel with prediction and conventional wisdom as opening, blow room and card section are early processes in textile operation hence more contaminated than samplex, ring and auto cone sections. Further, results are consistent with earlier research in Pakistan and elsewhere (Anjum et al., 2009; Jiang et al., 1995; farooque et al., 2008).

Table 3
Prevalence of Cough by Work Section

Section	Cough (%)	No. of Workers
Opening/Mixing	38.3	47
Blow Room	53.8	26
Card Section	44.1	34
Samplex	33.3	36
Ring	27.0	26
Autocone	21.6	37

4.1.5 Prevalence of Byssinosis

Byssinosis aspractice was defined by Schilling’s grading of the disease. Grade 0: no symptoms of chest tightness or shortness of breath on Monday;

Grade ½: occasional chest tightness or breathing difficulty on the first day of the working week; Grade 1: chest tightness and/or breathlessness on Monday only; Grade 2: chest tightness and/or breathlessness on Monday and other weekdays; Grade 3: Grade 2 syndromes occur with signs of lasting damage in capacity from reduced ventilator "defect.

Table 4
Prevalence of Byssinosis among Textile Workers

Grades	Byssinosis Symptom	Prevalence rate
Grade 0	160	77.7
Grade ½	3	1.4
Grade 1	16	7.8
Grade 2	27	13.1
Grade 3	0	0.0

The general occurrence of byssinosis amid textile workers is 22.3 percent. The result also shows that about 21 percent are experiencing byssinosis symptom of grade 1 and grade ½ (13.1 percent and 7.8 percent respectively), and about 1.4 percent have reported experience of grade 2 symptoms. These findings indicate a high denseness of byssinosis in textile workers. These findings are parallel to most of the earlier studies in Pakistan. For example, saleema et al., (2007) found 14.4 percent byssinosis ailment in cotton spinning mill workers in Faisalabad and Farooque et al., (2008) found 19 percent byssinosis in cotton workers in Karachi. While, study done by Memon et al., (2008) reported 35 percent of the ailment which are much higher than present study. The other dimension of the evidence is that the presence of the ailment varied substantially due to absorption of air born cotton dust in the working environment. The highest proportions of byssinosis syndromes were found in the blow room department followed by card and opening departments. These findings certainly indicate the connection within dust levels and byssinosis in the textile mills.

Table 5
Prevalence of Byssinosis by work Section

Section	Byssinosis (%)	No. of Workers
Opening/Mixing	23.4	47
Blow Room	34.6	26
Card Section	32.4	34
Samplex	16.7	36
Ring	7.7	26
Autocone	18.9	37

Another aspect of importance to be studied is the connection of respiratory ailments with respect to gender. The data clearly depicts that female workers are generally experiencing more health risks than male counterparts except shortness of breath which is one percentage point higher for male workers (see table 6).

Table 6
The Health Effects by Gender of the Workers

Disease Name	Male %	Female %
Dry Cough	35.4	38.3
Cough with phlegm	18.5	21.4
Shortness of breath	22.5	21.4
Bronchitis	15.7	25.0
Asthma	0.05	0.16

4.1.6 Health Cost

The above findings show that air born dust in textile mill intently provoking adverse health impacts in terms of morbidity, yet affecting efficiency and well-being of workers. The cost of the health impacts that workers bear, resulting from exposure to air born dust pollution in the factory estimated in the present analysis. Such estimates give us monetary assessments of financial burden of the ailments to workers. The health cost results show that more than 9 percent worker visited doctors during the stated 15 days for medication. The average medication cost is Pak rupees 993 per worker while average travel cost is PKRs 339 and average cost of workdays lost due to illness is PKRs. 716. The above cost appraises are certainly less than the absolute cost of health deterioration since we have counted only those costs that are apparent. The above health cost estimates did not count free treatment of many workers at social security hospitals. Further, opportunity cost of time of medication (time spend in waiting and travel for treatment of individual, plus same for accompanying person) is not included. Overall cost of illness estimates shows that average ill worker's monetary loss is PKRs 4096 per month. Given low wages in textile mills and weak economic position of the workers, this cost put substantial economic burden on workers.

Table 7
The Health Cost Estimates

Variable Name	Estimated Value
Proportion of workers, visited doctors during 15 days health diary survey	0.09
Treatment cost (in PKR)	993.0
Travel cost (in PKR)	339.0
Cost of workdays missed (in PKR)	716.0
Total actual health cost in 15 days (in PKR)	2048.0
Estimated total actual health cost per month (in PKR)	4096.0
Health cost as % of income	32.0%
Observations	20

4.2 ECONOMETRIC ANALYSIS

4.2.1 Relationship between use of Safety Masks and Respiratory Diseases

In this section, results of regression analysis are provided. We first presented the results of models, investigating the relationship between use of safety masks and respiratory diseases in textile mills. To measure relationship between use of safety mask and occupational illness, we constructed a binary dependent variable indicating whether any respiratory illness is reported by an individual worker. For this purpose, 6 Probit models are estimated. Before, presenting results of probit models, descriptive statistics of variables used in the analysis are given in table 8.

Table 8
Descriptive Statistics of Variables use in the Regression Analysis

Variable Name	Definition	Mean	Std. Dev.	N (%)
Age	Years	28.35	6.934	-
Gender	Male	-	-	177 (86)
	Female	-	-	29 (14)
Marital Status	Married	-	-	130 (63)
	Non-married	-	-	76 (37)
Education	Years completed	7.845	8653.864	-
Household Expenditure	Pakistan Rupees	20320.874	.349	-
Use of Mask	Yes	-	-	29 (14)
	No	-	-	177 (86)
Smoking cigarettes	Cigarettes per day	3.495	.421	-
Opening Section	Yes	-	-	47(22.8)
	No	-	-	159 (77.2)
Blow room Section	Yes	-	-	27 (13.1)
	No	-	-	179 (86.9)
Card Room Section	Yes	-	-	34 (16.5)
	No	-	-	172 (83.5)
Samplex Section	Yes	-	-	36 (17.5)
	No	-	-	170 (82.5)
Ring Section	Yes	-	-	25 (12.1)
	No	-	-	181 (87.9)
Autocone Section	Yes	-	-	37 (17.6)
	No	-	-	169 (82.4)

The Probit coefficient estimates for cough and marginal effects are reported in Table 9 and 10 respectively. The overall model statistics explain that model is good fit, the Chi-square = 30.276; Prob> chi2 = 0.003 and Pseudo R^2 = 0. 117.Before, detail discussion of results, it is important to notice that most of the variables have the expected signs, although few are not significant at conventional levels. The main significant parameters correspond to gender, use of mask, cigarette smoking, work in blow room section and card room section of the mill. The coefficients of all these variables have expected signs. For example, the results indicate that women workers are more likely to get sick in textile mills which is very much in line with the expectations. Since women normally work in dust work section, therefore, they are more likely to get sick. The use of mask has negative relationship with the cough. The cigarette smoking, work in card room section and work in blow room section have positive relationship with cough.

Table 9
The Probit Regression Analysis of Relationship between use of Mask and Cough

Probit regression

Cough	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	.015	.015	0.97	.334	-.015	.045	
gender	-.56	.322	-1.74	.082	-1.191	.071	*
MaritalS	-.133	.207	-0.64	.521	-.539	.273	
Edu	.014	.032	0.44	.658	-.049	.077	
HHExp	0	0	1.85	.065	0	0	*
Maskuse	-.985	.362	-2.72	.007	-1.696	-.275	***
sigratesday	.025	.015	1.71	.087	-.004	.055	*
opening	.447	.33	1.35	.176	-.2	1.094	
blowroom	.99	.372	2.66	.008	.261	1.719	***
cardroom	.656	.355	1.85	.064	-.039	1.352	*
samplex	.545	.358	1.52	.128	-.156	1.245	
ringsection	-.009	.419	-0.02	.983	-.831	.813	
Constant	-1.322	.594	-2.23	.026	-2.485	-.159	**

Mean dependent var	0.320	SD dependent var	0.468
Pseudo r-squared	0.117	Number of obs	206.000
Chi-square	30.276	Prob > chi2	0.003
Akaike crit. (AIC)	254.115	Bayesian crit. (BIC)	297.377

**** p<.01, ** p<.05, * p<.1*

The marginal estimates in table 10 show that use of mask decreases the probability of getting sick with cough by 26 per cent compared to non-use of mask. Women are significantly more likely to get cough than male in the textile mills. Specifically, the result shows that compared to male workers, probability of cough increases by 21% for female workers. One possible explanation of this increased probability of getting cough is that women normally work in dusty sites in textile mills and do manual jobs where cotton dust is normally high compared to other sections. This explanation is corroborated by the results of work section dummies. The result shows that workers who work in blow room section and card room section compared to autocone section are significantly more likely to report cough than workers in autocone section which is base section in the analysis. The marginal effects of work section dummies point out that if worker moves from autocone (base) section to opening section, the chance of no cough decline by 16 percent or chance of cough develop by 16 percent. Similarly, the chance of developing cough increases by 37 per cent, if worker moves from autocone section to blow room section while possibility of no cough decline by 37 percent. Moreover, the possibility of progressing cough increases by 24 per cent if worker moves from autocone section to card room section. Again, the possibility of no cough decline by 24 percent for said worker. The high frequency of cough in these sections may be due to dust denseness in the environment.

Table 10
Marginal Estimates of Relationship between use of Mask and Cough

Variable	dy/dx	Std. Err.	z	P>z	[	95%	C.I.	]	X
Age	0.005	0.005	0.970	0.333	-0.005	0.015	8.349		
Gender*	-0.208	0.125	-1.670	0.095	-0.453	0.036	0.859		
MaritalS*	-0.046	0.072	-0.640	0.524	-0.188	0.096	0.631		
Edu	0.005	0.011	0.440	0.658	-0.017	0.026	7.845		
HHExp	0.000	0.000	1.850	0.065	-0.000	0.000	20320.900		
Maskuse*	-0.260	0.065	-4.030	0.000	-0.387	-0.134	0.141		
Sigrat~y	0.009	0.005	1.710	0.086	-0.001	0.019	3.495		
Opening*	0.162	0.124	1.310	0.190	-0.080	0.404	0.228		
Blowroom*	0.374	0.138	2.710	0.007	0.104	0.644	0.131		
Cardroom*	0.244	0.136	1.790	0.073	-0.023	0.512	0.165		
Samplex*	0.201	0.137	1.470	0.143	-0.068	0.470	0.175		
Ringse~n*	-0.003	0.144	-0.020	0.983	-0.285	0.279	0.121		

The Probit coefficient estimates for phlegm and marginal effects are reported in Table 11 and 12 respectively. The overall model statistics explain that model is good fit, the Chi-square = 23.913; Prob> chi2 = 0.013 and Pseudo R^2 = 0.130. Before, detail discussion of results, it is important to notice that main variable of concern, the use of mask has expected sign and significant at 5 percent level. Although few variables are significant at conventional levels but most of the variable coefficients have expected signs. Other than mask use, cigarette smoking is significant.

Table 11
The Probit Regression Analysis of Relationship between use of Mask and Phlegm

Phlegm	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	.001	.018	0.05	.963	-.034	.036	
gender	-.38	.375	-1.01	.311	-1.114	.354	
MaritalS	-.071	.242	-0.29	.769	-.546	.404	
Edu	.072	.04	1.79	.073	-.007	.151	*
HHExp	0	0	1.48	.14	0	0	
Maskuse	-1.011	.453	-2.23	.026	-1.899	-.124	**
sigratesday	.055	.018	3.07	.002	.02	.091	***
opening	.389	.391	0.99	.32	-.378	1.156	
blowroom	.616	.424	1.45	.146	-.216	1.448	
cardroom	.762	.397	1.92	.055	-.016	1.541	*
samplex	.249	.423	0.59	.556	-.58	1.079	
o.ringsection	0	.	.	.	.	.	
Constant	-2.003	.74	-2.71	.007	-3.455	-.552	***

Mean dependent var	0.204	SD dependent var	0.404
Pseudo r-squared	0.130	Number of obs	181.000
Chi-square	23.913	Prob> chi2	0.013
Akaike crit. (AIC)	183.428	Bayesian crit. (BIC)	221.810

**** p<.01, ** p<.05, * p<.1*

The marginal estimates in table 12 show that women is significantly more likely to get sick with phlegm than male in the textile mills. Specifically, the result shows that probability of getting phlegm increases by 10 percent for female workers compared to male workers. Again, the possible explanation of this increased probability of getting phlegm is that women normally work in dusty sites in textile mills and do manual jobs where cotton dust is normally high compared to other sections. The result shows that workers who work in opening section, blow room section, samplex section and card room section are significantly (at 10 percent level) more likely to report phlegm than workers in autocone section which is base section in the analysis.

The marginal effects of work section dummies specify that if worker moves from autocone (base) section to opening section, the probability of no phlegm decreases by 10 percent or probability of phlegm increases by 10 percent. Similarly, the probability of developing phlegm increases by 18 percent, if worker moves from autocone section to blow room section while probability of no phlegm decreases by 18 percent. Likewise, the probability of developing phlegm increases by 23 percent if worker moves from autocone section to card room section. Similarly, the probability of developing phlegm increases by 6 percent if worker moves from autocone section to samplex section. Finally, the marginal effects indicate that use of mask by worker decreases the probability of getting sick with phlegm by 17 percent compared to non-use of mask by the worker.

Table 12
Marginal Estimates of Relationship between use of Mask and Phlegm

Variable	dy/dx	Std.Err.	z	P>z	[	95%	C.I.	]	X
Age	0.000	0.005	0.050	0.963	-0.009	0.009	28.304		
gender*	-0.108	0.117	-0.920	0.356	-0.336	0.121	0.840		
MaritalS*	-0.018	0.062	-0.290	0.771	-0.140	0.104	0.624		
Edu	0.018	0.010	1.830	0.068	-0.001	0.038	7.773		
HHExp	0.000	0.000	1.480	0.140	-0.000	0.000	20665.700		
Maskuse*	-0.174	0.047	-3.680	0.000	-0.266	-0.081	0.138		
sigrat~y	0.014	0.005	3.090	0.002	0.005	0.023	3.398		
opening*	0.107	0.115	0.930	0.351	-0.118	0.332	0.260		
blowroom*	0.186	0.145	1.280	0.199	-0.098	0.470	0.149		
cardroom*	0.233	0.136	1.710	0.088	-0.034	0.499	0.188		
samplex*	0.068	0.122	0.560	0.579	-0.171	0.306	0.199		

(*) dy/dx is for discrete change of dummy variable from 0 to 1

The Probit coefficient estimates for shortness of breath and marginal effects are reported in Table 13 and 14 respectively. The overall model statistics explain that model is good fit, the Chi-square = 19.877; Prob> chi2 = 0.069 and Pseudo R^2 = 0.095. Although few variables are significant at conventional levels but most of the variable coefficients have expected signs. It is important to note that main variable of concern, the use of mask has expected sign and significant at 5 percent level. Other than mask use, cigarette smoking and gender variables are significant.

Table 13
The Probit Regression Analysis of Relationship between use of mask and Shortness of Breath

short_ breath	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	.009	.016	0.58	.565	-.022	.041	
gender	-.607	.344	-1.76	.078	-1.281	.067	*
MaritalS	.175	.228	0.77	.443	-.272	.623	
Edu	.029	.036	0.81	.417	-.041	.099	
HHExp	0	0	1.47	.142	0	0	
Maskuse	-.892	.41	-2.17	.03	-1.696	-.088	**
sigratesday	.029	.016	1.88	.061	-.001	.06	*
opening	.154	.355	0.43	.665	-.541	.849	
blowroom	.509	.389	1.31	.191	-.254	1.271	
cardroom	.416	.375	1.11	.268	-.32	1.151	
samplex	.187	.388	0.48	.629	-.573	.948	
ringsection	-.355	.483	-0.74	.462	-1.301	.591	
Constant	-1.502	.634	-2.37	.018	-2.746	-.259	**

Mean dependent var	0.204	SD dependent var	0.404
Pseudo r-squared	0.095	Number of obs	206.000
Chi-square	19.877	Prob> chi2	0.069
Akaike crit. (AIC)	214.487	Bayesian crit. (BIC)	257.750

*** *p<.01*, ** *p<.05*, * *p<.1*

The results show that the probability of developing shortness of breath (byssinosis) is significantly higher for individuals who do not wear face mask. The results of marginal effects indicate that keeping all else constant, the use of mask decreases the chances of getting sick with shortness of breath by 16 percent among textile workers. The marginal effects of gender dummy specify that being women workers increases the probability of getting sick with shortness of breath by 18 percent. Again smoking has positive relationship with shortness of breath. The marginal effects indicate that smoking cigarettes increases the probability of shortness of breath by 8 percent. The coefficients of dusty work sections like opening section, blow room section and card room section have positive but insignificant relationship with shortness of breath. The results are in line with expectation and conventional wisdom.

Table 14
Marginal Estimates of Relationship between use of mask and Shortness of Breath

Variable	dy/dx	Std.Err.	z	P>z	[	95%	C.I.	]	X
Age	0.002	0.004	0.580	0.564	-0.006	0.011	28.349		
gender*	-0.186	0.119	-1.560	0.118	-0.420	0.047	0.859		
MaritalS*	0.044	0.056	0.790	0.432	-0.066	0.155	0.631		
Edu	0.007	0.009	0.820	0.415	-0.010	0.025	7.845		
HHExp	0.000	0.000	1.470	0.142	-0.000	0.000	20320.900		
Maskuse*	-0.166	0.049	-3.390	0.001	-0.261	-0.070	0.141		
sigrat~y	0.008	0.004	1.880	0.060	-0.000	0.016	3.495		
opening*	0.041	0.099	0.420	0.676	-0.152	0.234	0.228		
blowroom*	0.153	0.132	1.160	0.244	-0.105	0.411	0.131		
cardroom*	0.121	0.120	1.010	0.313	-0.114	0.356	0.165		
samplex*	0.051	0.111	0.460	0.646	-0.167	0.270	0.175		
ringse~n*	-0.080	0.093	-0.860	0.389	-0.263	0.103	0.121		

(*) dy/dx is for discrete change of dummy variable from 0 to 1

The Probit coefficient estimates for asthma and marginal effects are reported in Table 15 and 16 respectively. The overall model statistics explain that model is good fit, the Chi-square = 17.155; Prob> chi2 = 0.071 and Pseudo R^2 = 0.090. Although few variables are significant at conventional levels but most of the variable coefficients have expected signs. It is important to note that main variable of concern; the use of mask is not significant. The main significant variables are gender, cigarette smoking and blow room section.

Table 15
The Probit Regression Analysis of relationship between use of mask and Asthma

Asthma	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	-.024	.028	-0.85	.395	-.078	.031	
gender	-.996	.488	-2.04	.041	-1.953	-.04	**
MaritalS	.234	.371	0.63	.528	-.492	.96	
Edu	.041	.06	0.68	.499	-.077	.158	
HHExp	0	0	0.30	.764	0	0	
Maskuse	.7	.467	1.50	.134	-.214	1.614	
sigratesday	.057	.023	2.45	.014	.011	.102	**
opening	.894	.586	1.53	.127	-.255	2.043	
blowroom	1.306	.704	1.85	.064	-.074	2.686	*
cardroom	.973	.698	1.39	.163	-.395	2.341	
o.samplex	0	-	-	-	-	-	
o.ringsection	0	-	-	-	-	-	
Constant	-1.798	1.006	-1.79	.074	-3.769	.173	*

Mean dependent var	0.090	SD dependent var	0.287
Pseudo r-squared	0.196	Number of obs	145.000
Chi-square	17.155	Prob> chi2	0.071
Akaike crit. (AIC)	92.349	Bayesian crit. (BIC)	125.093

*** *p<.01*, ** *p<.05*, * *p<.1*

The marginal estimates in table 16 show that women are significantly more likely to get sick with asthma than male in the textile mills. Specifically, the result shows that probability of getting sick with asthma increases by 16 percent for female workers compared to male workers. Again, the possible explanation of this increased probability of getting asthma is that women normally work in dusty sites in textile mills and do manual jobs where cotton dust is normally high compared to other sections which cause respiratory diseases like asthma. The result shows that workers who work in blow room section are significantly (at 10 percent level) more likely to report asthma than workers in autocone section which is base section in the analysis. The marginal effects of work section dummies specify that probability of getting sick with asthma increases by 24 percent if worker moves from autocone (base) section to blow room section while probability of no asthma decreases by 24 percent. Likewise, the probability of developing asthma increases by 03 percent if worker is smoking cigarettes compared to workers who do not smoke cigarettes.

Table 16
Marginal estimates of relationship between use of mask and Asthma

Variable	dy/dx	Std.Err.	z	P>z	[	95%	C.I.	]	X
Age	-0.002	0.003	-0.850	0.395	-0.008	0.003	28.379		
gender*	-0.165	0.105	-1.570	0.116	-0.370	0.041	.8		
MaritalS*	0.023	0.035	0.650	0.513	-0.046	0.092	0.621		
Edu	0.004	0.006	0.670	0.503	-0.008	0.016	7.690		
HHExp	0.000	0.000	0.300	0.765	-0.000	0.000	20637.900		
Maskuse*	0.109	0.098	1.110	0.268	-0.083	0.301	0.124		
sigrat~y	0.006	0.003	2.250	0.025	0.001	0.011	3.531		
opening*	0.122	0.094	1.290	0.197	-0.063	0.306	0.324		
blowroom*	0.249	0.180	1.390	0.165	-0.103	0.601	0.186		
cardroom*	0.152	0.142	1.080	0.282	-0.125	0.430	0.234		
samplex*	0.051	0.111	0.460	0.646	-0.167	0.270	0.175		
ringse~n*	-0.080	0.093	-0.860	0.389	-0.263	0.103	0.121		

(*) dy/dx is for discrete change of dummy variable from 0 to 1

The Probit coefficient estimates for bronchitis and marginal effects are reported in Table 17 and 18 respectively. The overall model statistics explain that model is good fit, the Chi-square = 18.78; Prob> chi2 = 0.094 and Pseudo R^2 = 0.00. Only two variables namely gender and smoking cigarettes are significant at 5 percent level. Although only two variables are significant but most of the variable coefficients have expected signs. It is important to note that main variable of concern, the use of mask is not significant.

Table 17
The Probit Regression Analysis of relationship between use of mask and Bronchitis

Bronchitis	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	.007	.018	0.42	.672	-.027	.042	
gender	-.827	.344	-2.41	.016	-1.501	-.153	**
MaritalS	-.019	.237	-0.08	.936	-.482	.445	
Edu	-.034	.037	-0.91	.365	-.107	.039	
HHExp	0	0	1.14	.256	0	0	
Maskuse	.168	.314	0.53	.593	-.448	.783	
sigratesday	.033	.016	2.10	.036	.002	.064	**
opening	.429	.363	1.18	.238	-.283	1.142	
blowroom	.455	.437	1.04	.298	-.401	1.311	
cardroom	.649	.415	1.56	.118	-.164	1.461	
samplex	.508	.412	1.23	.218	-.3	1.317	
ringsection	-.273	.563	-0.48	.628	-1.377	.832	
Constant	-1.033	.641	-1.61	.107	-2.289	.223	

Mean dependent var	0.170	SD dependent var	0.376
Pseudo r-squared	0.100	Number of obs	206.000
Chi-square	18.781	Prob> chi2	0.094
Akaike crit. (AIC)	194.980	Bayesian crit. (BIC)	238.243

*** *p<.01*, ** *p<.05*, * *p<.1*

The marginal estimates in table 18 show that women are significantly more likely to get sick with bronchitis than male in the textile mills. Specifically, the result shows that probability of getting sick with asthma increases by 24 percent for female workers compared to male workers. Again, the possible explanation of this increased probability of getting asthma is that women normally work in dusty sites in textile mills and do manual jobs where cotton dust is normally high compared to other sections which cause respiratory diseases like asthma. The marginal effects show that probability of getting sick with bronchitis increases by 08 percent if worker is smoking cigarettes compared to workers who do not smoke cigarettes. The result shows that workers who work in opening section, blow room section, card room section and samplex section are more likely to report bronchitis than workers in autocone section which is base section in the analysis. However, these results are not significant.

Table 18
Marginal estimates of relationship between use of mask and Bronchitis

Variable	dy/dx	Std.Err.	z	P>z	[	95%	C.I.	]	X
Age	0.002	0.004	0.420	0.671	-0.006	0.009	28.349		
gender*	-0.243	0.118	-2.050	0.040	-0.475	-0.011	0.859		
MaritalS*	-0.004	0.054	-0.080	0.936	-0.110	0.101	0.631		
Edu	-0.008	0.008	-0.910	0.364	-0.024	0.009	7.845		
HHExp	0.000	0.000	1.140	0.254	-0.000	0.000	20320.900		
Maskuse*	0.040	0.080	0.500	0.614	-0.117	0.198	0.141		
sigrat~y	0.008	0.004	2.110	0.035	0.001	0.015	3.495		
opening*	0.109	0.102	1.070	0.284	-0.090	0.309	0.228		
blowroom*	0.121	0.133	0.910	0.361	-0.139	0.381	0.131		
cardroom*	0.180	0.133	1.350	0.176	-0.081	0.441	0.165		
samplex*	0.135	0.124	1.090	0.277	-0.108	0.378	0.175		
ringse~n*	-0.055	0.100	-0.550	0.581	-0.250	0.140	0.121		

(*) dy/dx is for discrete change of dummy variable from 0 to 1

4.2.2 Relationship between use of Safety Masks and Sickness Absence

In this section, we presented the analysis of relationship between use of safety masks and absence from work. For this purpose, we used a probit model and results are presented in table 19 and 20. The Probit coefficient estimates for work absence are reported in Table 19 and marginal effects are reported in Table 20. The overall model statistics explain that model is good fit, the Chi-square = 15.99; Prob> chi2 = 0.141 and Pseudo R^2 = 0.89. Only two variables namely use of mask and smoking cigarettes are significant at 5 percent level. Although only two variables are significant but most of the variable coefficients have expected signs. It is important to note that main variable of concern; the use of mask is significant.

Table 19
The Probit Regression Analysis of Relationship between use of Mask and Work Absence

Misswork	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	-.018	.018	-0.98	.33	-.054	.018	
gender	-.511	.324	-1.58	.115	-1.146	.125	
MaritalS	-.017	.235	-0.07	.943	-.478	.444	
Edu	-.024	.038	-0.63	.531	-.098	.05	
HHExp	0	0	0.94	.346	0	0	
Maskuse	-.787	.397	-1.98	.047	-1.565	-.009	**
sigratesday	.044	.018	2.43	.015	.009	.08	**
opening	-.124	.328	-0.38	.705	-.766	.518	
blowroom	-.39	.398	-0.98	.327	-1.169	.389	
cardroom	-.487	.395	-1.23	.218	-1.262	.288	
samplex	-.143	.361	-0.40	.692	-.85	.564	
o.ringsection	0	.	.	.	.	.	
Constant	.131	.65	0.20	.84	-1.143	1.405	

Mean dependent var	0.199	SD dependent var	0.400
Pseudo r-squared	0.089	Number of obs	181.000
Chi-square	15.994	Prob> chi2	0.141
Akaike crit. (AIC)	188.596	Bayesian crit. (BIC)	226.978

*** p<.01, ** p<.05, * p<.1

The marginal estimates in table 20 show that use of mask variable is significantly and negatively related to work absence. Specifically, the marginal estimates indicate that probability of work absence decreases by 15 percent if worker use face mask during work. This result clearly shows that use of mask not only reduces respiratory diseases but also contribute to work productivity by reducing work days lost due to work related absence. The marginal effects show that probability of work absence increases by 012 percent if worker is smoking cigarettes compared to worker who do not smoke cigarettes.

Table 20
Marginal estimates of relationship between use of mask and work absence

Variable	dy/dx	Std.Err.	z	P>z	[	95%	C.I.	]	X
Age	-0.005	0.005	-0.980	0.327	-0.014	0.005	28.304		
gender*	-0.153	0.108	-1.410	0.158	-0.364	0.059	0.840		
MaritalS*	-0.004	0.061	-0.070	0.943	-0.124	0.116	0.624		
Edu	-0.006	0.010	-0.630	0.531	-0.025	0.013	7.773		
HHExp	0.000	0.000	0.940	0.346	-0.000	0.000	20665.700		
Maskuse*	-0.152	0.054	-2.840	0.005	-0.257	-0.047	0.138		
sigrat~y	0.012	0.005	2.470	0.014	0.002	0.021	3.398		
opening*	-0.031	0.080	-0.390	0.697	-0.188	0.126	0.260		
blowroom*	-0.088	0.077	-1.140	0.253	-0.240	0.063	0.149		
cardroom*	-0.109	0.074	-1.470	0.141	-0.253	0.036	0.188		
samplex*	-0.036	0.086	-0.410	0.680	-0.204	0.133	0.199		
ringse~n*	-0.055	0.100	-0.550	0.581	-0.250	0.140	0.121		

(*) dy/dx is for discrete change of dummy variable from 0 to 1

4.3 DISCUSSION

The result of the present study shows that respiratory diseases are in a high proportion of textile workers. Most of the studies in Pakistan have described identical results (Farooque et al., 2008; Memon et al., 2008; Khan, et al., 2015; Khan, 2017; Jamali & Nafees, 2017; Khan, et al., 2021). Analogous research findings can also be traced to the region. For example, Ajeet, et al., (2010) in India, Singh, et al., (2019) and Paudyal, et al., (2011) in Nepal and Wang et al., (2003) in China have found that the incidence of respiratory diseases varies between 12 percent to 24 percent. The denseness of the illness diverse substantially due to denseness of cotton dust in the work place (Singh, et al., 2019). The highest proportions of respiratory syndromes were found in the blow room section followed by card and opening sections. The respondents in the ring section and autocone section reported relatively less level of respiratory symptoms compared to those in the other sections.

It is the fact that opening, blow room and card sections are relatively more polluted than samplex, ring and autocone sections and it is expected that higher the level of pollution, the higher will be the respiratory symptoms. These findings clearly show the connection within dust levels in the work place and respiratory symptoms. The previous research in Africa and Asia have measured dust levels in different sections of spinning mills and described that the highest level of dust and resultant respiratory symptoms are found in blow room, card room and waste room (Ghasemkhani et al., 2006; Wang et al., 2005; Alemu et al., 2010; Khan et al., 2020; Dangi & Bhise, 2017). The findings are parallel with prediction and conventional wisdom as opening, blow room and card section are early processes in textile operation hence more contaminated than samplex, ring and auto cone sections.

Another aspect of importance to be studied is the relationship between respiratory diseases with respect to gender. The data portray an important piece of information which clearly depicts that female workers are generally experiencing more health problems than male counterparts except shortness of breath. The notable result is the prevalence of bronchitis and wheezing which are much higher among female workers than male workers. The possible reasons for this status are straightforward. The female workers are working in the opening section, a relatively dusty work section which is associated with significantly higher health problems. These results are parallel to Khan, et al., (2018) who observed that female workers are facing high rate of respiratory diseases and associated abnormalities in Pakistan.

The health effects described above can often be decreased substantially by preventive behaviour, practicing safety measures that commonly involve wearing safety masks and earplugs. Despite significant disease burden, the use of the mask is less in present study and most of the workers said that sometimes during work they wear face masks, while a solid fraction openly admitted that they do not use mask during work. These findings are comparable to earlier studies in Pakistan and other developing countries that undoubtedly clarify less utilization of safety masks among workers in textile mills (Malik et al., 2010; Howyida et al., 2012; Tetemke et al., 2014).

Despite trivial use of face mask, the result shows that use of face mask significantly reduce development of respiratory diseases among workers. For example, the results indicate that the probability of developing chronic cough, phlegm and shortness of breath (byssinosis) is substantially less for individuals who use face mask compared to workers who do not use face mask. Given above result, it can be concluded that occupational diseases can be prevented by taking control measures in textile mills. These results are in line with previous literature (Howyida, 2012; Khan, 2017; Khan, et al., 2020) as well as World Health Organization (WHO) advisories. According to World Health Organization (WHO), Occupational Health Administration (OHA) believes that use of safety gadgets is the most important element in achieving full compliance with existing occupational health and safety standards and reducing potential health hazards in the workplace. Furthermore, prevention measures are the most cost-effective tool to reduce diseases and accident rates at the workplace (Howyida, 2012).

In addition to reducing occupational health burden on textile workers, the use of safety masks was also linked with reducing illness associated work absence. This result clearly shows that use of mask not only reduces respiratory diseases but also contribute in work productivity by reducing work days lost due to work related absence. This result can playa significant policy implication for mill administration to raise safety culture in the mills. As Farooqui et al., (2008) reported in their study that strict imposition of wearing safety masks by mill administration in Karachi resulted in substantially low rate of respiratory ailments and connected complexities.

This study underscores the need to strictly follow the safety standards. Prevention measures must be imposed in order to safeguard workers while performing routine activities. Safety gadgets is considered when disclosure to high volume dust cannot be averted particularly in dusty work sites like opening section, blow room section and card room section. Furthermore, the use of safety gadgets is the most cost-effective tool to reduce illness and associated complexities. This is particularly important in the case of Pakistan where promulgation of cotton dust standards seems unlikely to happen in foreseeable future. Therefore, the only available option is the use of protective measures by the workers.

The study has some weaknesses. The major weakness of this study is the small sample size. The selected sample of workers in the study cannot be considered representative of the worker's population of spinning textile mills in Faisalabad. Therefore, the results of this study may not be generalized to all spinning mill workers. Also, the assessment of respiratory symptoms was based on a questionnaire only, rather than objective diagnosis, and the extent to which the answers may have been biased by knowledge of the worker (information bias) is uncertain. Another major limitation of this research is that the standard measurement of dust in mills was not performed. Thus, we cannot with confidence conclude that disclosure to cotton dust is connected with respiratory illnesses. Therefore, some further analysis of chest illness and their relationship with dust level might provide a clearer answer. However, the available literature can help in this regard. Most of our results are logical and parallel to existing studies in the literature. The consistency of the results across studies and consistency of symptom complexes viz-a-viz work section are strong evidence that the associations between respiratory symptoms and dust concentrations in workplaces are real.

CHAPTER 5

CONCLUSION

5.1 CONCLUSION

Textile workers are subject to many workplace risks that are detrimental to their health and safety in the industry. One of the most important hazardous components is disclosure to airborne dust which causes respiratory impairments. These ailments impact on health of workers, their productivity, quality of life, thus in the long run, well-being very badly. However, these ailments and associated limitations like work absence and work performance can be reduced by use of safety gadgets. The present study is attempted to investigate the effectiveness of personal protection equipment for textile mill workers in Faisalabad, Pakistan.

The findings indicate that use of safety mask was limited, and the use of earplugs was almost non-existent. The workers suffer from various types of respiratory symptoms like byssinosis, chronic bronchitis, phlegm, asthma, wheezing, chronic cough and cough with bloody phlegm. However, most of the ailments are negatively and significantly associated with use of mask. For example, the marginal estimates show that use of mask decreases the probability of getting sick with cough by 26 percent, phlegm by 17 per cent and shortness of breath by 16 percent among textile workers compared to non-users of face mask. Other than mask use, cigarette smoking and gender variables are significant. The results indicate that women workers are more likely to get sick in textile mills than male workers. The result also shows that workers who work in dusty work sections are significantly more likely to report respiratory ailments than workers in Autocone section which is base section in the analysis. Likewise, the chance of developing respiratory ailments increases significantly if worker is smoking cigarettes compared to workers who do not smoke cigarettes. The marginal estimates also indicate that probability of work absence decreases by 15 percent if worker use face mask during work. This result clearly shows that use of mask not only reduces respiratory diseases but also contribute to work productivity by reducing workdays lost due to work related absence.

5.2 POLICY RECOMMENDATIONS

This study recommends that to minimize the health hazards as well as to improve the longevity and productivity of workers, compliance with the using of occupational protection tools is essential. Personal protection should be established where managerial action should be more applicable in present framework. For instance, a good example of this kind of operation can be picture from Farooqui et al., (2008) who documented that the factory administration imposed a fine of Rupees 100/= on those who would not wear the face mask at work. As a result, the utilization safety gadgets increased, and respiratory ailments substantially decreased.

In addition, educational programs on health should be held to raise the knowledge of the workers about the appropriate utilization of safety gadgets in textile industry. Workers must be trained not only in the proper use of the protective equipment and machines, but also in the care and sustaining of that tool and machines. Howyida, et al., (2012) conducted their study in Egypt and reported that the informational intervention about workers' awareness and consent with the utilization of PPE was efficient and its effects had dire emendation in utilization of the PPE by workers (Howyida, et al., 2012).The Directorate of Workers Education (DWE), Ministry of Human Resource Development should be equipped and authorized to serve as a national focal institution for promoting safety culture by giving OSH coaching and consultative helps to the workers and administration.

The hazard of respiratory symptoms indicates substantial fluctuation within work sections. Thus, the estimates of hazard of respiratory symptoms in relation to dusty worksites could be convenient in setting dust protocols for the industry. The smoking should be strictly prohibited, and women workers should be given priority in all health and safety management decisions.

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