

Textile and leather sector provide employment to about 50 per cent of industrial labour force.

In Punjab, the fines collected for non-compliance amount to just 0.21 per cent of the health costs.



An average worker spent PKR 4,096 per worker on doctor visits.

OHS Standards should be in place and regular monitoring of these standards should be done.



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REPORT

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Economic Impacts and Health Implications

of Non-Compliance of the Leather and Textile Industry



by Junaid Ahmed Noor,
Hamza Ijaz and Ali Zafar



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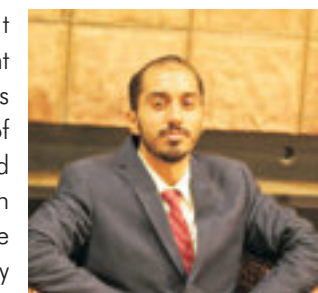
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List of Acronyms

ADB	Asian Development Bank
AHP	Analytical Hierarchical Process
ARI	Acute Respiratory Infection
BHUs	Basic Health Units
BS	British Standard
CFC	Chlorofluorocarbon
CMI	Census of Manufacturing Industries
COD	Chemical Oxygen Demand
DALY	Disability Adjusted Life Years
DHIS	District Health Information System
EMPs	Environmental Management Practices
EPD	Environmental Protection Department
EPI	Environmental Performance Index
EU	European Union
GDP	Gross Domestic Product
GER	Global Effluent Requirement
GoP	Government of Pakistan
GoPb	Government of Punjab
GOTS	Global Organic Textile Standard
GSP	Generalized System of Preferences
ILO	International Labour Organization
INGOs	International Non-Governmental Organizations
ISO	International Organization for Standardization
NGOs	Non-Governmental Organizations
NOW	National Organization for Working Communities
PEPA	Pakistan Environmental Protection Act
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
SA	Social Accountability
SOMO	Centre for Research on Multinational Corporations
T&L	Textile and Leather
VOCs	Volatile Organic Compounds
WRAP	Worldwide Responsible Accredited Production

Author's Profile

Junaid Ahmed Noor is currently serving as the Manager (Monitoring & Evaluation) at Development & Policy Management Consultant Pvt. Ltd., as an Economist by training and has more than half a decade's experience of conducting research in both academic and field settings. Junaid has a degree of MPhil in Economics from the Government College University Lahore. He has worked extensively with the EU Punjab Access to Justice on the performance evaluation of the Legal Service Centres, Monitoring & Evaluation of the District Legal Empowerment Committee Pilot Project and End-line Evaluation Survey of the Public Awareness Campaign along with performance evaluation of public prosecutors in Punjab. He is also the co-principal investigator for the Higher Education Commission's project on 'Ecological Valuation of Scrub Forest (Hayat ul Mir) and Plain Thorn Forest Community in Harrappa'. The project involves extensive field work which includes studying the forests in biological perspective and socioeconomic perspective and suggests improvements for restoration of these forests. Junaid has also worked as Tutor on GCU – ZEF Collaboration Project where he co-supervised research on Marginality among Khawajasara's – Challenge for Economic Development. In the research, various marginalized communities of Khawajasara's (transgenders) were studied through focus group discussions and interviews to assess the status of marginality.



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Textile and leather sector provide employment to about 50 per cent of industrial labour force.

Executive Summary

Pakistan is the sixth most populous country in the world, with the current census estimating the country's population to be over 207 million. Despite a large population burden, Pakistan has continued to demonstrate consistent growth in industrial and service sectors, with an average GDP growth rate of 4.3 per cent during the last five years (Ministry of Finance, 2017). Moreover, social indicators have also improved during the last decade, with multidimensional poverty falling from 55 per cent to 39 per cent between 2004 and 2015 (UNDP, 2016). Despite strong performance in other sectors, Pakistan continues to lag behind in terms of reducing environmental pollution, degradation and mitigating the associated health and social hazards.

According to the Environmental Performance Index 2016, computed by Yale University, Pakistan ranks 144th out of 180 countries, making it one of the most vulnerable countries against environmental risks and hazards. Currently, Pakistan is ranked in medium to high risk category, grouped with countries such as Angola and Gambia. Other environmental indices also present a bleak picture for the country; the Global Climate Risk Index 2018 ranks Pakistan as the 7th most adversely affected country due to climate change. These risks pose a high toll on the country, both socially as well as economically. According to the calculations by the experts from World Bank, these risks are equivalent to almost 9 per cent of Pakistan's GDP (World Bank, 2008), resulting in significant health and economic costs.

While Pakistan has registered strong growth in both industrial and service sectors during the last decade, there is a need to evaluate the social and economic impacts that result due to the lack of willingness of the major actors to ensure compliance with the national environmental and health standards. This study has a two-fold objective; firstly, to estimate the level of non-compliance within two major industrial sectors in Pakistan, namely the Textile and Leather sectors. Secondly, this study aims to estimate the health risks and associated health and trade-related costs for the population and the economy. Together, the two sectors contribute nearly one-third of industrial value-added products manufactured within the country and provide employment to about 50 per cent of industrial labour force. Moreover, leather and textile account for approximately 67 per cent of total national exports (GoP, 2017). Due to the high impact on both, domestic population and national exports, non-compliance in these sectors can have a detrimental effect on health and economy of the country.

Environmental Non-Compliance in Textile & Leather Sectors

The study makes use of data from the government departments as well as secondary studies to estimate the levels of non-compliance within the two sectors. However, it is safe to claim that the data generated by the government is extremely limited and reflects poorly on the ability of the government to enforce its own standards and regulations. Our review reveals that during the last five years, 145 units from these sectors (87 leather units and 58 textile units) were fined due to their inability to meet the set standards. It is disconcerting to note that only 38 leather and textile units were fined in 2016, suggesting that only 1.4 per cent of the total textile and leather units were non-compliant or, as is more plausible, the department was unable to monitor these industries effectively. Independent studies also seem to reinforce the latter perception, with World Bank (2014) identifying that only 3.63 per cent of the industrial units in a sample of leather and textile industries were found to be

environmentally compliant. Similarly, a study by Vaqar (2015) shows that out of 60 units sampled, 87 per cent of the sampled units adopt only two out of nine major environmental management practices and only 12 per cent of the units showed compliance to more than 6 EMPs

Estimation of Direct Treatment Costs

Our study makes use of the methodology used by the WHO to estimate Burden of Disease. A variation of the Analytical Hierarchical Process (AHP) was used to obtain expert opinion from the five districts, chosen for this study, regarding the percentage of diseases that can be attributed to pollutants that are directly discharged by the textile and leather units. Based on these attributions and the prevalence of disease data, obtained from the Global Health Database, 2017, it is estimated that the treatment costs for major diseases caused by pollutants and hazards from these industries can range from PKR 1.5-2.2 billion (US\$15-22 million), resulting in a significant out-of-pocket health expenditure for the population in the five districts of study. Moreover, an estimation based on the incidence of disease data posits an alarmingly high amount, between PKR 33.28-43.3 billion (US\$330-430 million), indicating that a significant risk in terms of health cost exists if environmental non-compliance remains unchecked.

Burden of Diseases Due to Textile & Leather Sector

The study estimates the rates of attribution of Disability Adjusted Life Years (DALY) to diseases caused by the T&L sector in the five districts of study and extrapolates the results to estimate total impact for Pakistan. DALY is expressed as number of years lost due to ill health, disability or early death and is a measure of the burden of disease. It is estimated that Pakistan as a whole loses approximately 2.3 million years due to diseases that can be directly attributed to the T&L sectors. The total economic value of this is estimated to be US\$3.5 billion per year, equivalent to 1.16 per cent of the GDP or 26 per cent of our exports of leather and textile.

Environmental Compliance, GSP+ and T&L Trade

Pakistan was granted duty-free access to the EU under GSP+ scheme in 2013. The status, however, is conditional to ratification and adoption of 27 core International Conventions related to Human rights, Environment, Labour rights, Drug control and Corruption. Since the inception of GSP+ status, Pakistan's textile and leather exports have risen over time, with an increase of 51.5 per cent between 2013 and 2016. In particular, the exports to EU have increased by 37 per cent, with leather and textile sectors registering an increase of 6.68 and 55 per cent respectively (Ministry of Finance, 2017).

In absence of extensive reporting on compliance of individual sectors, it is extremely difficult to assess the impact of non-compliance on trade with the EU. Nevertheless, the export data and the initial reports suggest that Pakistan has, thus far, complied with the requirements of the European Union and, as a result, has witnessed a significant increase in its exports to the region.

Conclusion

The results from this study are of immense significance for adopting a macro-view of the socio-economic impact of industries. While Pakistan has ratified

and adopted international conventions pertaining to environment, which has led to the award of preferential trade terms in GSP+, a lack of implementation and enforcement exact a heavy social and economic cost for the increase in trade. Therefore, even though Pakistan's textile and leather exports have shown an increase during the last four years, especially to the European Union, if the economic burden and treatment costs are included in the analysis, the contribution of these sectors in the economy would decrease significantly. At the moment, the analysis at both federal and provincial level excludes these costs, primarily due to non-availability of data. However, there is a pressing need to document and address these issues if sustainable development is to be achieved.

Pakistan was granted duty-free access to the EU under GSP+ scheme in 2013.

Total economic value of diseases related to textile and leather sector is estimated to be US\$3.5 billion per year.

Introduction



1

1 Introduction

	2000	2005	2010	2014	2015
GDP per capita growth (annual %)	1.91	5.48	-0.48	2.51	2.59
GDP growth (annual %)	4.26	7.67	1.61	4.67	4.71
Manufacturing, value added (% of GDP)	14.68	18.56	13.64	14.18	13.42
Textiles and clothing (% of value added in manufacturing)
Health expenditure per capita (current US\$)	15.50	22.36	30.95	36.15	..
Health expenditure, public (% of GDP)	0.61	0.69	0.95	0.92	..
Health expenditure, private (% of GDP)	2.18	2.23	2.06	1.70	..
Out-of-pocket health expenditure (% of total expenditure on health)	63.70	66.01	60.61	56.28	..
Cause of death, by communicable diseases and maternal, prenatal and nutrition conditions (% of total)	50.30	42.70	39.80	..	34.80
Cause of death, by injury (% of total)	6.90	12.20	9.10	..	8.60
Cause of death, by non-communicable diseases (% of total)	42.70	45.00	51.00	..	56.40
CO ₂ emissions (metric tons per capita)	0.77	0.89	0.95	0.90	..
CO ₂ emissions from manufacturing industries and construction (% of total fuel combustion)	23.08	31.66	29.03	23.84	..
Improved sanitation facilities (% of population with access)	36.90	45.90	54.80	61.80	63.50
Improved water source (% of population with access)	88.50	89.50	90.50	91.30	91.40
Incidence of tuberculosis (per 100,000 people)	275.00	276.00	276.00	270.00	270.00
Nitrous oxide emissions (thousand metric tons of CO ₂ equivalent)	26350.00	27077.38	30050.22
PM _{2.5} air pollution, mean annual exposure (micrograms per cubic meter)	69.59	63.88	61.44	64.28	64.95
PM _{2.5} air pollution, population exposed to levels exceeding WHO guideline value (% of total)	100.00	100.00	99.98	100.00	100.00

Source: WDI, 2017

Table 1-1: A Snapshot of Key Indicators for Pakistan

With a population of more than 207 million, Pakistan is the sixth most populous country in the world. With an average GDP growth rate of 4.3 per cent during the last five years, Pakistan has continued to show consistent growth in industrial and service sectors (Ministry of Finance, 2017). Moreover, Pakistan has also fared impressively in terms of some of the key social indicators, with multidimensional poverty falling from 55 to 39 per cent between 2004 and 2015. Nonetheless, despite strong performance in other quarters, Pakistan continues to fall behind in terms of curbing down environmental pollution and degradation as well as the associated health and social hazards.

According to World Bank (2008), these risks exact a toll equivalent to almost 9 per cent of Pakistan's GDP (World Bank, 2008), resulting in significant health and economic costs. While a number of contributing factors exist, industrial waste and non-compliance remain among the most significant contributors to air and water pollution in the country, posing significant health risks to not just the workers but also the population in general. Moreover, with increased global emphasis on green production, environmental non-compliance can have detrimental effect on the country's exports by hampering a country's competitiveness and ability to meet non-tariff environmental restrictions.

Pakistan showed GDP growth, with the rate of 4.3 per cent in last five years.

Textile and leather sector, together, contribute nearly one-third of industrial value-added products manufactured in Pakistan.

This study explores the level of non-compliance within two of the major industrial sectors in Pakistan, namely the Textile and Leather sectors, and estimates the health risks and associated health and trade-related costs for the population and the economy. The two sectors, together, contribute nearly one-third of industrial value-added products manufactured within the country and provide employment to about 50 per cent of industrial labor force. Leather and textile account for approximately 67 per cent of national¹ exports (GoP, 2017). Due to their high impact on both domestic population and national exports, non-compliance in these sectors can have a detrimental effect on health and economy of the country.

The study makes use of data from five districts of Pakistan, namely Karachi, Lahore, Faisalabad, Sialkot and Kasur, which account for nearly 20 per cent of the total population and 60 per cent of the total leather and textile industry in the country. Consequently, the results generated from the study can be generalized to provide a comprehensive picture of the impact of non-compliance in these sectors. The study makes use of both primary and secondary data to determine the levels of non-compliance, disease burden and attribution as well as the associated health and economic costs.

1.1 The State of Environment in Pakistan

According to the Environmental Performance Index (EPI) 2016, computed by Yale University, Pakistan ranks 144th out of 180 countries, making it one of the most vulnerable countries against environmental risks and hazards (Malik, Hsu, Jhonson, & Sherbinin, 2016). EPI is a composite index of more than 20 indicators reflecting national level environmental data, with 0 indicating no risk and 100 representing maximum risk. As shown in Table 1-2, Pakistan's performance in terms of environment has deteriorated over time and Pakistan currently ranks in medium to high risk category, grouped with the likes of Angola and Gambia. A detailed analysis of the EPI scores, as presented in the Appendix A, suggests that Pakistan has a medium to high risk of environmental exposure, air quality, unsafe sanitation and unsafe drinking water.

	EPI 2012	EPI 2014	EPI 2016
Rank		148	144
Score	39.56	34.58	51.42
Environmental Health	28.56	38.78	52.73
Ecosystem Vitality			50.11

Source: (Malik, Hsu, Jhonson, & Sherbinin, 2016)

Table 1-2: Pakistan's EPI Score

Similarly, the Global Climate Risk Index 2018 posits Pakistan at 7th position as the most adversely affected countries due to climate change. While the risk posed by climate change itself is considerable, the inability and lack of will power on part of the federal and provincial governments to effectively monitor and counter environmental degradation and climate change

¹ Economic Survey of Pakistan 2016-17.

Global Climate Risk Index 2018 posits Pakistan at 7th position as the most adversely affected countries due to climate change.

exacerbate the risk even further. The government has failed to produce the mandatory Annual Report on the State of the Environment since 2008. As a result, no official statistics are available on compliance and enforcement of regulations and environmental policies. Even at the provincial level, there is a lack of commitment on behalf of the governments to commission in-depth studies on compliance and state of the environment. Consequently, the only sources for reliable information are individual cross-sectional studies commissioned by INGOs, IGOs, and academics for specific sectors or regions.

Methodology



2 Methodology

This study responds to three major objectives:

- a) Estimation of levels of non-compliance in leather and textile industry.
- b) Calculation of health costs for workers and population at large.
- c) Assessment of the impact of non-compliance on trade performance of the leather and textile sectors.

It is important, however, to mention from the onset that the study was hampered by lack of extensive and exhaustive data on these issues. Consequently, the study had to rely on secondary research and limited data that was collected from the field, to quantify the aforementioned parameters. The field data collection was restricted due to limited access to industry and unwillingness of workers to cooperate at the time of data collection.

2.1 Data Collection

The study relies on both primary and secondary sources of data therefore it uses a number of different techniques to gather relevant statistics. The primary data was collected from the Basic Health Units and the factory workers by the WWF staff through a close-ended questionnaire.

The secondary data was obtained from multiple sources, including but not limited to the data from Environment Protection Department, Economic Survey of Pakistan, Global Health Database, District Health Information System (Punjab) and independent studies commissioned by World Bank, Asian Development Bank (ADB), International Labour Organization (ILO) as well as academic researches.

2.2 Levels of Non-Compliance in Leather and Textile Industry

In order to assess the level of compliance, the primary source of information was the data collected by the Environment Protection Department, Punjab (EPD). However, a review of the data showed that only a handful of firms were fined due to non-compliance, as demonstrated in section 5.1 below. After conversation with officials from the EPD and review of the secondary literature, it was realized that the EPD lacked sufficient resources to effectively monitor compliance and enforce environmental regulations. Independent studies undertaken by academics and those commissioned by developmental organizations such as the World Bank, Greenpeace, ILO etc. report a much higher prevalence of non-compliance. Consequently, estimates from these cross-sectional studies were used to extrapolate levels of non-compliance for the two industries.

2.3 Treatment Costs for Population and their Burden

To assess the health costs attributed to non-compliance of these industries, a mix of primary and secondary data was used. Firstly, the data on prevalence of diseases attributed to environmental wastes was obtained from the Global Health Database, 2017.

Moreover, a variation of Analytical Hierarchical Process was used to obtain expert opinion from the five districts with regards to the percentage of prevalent diseases that can be directly attributed to the pollutants produced by these industries and the average cost of treatment. These were used to calculate population wise cost of attributable percentages.

Similarly, data was collected from factory workers in the target districts

on disease prevalence and the percentages obtained were used to extrapolate the numbers for the total workforce in leather and textile sector. Similarly, incidence of diseases was used to extrapolate the number of population at risk.

2.4 Impact of Non-Compliance on Trade Performance of the Leather and Textile sector

Finally, time-series data for textile and leather exports, from the official statistics provided by the State Bank of Pakistan and the Bureau of Statistics, was assessed to determine trends for the two sectors published by Government of Pakistan and EU Trade statistics. The numbers were also broken down with regards to specific regions, especially the EU, which has extended GSP+ status to Pakistan, conditional on compliance with specific environmental and human rights conventions. It is important to note, however, that the 2nd report on GSP+ compliance is due in 2018, and other than that, no data is compiled by the EU to assess compliance with the enlisted conventions.

In 2016-17,
textile exports
from Pakistan
amounted to
US\$12.45
billion.

Faisalabad,
Lahore, Karachi,
Sialkot and Kasur
host 60 per cent
of total leather
and textile
industry in the
country.

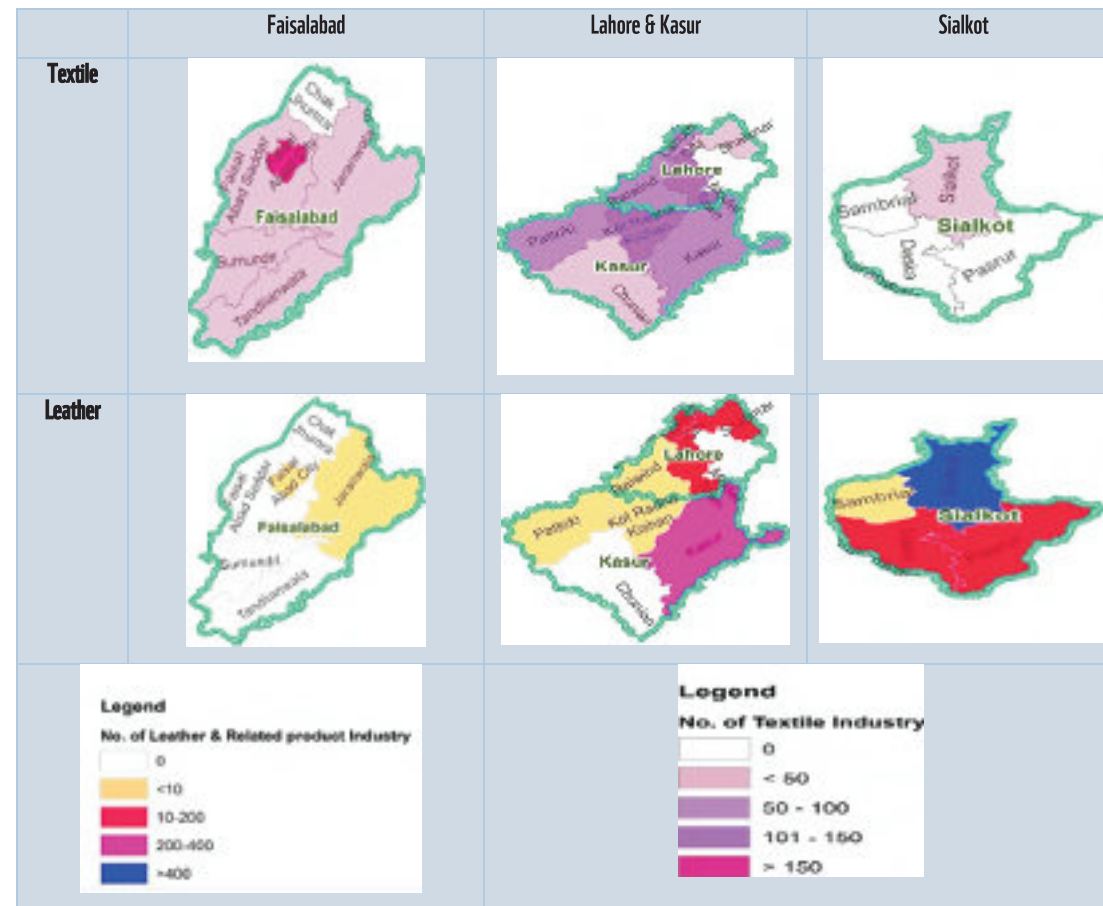
Profile of Textile and Leather Industries of Pakistan - Karachi,
Lahore, Faisalabad, Sialkot



3 Profile of Textile and Leather Industries of Pakistan - Karachi, Lahore, Faisalabad, Sialkot

Karachi hosts at least 10 to 15 per cent of total leather and textile industry in the country.

Faisalabad, Lahore, Sialkot and Kasur are some of the most densely industrialized districts of the country. There are a combined 2,704 industrial units of textile and leather in these four districts². While textile industry is mostly concentrated in Faisalabad and Lahore; Sialkot and Kasur have a majority share in the leather industry. Together these districts provide employment to 425,799 industrial workers. However, for Karachi, the data on industrial units and employment is unavailable, as no census of the manufacturing industry is carried out at the national level and therefore no official statistics are available with the Department of Industries, Sindh. Estimations suggest that Karachi hosts at least 10 to 15 per cent of total leather and textile industry (CMI Sindh 2005-06). Together, these five districts comprise approximately 60 per cent of the total leather and textile industry in the country³.



Source: Pre-Investment Reports, (Directorate of Industries, 2012)
Figure 3-1: Concentration of Leather & Textile Industry

In 2016-17, leather exports from Pakistan amounted to US\$918.243 million.

The textile and leather industries are among the major contributors to the exports in Pakistan; with textile industry alone accounting for almost 62 per cent of total exports (Ministry of Finance, 2017). On the other hand, leather industry accounts for approximately 5 per cent of total exports⁴, making it the third largest export industry after textile and rice sector⁴ (GoP, 2017). In 2016-17, leather exports from Pakistan amounted to US\$918.243 million while the export of textile manufactures was estimated at US\$12.45 billion (Bureau of Statistics, 2017). The details of exported textile and leather products are provided in Table 3-2. Moreover, in addition to the exports, there exists a large local market for textile and leather products which posits them among the major contributors to the country's GDP. Between the period of July and December of 2016 and 2017, the exports of Pakistan's textile and leather grew by 8 and 11 per cent respectively.

Commodities	2016-17	2017-18 (Jul-Dec)	2016-17 (Jul-Dec)	Growth Rate 2016-17/2017-18
Cotton Yarn	1,140,213	600,723	544,464	10%
Cotton Cloth	2,122,525	1,052,389	1,067,236	-1%
Knitwear	2,333,639	1,280,730	1,149,855	11%
Bedwear	2,155,904	1,174,634	1,069,292	10%
Readymade Garments	2,279,250	1,215,888	1,099,039	11%
Other Textile Manufacturing	2,421,974	1,251,200	1,172,432	7%
Total Textile Exports	12,453,506	6,575,564	6,102,317	8%
	2016-17	2017-18 (Jul-Dec)	2016-17 (Jul-Dec)	Growth Rate 2016-17/2017-18
Leather Tanned	378,826	174,868	191,658	-9%
Leather Garments	311,259	184,765	156,871	18%
Leather Gloves	108,082	65,707	47,429	39%
Leather Footwear	75,286	38,409	36,254	6%
Other Leather Manufacturing	67,248	46,129	29,016	59%
Total Leather Exports	940,700	509,878	461,228	11%

Source: State Bank of Pakistan, 2017⁵

Table 3-1: Leather & Textile Exports of Pakistan (Thousand Dollars)

3.1 Environmental and Health Aspects of Leather & Textile Industry

The environmental and health related risks that exist throughout the textile and leather value chain have been well-documented internationally. The following section maps the activities and the associated environmental and health risks across the two industries.

3.1.1 Textile Industry

Textile industry has an elaborated value chain, which starts from cotton production and incorporates different stages including cotton handling, curing, bleaching, dyeing, printing, finishing etc. A number of hazardous chemicals and byproducts are generated during this entire process, which produce specific pollutants, most notable of which include particulate matter, nitrous and sulphur dioxide, VOCs, formaldehyde and toxic waste. Table 3-2 enlists the various hazardous wastes generated during various stages of the value chain.

²Census of Manufacturing Industries 2016.
³Author's Calculation.

⁴Economic Survey of Pakistan 2016-17.

⁵State Bank of Pakistan, 2017 - http://www.sbp.org.pk/ecodata/Export_Receipts_by_Commodity_Arch.xls

Process	Source	Pollutants
Energy production	Emissions from boiler	Particulates, nitrous oxides(NO _x) Sulphur dioxide (SO ₂)
Coating, dyeing and curing	Emissions from high temperature ovens	VOCs (volatile organic compounds)
Cotton handling activities	Emissions from preparation, carding, combing and fabrics manufacturing	Particulates
Sizing	Emission from using sizing compounds (gums, PVA)	Nitrogen oxides, Sulphur oxides, carbon monoxides
Bleaching	Emission from using chlorine compound	Chlorine, Chlorine dioxide
Dyeing	Disperse dyeing using carriers Sulphur dyeing Aniline dyeing	Carriers H ₂ S Aniline vapours
Printing	Emission	Hydrocarbons, ammonia
Finishing	Resin finishing heat setting of synthetic fabrics	Formaldehyde carriers Polymers
Chemical Storage	Emissions from storage tanks for commodity and chemicals	VOCs
Wastewater Treatment	Emission from treatment tanks and vessels	VOCs, toxic emissions

Source: KopalKrishan and Karthik, 2014

Table 3-2: Waste Generated during Textile Manufacturing – Air Pollution

Moreover, a number of chemical compounds are also used during different points within the value chain, and can have severe consequences for human beings as well as the environment at large if necessary precautions are not taken. Some of the key chemical compounds used in textile manufacturing and the associated hazards are listed in Table 3-4.

Hazardous chemicals	Hazard
Stain remover: carry solvents such as CCL ₄	Ozone depletion; capacity ten times more than CFC
Oxalic acid: used for rust stain removal	Toxic to aquatic organisms; increases COD
Printing gums: preservative Pentachlorophenol	Dermatitis, liver and kidney damage, carcinogenic; Banned
Fixing agent: formaldehyde and benzidine	Harmful; internationally banned
Bleaching: chlorine bleaching	Skin diseases (itching); harmful
Dyeing: amino acid liberating groups	Carcinogenic; internationally banned

Source: KopalKrishan and Karthik, 2014

Table 3-3: Hazardous Chemicals and their Impact:

3.1.2 Leather Industry

According to Syed et al. (2010), leather tanneries in Pakistan generate three types of wastes: wastewater, solid waste and air emissions. Among these, wastewater is perhaps the most serious issue due to the amount of water consumed and its discharge into sewerage and local water streams. Table 3-4 provides a brief overview of the types of pollutants produced during various stages of leather processing and manufacturing.

Process	Source	Pollutants
Soaking	Bactericide and Soda Ash Mixture	Dirt laden Saline Liquors
Unhairing and Reliming	Lime and Sodium Sulfate Solution	Hydrogen Sulfide Alkaline Waste Water
Delimiting and Bating	Lactic Acid and Ammonium Chloride Mixture	Ammonia and Alkaline Waste Water
Pickling	Sulfuric Acid	Brine and Acidic Solutions
Chrome Tanning	Tanning Solution of Chromium Sulfate and Sodium Formate	Acidic Waste Waters with Cr ⁺³ and Syntan
Secondary Tanning, Dyeing and Fatliquoring	Solution of Dyes, Calcium Formate, and Titanium Dioxide	Acidic Waste Waters with Cr ⁺³ and Syntan
Printing	Emission	Hydrocarbons, ammonia
Finishing	Surface Coatings	Solvent Vapor

Source: (ILO, 1998)

Table 3-4: Waste Generated during Leather Production – Pollutant

The literature on diseases directly attributable to the waste produced by the tanneries is exhaustive. The diseases include asthma, occupational cancers including cancers of nose, larynx, nasal sinuses lung, and gallbladder. It has also been found to cause hematological disorders such as leukemia and aplastic anemia, neurological impairment due to decreased nerve conduction velocity, dermatological disorders such as occupational vitiligo and dermatitis, and musculoskeletal problems such as carpal tunnel syndrome (Ory, et al., 1997; Tiwari, 2005; Hansen et al., 2006; De Nicola et al., 2007)

3.2 Standards and Compliance Requirements

Textile and leather are some of the most highly contributing export sectors of Pakistan. As the sector constitutes a major share in exports, there are several standards and compliances affiliated with it as well. A study by Ehsan and Khanum (2014) identified the following general categories of standards that must be fulfilled in order to export textile products abroad:

1. Regulatory: Safety, Labeling and Origin, REACH, Global Organic Textile Standards (GOTS) etc.
2. Product Specific: Durability, Performance and Appearance
3. Customer Specific: Physical and Chemical
4. Social: Labour, Facility and Work Environment
5. Codes of Conduct and Standards (AKA private standards i.e. IKEA iway standard 2016)
6. Environment - Global Effluent Requirement (GER) by Levi Strauss & CO.

According to Ehsan and Khanum (2014), the main international compliance and standard certifications that are issued are:

1. ISO 9001/2015: the standard that is used for improving the competitive advantage by enhancing the quality of the product.
2. ISO 14001/2015: the compliance measures for proving environmental responsibility of the producer.
3. OHSAS 18001: 2007 the standard that demonstrates the producer's ability to manage risk (Recently ISO 45000).

Leather tanneries in Pakistan generate three types of wastes: wastewater, solid waste and air emissions.

4. SA 8000: 2014 the compliance measure that sets the producer's reputation through social responsibility.
5. ISO 17799/BS 7799/BS 15000: a standard that is used for enhancing the security of a business.
6. WRAP: a compliance standard that ensures that the producer carries out ethical, humane and lawful manufacturing.
7. Eco-labels: may vary in several ways; depending on the scope of the product and its association with the textile sector. There are two eco-labels used in Pakistan:
 - a. Oeko-Tex 100: an eco-label that focuses on minimum use of dangerous chemicals in textile.
 - b. EU Eco-Label for Textiles: an eco-label that considers if the lifecycle of a textile product has been completed or not.

This section will focus on how violation of health and environmental standards can impact producer, the workers, the customer and the entire value chain of the textile product that is being produced.

Review of the Relevant Literature



4 Review of the Relevant Literature

4.1 Environmental Non-Compliance and Health Costs

Environmental non-compliance in the industrial sector of developing countries like Pakistan pose major challenges including added health costs for the workers of the sector. Khan (2017) took a random sample of 206 textile weaving factory workers and found that significant number of the workers were suffering from respiratory issues such as tuberculosis, chronic coughing, blood in phlegm, asthma, byssinosis, bronchitis and other related respiratory problems. The author also determined that the average worker spent PKR 4,096 per month on doctor visits which constitute 32 per cent of their average income. The study shows direct relationship between textile industry workers and the incurred health costs; as a result of environmental non-compliance, workers in textile industry suffer from a number of diseases.

Furthermore, evidence on the types and frequency of diseases caused by environmental non-compliance, is explored through a paper that probes into the health issues caused by dust pollution in the textile sector. Mehwish and Mustafa (2016) found that 69 per cent of the textile industry workers reported respiratory diseases and symptoms; they also believed that their performance was affected by these diseases. The authors reported that 35.5 per cent of the textile industry workers suffered from wheezing, 65.5 per cent had phlegm, chest tightness was reported by 58 per cent of the textile industry workers, and 72 per cent reported throat irritation. These numbers reflect serious threat to the health of industrial workers of textile sector due to environmental non-compliance. Policy makers and regulatory authorities need to pay immediate attention to this issue.

The health costs incurred by the workers of textile sector can be in the form of doctor visits, hospitalization, medicines and even workable days lost as a result of sickness (opportunity cost). The average income of a textile industrial worker is PKR 12,800 per month and as a result of the environmental non-compliance, considerable amount of income is spent on health costs (Khan, 2017).

The studies conducted by Khan (2017) and Mehwish and Mustafa (2016) provide the following textile industry related estimations:

- 30 per cent of the textile industrial workers spend approximately 4 per cent of their monthly income on health related costs;
- 15 per cent of the textile industrial workers spend about 8 per cent of their monthly income on costs related to health;
- 15 per cent spend nearly 16 per cent of their monthly income on health related costs;
- 2.5 per cent of textile industrial workers spend close to 20 per cent of their monthly income on health costs associated with their diseases caused due to environmental non-compliance in textile sector.

Percentage of Textile Industrial Workers	Minimum Cost	Maximum Cost
30%	PKR. 1	PKR. 500
15%	PKR. 600	PKR. 1000
15%	PKR. 1100	PKR. 2000
2.5%	PKR. 2100	PKR. 2500

Source: (Mehwish and Mustafa, 2016)

Table 4-1: Health Related Monthly Costs as Calculated by Mehwish and Mustafa, 2016

An average worker spent PKR 4,096 per month on doctor visits.

Moreover, the impact of environmental non-compliance cannot just be measured by the diseases inflicted to the textile industrial workers and costs related to it. The number of employment days lost due to the diseases is also a significant aftermath. According to Mehwish and Mustafa (2016), 41 per cent of textile workers lost monetary remunerations due to lost days of employment as a result of illness. As a result, an average opportunity cost of PKR 500 to 1500 per month is incurred, costing 41 per cent of textile industrial workers approximately 12 per cent of their monthly income due to loss of employment days.

4.2 Studies related to Leather Sector

Leather industry is a chemical-intensive industry which requires extensive use of chemicals, dyes and paints that are not only harmful for the environment but also cause health issues to the people who work in the sector. Extensive use of chromium, dyes and paints for tanning and coloring purposes expose the workers to these hazardous chemicals. Direct contact with these chemicals or fumes poses a serious threat to the health of the workers. The SOMO (2016) report which was in collaboration with National Organization for Working Communities (NOW) and Oxfam identified the primary health issues like skin infections, ulcers, peeling and chrome holes that are caused by exposure to chemicals used in the process of leather tanning and dyeing. The leather industry workers generally are at a higher risk of getting perforated nasal septum, nasal cancer, skin rashes, respiratory illnesses, jaundice, lung cancer and allergic reactions.

The SOMO, NOW and Oxfam report (2016) used a survey of 17 leather processing factories and 160 leather tannery workers in Karachi which outlined that 70 to 75 per cent of the leather industry workers were constantly sick and suffered from heart problems. The perception survey side of the report showed that 47 per cent of the leather industry workers believed that their health is damaged by the work they do while 41 per cent of the leather industry workers suffered from respiratory problems. Approximately 15 per cent of the sample also believed that they had hearing issues which was caused by the work they are involved with. In addition to this, 10 per cent reported that they suffered from skin related diseases while 8 per cent of the sample reported issues related to their back.

The same report by SOMO, NOW and Oxfam (2016) also probed the leather industry workers about the important human resource compliances that factory owners are obligated to comply with. Nearly 83 per cent of the sample leather industrial workers reported that they were not provided with any medical benefits or medical facilities while 56 per cent complained that they were not entitled to any sick leaves and if they did take a day off due to sickness, they had to forego their daily wage. In addition to this, approximately 63 per cent of the workers reported that they were not allowed to take any unpaid leave. Although it was not documented by this particular study but it can be inferred that these forced and unpaid leaves can have significant and negative impact on the economic and social well-being of the workers.

Another study on occupational health and safety practices in leather industry conducted by Shams, Butt and Khan (2007) took a sample of 2000 leather industry workers from Sialkot to assess the non-compliance and health issues associated with the work of the leather industry. The study identified that the leather industry of Pakistan has to comply with the following international and national standards:

- ISO 14000
- SA 8000
- OH SAS 18001
- The Factories Act 1934
- Mines Act 1923

63 per cent of the workers are not allowed to take any unpaid leave.

36.25 per cent of the leather industrial workers suffer from skin burns.

The study (Shams, Butt, & Khan, 2007) recognizes that a majority of the leather industry in Sialkot lacks compliance with most of the environmental and health safety standards. Excessive use of chromium during the tanning process of the leather results in workers being constantly exposed to the chemical which leads to a number of general and skin related diseases. The study shows that 36.25 per cent of the leather industrial workers suffer from skin burns and rashes; 41.25 per cent of the workers had skin irritation and 51.25 per cent of the leather industry workers were diagnosed with eczema as a result of working with harmful chemicals. The fumes of the chemicals and poor working environment have caused various respiratory diseases to the leather industry workers. About 24 per cent of the leather industrial workers reported that they are suffering from asthma, 20 per cent have been diagnosed with tuberculosis, 63.75 per cent get the common flu on regular basis, 47.5 per cent have issues of chest congestion and 60 per cent of the leather industrial workers have throat infections. The study also found that in addition to skin and respiratory diseases the exposure to chemicals and fumes also resulted in general problems; 50 per cent of the leather industrial workers had prolonged headaches, 75 per cent suffered from lumbar back pains, 25 per cent had muscular pains, 68.75 per cent had stomach disorders and 8.75 per cent suffered from eye infections.

The study (Shams, Butt, & Khan, 2007) also explores the absence of safety practices at the workplaces in leather industry of Sialkot. The leather industrial workers were asked about the safety regulations that are required according to safety compliance measures. Out of the sample of 2,000 industrial workers, 52 per cent complained that there is improper ventilation at the working spaces; 60 per cent reported that there is improper lighting; 76 per cent mentioned that the toilets are not clean; 48 per cent complained that there is unavailability of potable water; 64 per cent of the workers reported that the instructions to deal with emergency are not displayed; 72 per cent of the sample reported that there is an absence of two emergency exits which is the standard procedure; 60 per cent of the sample complained that there is no fire extinguishing equipment; and 52 per cent of the sample mentioned that the first aid kit is absent. Every one of the workers said that they don't use ear plugs and they are neither checked nor provided with them; 84 per cent reported that they don't use safety goggles, and they are neither monitored nor provided with the goggles; 56 per cent said that they don't use safety gloves and again their supervisors neither check them nor provide them with a pair and 52 per cent of the sample mentioned that they neither wear safety shoes nor they are provided with them.

The studies, and data collected from these studies, reflect that the leather industry in Pakistan lacks compliance with the international standards of environment which results in leather industry workers suffering from various skin and respiratory diseases. This increase in frequency of diseases inflicted upon the leather industry workers leads to increased health costs which include visits to the doctor, hospitalization and cost of medication. As most of the leather industrial units don't comply with the Factories Act 1934, they don't allow for unpaid medical or casual leaves which results in loss of days of employment for the leather industrial workers when they fall prey to the illnesses (article 60 to 75 of the act deals with penalties to the mentioned issues). These can also have a significant macro-economic impact on well-being of the households as economic costs can adversely affect their income. Moreover, other aspects of this non-compliance include loss of trade volumes due to decreased productivity and inability to meet quality and safety standards, which in turn lead to increased rejection rates of orders by the client.

4.3 Environmental Non-Compliance and Trade

The need here is to understand that while economic growth is important yet issues of the environment cannot be trivialized. The idea of sustainable development, in the form of Hartwick Rule (Solow, 1986), argues that there is

24 per cent of the leather industrial workers suffer from asthma.

a need to strike the balance between preserving the environment, nature and economic growth. One of the major contributors to economic growth is trade of competitively advantageous commodities, but it should not come at the cost of environmental degradation.

The Environmental Kuznets Curve (Shafik & Bandyopadhyay, 1992), loose U-shaped relationship between environment and economy, portrays that initially the environmental degradation increases with gains achieved in the income levels but after a point when the critical level of income is achieved a decrease in environmental degradation is observed. The economic growth and increase in income levels here is attributed to increase in industrial activity and growth in trade. The report sanctioned by The World Bank and written by Shafik and Bandyopadhyay (1992) provides an econometric evidence which suggests that trade and related macroeconomic indicators and policy variables have little effect on the environment and the evidence also reflects that it is probable that a country can "grow out of" the issues of environmental degradation. While, they find these otherwise unconventional results, they also mention that this growing out is not automatic in nature and requires specific and targeted investments and policies to reduce degradation.

Developing countries such as Pakistan are a classic case of "race to the bottom" hypothesis. In order to achieve an economic growth through deregulation of laws to achieve economic growth, environmental governance is usually compromised. These countries tend to prefer increased growth rates, thriving industrial sector and increased international trade at the expense of environment, following the Environmental Kuznet's Curve rather too blindly. Although, these effects have not been quantified or specifically explored in terms of Pakistan, but the general trend of developing countries persist (Frankel, 2008).

This strategy adopted by lesser developed countries is based on the "gains from trade" hypothesis which specifies that once a certain level of production is achieved, exports have bolstered, and globalization has reached an optimal level there will be enough technological spillovers, advancements in science and technological innovation to take care of the environment (Frankel, 2008). Again, no specific work or quantification has been done in terms of Pakistan but evident lack of attention to environmental regulations and policies proves this hypothesis in terms of Pakistan. The prevailing extremely high levels of smog in Lahore alone support this hypothesis and lack of policy measures taken to address the issue over last couple of years proves the negligence on environmental reforms.

Developing countries, as a result of globalization and increased trade, have also become pollution havens. The pollution havens hypothesis calls out that the more developed countries of west import goods from lesser developed countries where cost of production is drastically less (Frankel, 2008). Some reasons for low cost of production in lesser developed countries include availability of cheap labour as well as weak environmental and labour standards, which result in significantly lower costs. However, the latter has a direct role in increasing environmental pollution which, in turn, undermines the economic gains that are achieved through increased industrialization. The pollution havens hypothesis defies the theory that environmental standards are kept in consideration while choosing the trade partners and environmental non-compliance on the exporting country's end results in loss of trade.

The environmental degradation is a tragedy of common: the impact of pollution is shared through the air everyone breathes and the water everyone uses (Frankel, 2008). Although, there is no one composite method to measure the environmental losses and impacts it has across boundaries yet there is a need to have stringent policies and laws that curb these issues down. In order to design such policies, it is important to have strong institutions which can identify the problems at an initial level, and on the basis of them formulate policies that can tackle the issue of environment with a head on approach; striking a right balance between the economic growth, trade and environmental protection.

Status of Environmental Compliance
in Pakistan



5 Status of Environmental Compliance in Pakistan

The state of environmental compliance is a topic of major debate in Pakistan. The costs to economy as per the Ministry of Climate Change in Pakistan is calculated to be PKR 365 billion or 6 per cent of GDP⁶. However, it is noteworthy that this cost was calculated by a study commissioned by the World Bank in 2004 and, since then, no effort has been made by the government to update these statistics in light of recent trends and challenges.

While regulatory bodies at both national and provincial levels have been entrusted with the task of reporting on compliance and enforcing environmental and safety standards, a number of non-partisan studies (as mentioned in the review of literature) suggest that their efforts still fall short, primarily due to lack of capacity and resources. It is also pertinent to mention that no consolidated data is collected at the federal level to measure compliance of industrial units with environmental standards. Furthermore, data on environmental indicators such as ambient air quality, water pollution etc. is also not collected on regular basis making it almost impossible to carry out any analysis on environmental degradation at the national level.

The following section, therefore, is focused on the officially reported government data on levels of non-compliance within the province of Punjab while section 5.2 looks at level of non-compliance in view of the third-party studies.

5.1 Environmental Non-Compliance in Punjab

The figure below shows fines imposed by the Environment Protection Department, Punjab during the last five years due to non-compliance with environmental and safety standards. It can be observed that complaints filed against non-compliance have declined during this period.

There can be two possible explanations for this. Firstly, enforcement of environmental non-compliance is expensive; the local departments and institutions either do not have the capacity in terms of human resources or finance availability to pursue it. Punjab's 2016-2017 budget shows the allocation of PKR 0.4 billion to environmental protection which is just over 0.02 per cent of the total expenditure undertaken by government⁷.

Another explanation could be that there might have been an increase in voluntary compliance by the industry due to a more outward looking behavior towards export markets. This voluntary compliance helps reduce the number of complaints filed in the previous years. Furthermore, the decline in complaints filed may also be that after the devolution and PEPA 2012, the tribunal now doesn't have statutory authority to rule over any of the cases. Hence an institutional gap exists which governs the current status of the environmental monitoring and compliance.

⁶Economic Survey of Pakistan 2014-15.
⁷<http://www.finance.punjab.gov.pk/system/files/citizenBudget2016.pdf>.



Source: EPD Punjab, 2017

Figure 5-1: Complaints filed, decided and fine collected for environmental non-compliance, Punjab 2013-2017

Table 5-1 shows the number of units that were fined for environmental non-compliance. During the last five years the total number of units fined are 145 including 87 leather units and 58 textile units. Although the leather sector is smaller as compared to textile, the regulators have fined 33 per cent more leather units as compared to textile sector. Since 2014 the number of industrial units reported for non-compliance in the leather sector have decreased significantly, whereas no discernable trend can be ascribed to the textile sector. However, it is disconcerting to note that only 38 leather and textile units were fined in 2016, suggesting that only 1.4 per cent of these industrial units were non-compliant or, as is more plausible, the department was unable to monitor these industries effectively (as shall be demonstrated in the subsequent section).

Industry/Year	2013	2014	2015	2016	2017	Grand Total
Leather	27	32	11	12	5	87
Textile	6	16	8	26	2	58
Grand Total	33	48	19	38	7	145

Source: EPD, Punjab 2017

Table 5-1: Number of Leather and Textile Units fined by EPD, Punjab

Similarly, in terms of revenue received from fines from these two sectors, 52 per cent of the revenue was received from leather sector whereas 48 per cent was collected from the textile sector. If we look at the average fine imposed per unit in both the sectors, textile has an average fine of PKR 36,897 rupees per unit and leather has PKR 26,027 fine per unit. There is a difference of 40 per cent between the average fines of the two sectors which suggests that although the number of units guilty of non-compliance are greater in number in the leather sector, the degree of non-compliance is higher in the textile sector.

*All amounts are in PKR.

Industry	2013	2014	2015	2016	2017	Grand Total
Leather	735,000	755,000	305,000	370,000	115,000	2280,000
Textile	620,000	600,000	180,000	670,000	70,000	2140,000
Grand Total	1355,000	1355,000	485,000	1040,000	185,000	4,420,000

Source: EPD, Punjab 2017

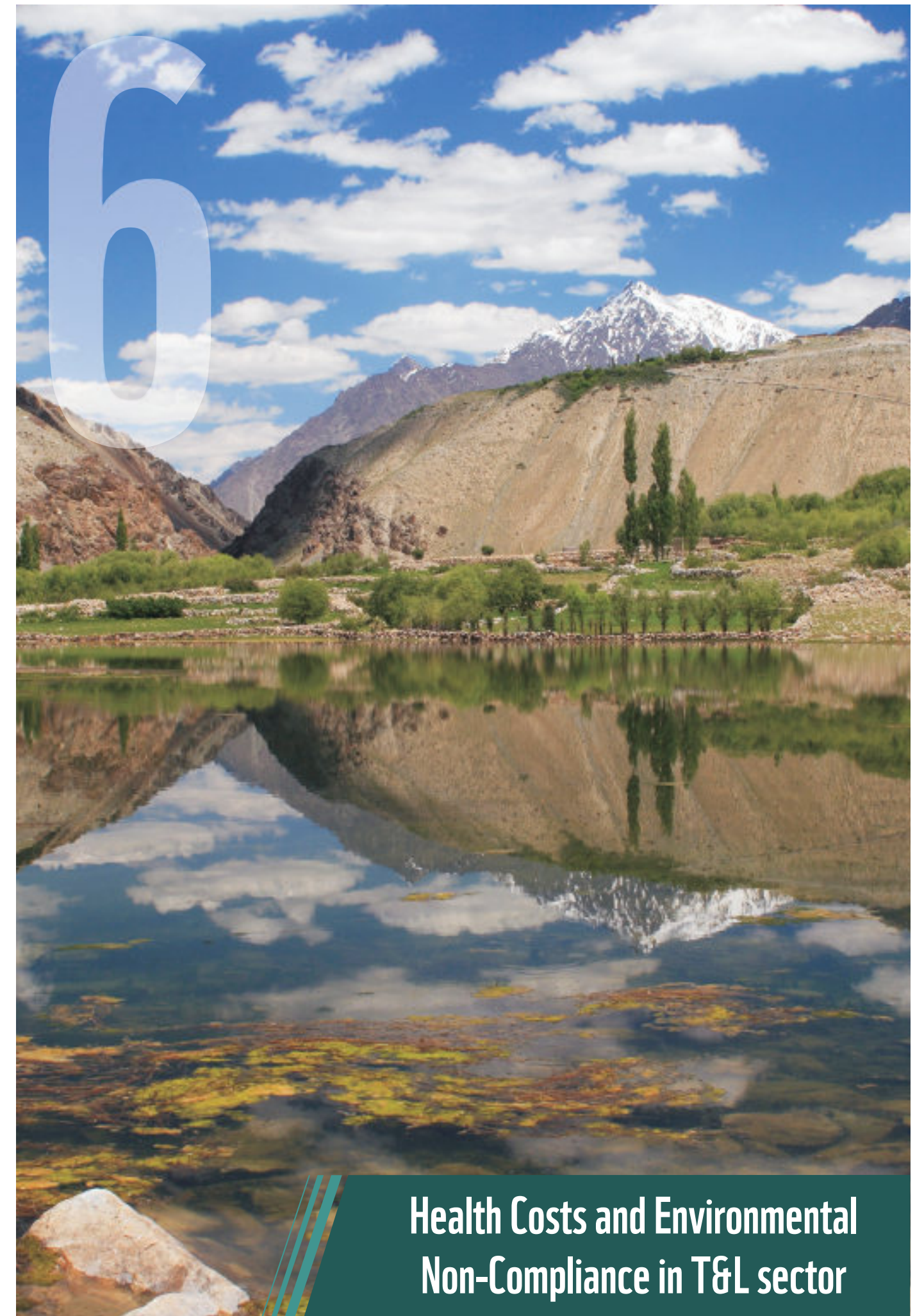
Table 5-2: Fine Collected by the EPD, Punjab

5.2 Estimation of Non-Compliance from Independent Studies

The literature on non-compliance with reference to textile and leather industry is limited. Independent studies have estimated the state of compliance and motivations for compliance in leather and textile industry. An independent study by the World Bank (2014) identifies the state of non-compliance in a sample of 55 units in textile and leather. Only 3.63 per cent of the industrial units in sample were found to be environmentally compliant.

Similarly, a study by Samad, Gulzar, and Ahmed (2015) shows that out of 60 units 87 per cent of the sampled units adopt only two out of nine major environmental management practices (EMPs). Only 12 per cent of the units showed more than 6 EMPs.

Similarly, a study by Wahga, Blundel, and Schafer (2015) shows that the environmental compliance is a voluntary measure which is dependent on the pressure by client and a small number of units dealing in export markets adopt better environmental compliance and management practices as per demands of the client.



Health Costs and Environmental
Non-Compliance in T&L sector

6 Health Costs and Environmental Non-Compliance in T&L sector

6.1 Profile of Health Incidence in Punjab, Pakistan

In Punjab there are 43 high-priority diseases out of which 19 are communicable and 24 are non-communicable (GoPb, 2015)⁸. Data from District Health Information System, Punjab (DHIS, 2015) report suggests that out of the total reported cases in Punjab in 2015, 58 per cent of the cases were of communicable diseases and 42 per cent were of non-communicable diseases. These diseases have high incidence due to the ease of transferability, lack of proper sanitation and hygiene practices, knowledge and awareness among people. Acute Respiratory Infection (ARI) is one of the major diseases in Punjab comprising 13.59 per cent of the total cases reported in 2015. The following table shows the top ten diseases in the total reported cases along with incidence of disease for the districts in study. We could see from Table 6-1 that the incidence of ARI is alarmingly high in these cities. This can be attributed to the local industry presence and unchecked environmental degradation which puts the population at a high risk.

Disease	Reported Cases 2015		Incidence of disease per 1000 personnel			
	Total	%age	Lahore	Faisalabad	Sialkot	Kasur
ARI	15,365,353	13.59	90	251	214	169
Fever due to other causes	4,219,952	3.73	23	64	38	58
Scabies	2,754,452	2.44	15	33	33	39
Peptic Ulcer Diseases	2,737,535	2.42	19	33	23	24
Diarrhoea/Dysentery in <5 yrs	2,428,264	2.15	22	29	18	49

Source: GoP 2015

Table 6-1: Top five diseases in Punjab with Incidence of disease in selected districts

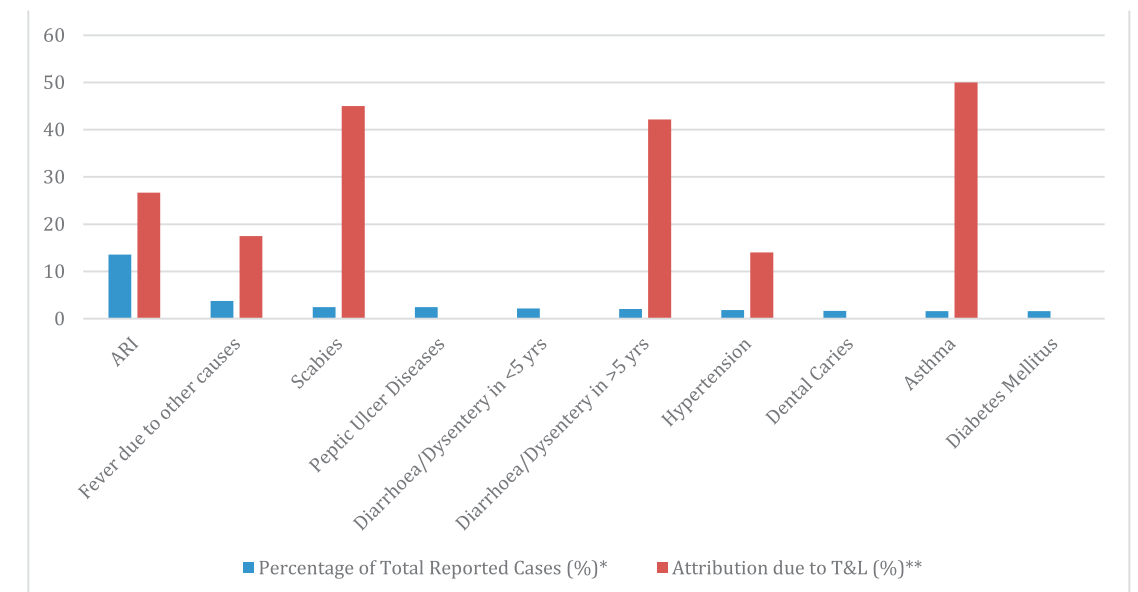
Table 6-1 shows a list of top ten diseases in Punjab and the attribution of leather and textile industries in their propagation. This attribution is based on the survey in BHUs near the leather and textile industry in Kasur, Faisalabad and Sialkot.

⁸District health information system (2015) - <http://dghs.punjab.gov.pk/system/files/DHIS%20Annual%20Report%202015.pdf>

Disease	Total Reported Cases*	Percentage of Total Reported Cases (%)*	Attribution due to T&L (%)**
ARI	15,365,353	13.59	26.67
Fever due to other causes	4,219,952	3.73	17.5
Scabies	2,754,452	2.44	45
Peptic Ulcer Diseases	2,737,535	2.42	-
Diarrhoea/Dysentery in <5 yrs	2,428,264	2.15	-
Diarrhoea/Dysentery in >5 yrs	2,315,660	2.05	42.17
Hypertension	2,076,239	1.84	14
Dental Caries	1,885,073	1.67	-
Asthma	1,824,421	1.61	50
Diabetes Mellitus	1,771,800	1.57	-

Source: *GoP 2015, **Author's estimation.

Table 6-2: Top ten diseases in Punjab and their attribution to textile and leather sector



This attribution shows that the industry's presence is one of the major causes of the aforementioned diseases in these cities; industry has an increasing societal cost. This cost is the opportunity cost in terms of monetary losses and disability caused by illness. The monetary losses include all the averting and mitigating expenses including health expenses that are borne by an individual. The opportunity cost also includes the time lost due to illness. The disability caused by the disease is the amount of work days lost due to illness.

Section 6.2 and 6.3 details the treatment costs and estimated monetary value of disability adjusted life years (DALY) in Pakistan and the cities under discussion.

6.2 Treatment Costs due to Textile and Leather Industry in Pakistan

The table shows the estimated impact of textile and leather industry on treatment costs in Pakistan. As mentioned earlier, the cities chosen for this study represent almost 20 per cent of the Pakistan's population and account for approximately 60 per cent of the total industry. The same percentage shares are used to estimate the health costs attributable to the textile and leather sector as well as extrapolate for the numbers for Pakistan.

The estimated impact of textile and leather industry on treatment costs is

between PKR 1.55 to 2.22 billion in nominal terms for the year 2016. This cost is estimated on the prevalence of the most common diseases that are attributable to the textile and leather sector for the year 2016. (Refer to Technical Appendix at the end of report to read methodology)

	Treatment Cost - Low	Treatment Cost - High
Pakistan	PKR 1.55 B	PKR 2.22 B
Karachi	PKR 0.33 B	PKR 0.48 B
Lahore	PKR 0.23 B	PKR 0.33 B
Faisalabad	PKR 0.16 B	PKR 0.23 B
Sialkot	PKR 0.08 B	PKR 0.12 B
Kasur	PKR 0.07 B	PKR 0.1 B

Source: Authors Calculation

Table 6-3: Treatment cost of diseases to economy as a result of exposure to textile and leather Sector

Out of the total estimated cost Karachi bears the most cost in terms of health externality that is approximately 23 per cent. Lahore is second in terms of the health costs with 16 per cent followed by Faisalabad, Sialkot and Kasur with 11 per cent, 6 per cent and 5 per cent respectively.

This cost is alarmingly high and the current environmental non-compliance and its impact on the health and environment do not account for these. The public health expenditure in Pakistan was PKR 134 billion in 2015-2016 (GoP, 2017) and this cost approximately amounts to 1.16-1.66 per cent of the public health expenditure.

Similarly, Table 6-4 shows the possible treatment costs associated to the incidence of disease due to exposure to textile and leather sector. This cost tells us the potential of the impact that textile and leather sector could have on the economy. The table shows that there is an increase of 15 times if the population at risk is fully exposed to the textile and leather sector.

	Expected Health Cost - Low	Expected Health Cost - High
Pakistan	PKR 33.28 B	PKR 43.3 B
Karachi	PKR 5.45 B	PKR 7.2 B
Lahore	PKR 3.78 B	PKR 4.99 B
Faisalabad	PKR 2.68 B	PKR 3.53 B
Sialkot	PKR 1.32 B	PKR 1.75 B
Kasur	PKR 1.17 B	PKR 1.55 B

Source: Authors Calculation, methodology provided in the technical appendix.

Table 6-4: Expected Health Costs of diseases to economy as a result of exposure risk due to textile and leather sector

The impact of textile and leather industry on treatment costs is between PKR 1.55 to 2.22 billion.

It is important to note that the out of pocket expenditure is a major source of funding individuals' health cost. The Table 6-5 shows that the average cost of treatment for diseases is attributable to textile and leather sectors in Pakistan. These costs are reflective of the out of pocket expenditure that patients bear for averting and mitigating these diseases. These diseases have a high impact on the population through direct and indirect means when they come in contact with the population. In cities with large industrial bases these have a direct impact on the population due to their waste discharges in the local vicinity.

Diseases	Attribution of Diseases to T&L (%)	Average Cost - Low	Average Cost - High	Treatment Costs - Low	Treatment Costs - High	Rank
Total Treatment Costs				PKR 1.55 B	PKR 2.22 B	
Dermatitis	50	392	625	PKR 595 M	PKR 949 M	1
Asthma	50	208	283	PKR 316 M	PKR 429 M	2
Acute Respiratory Disease	27	400	500	PKR 201 M	PKR 251 M	3
Gastroenteritis	70	200	250	PKR 138 M	PKR 173 M	4
Diarrhea	42	275	392	PKR 115 M	PKR 163 M	5
Scabies	45	150	240	PKR 92 M	PKR 146 M	6
Worm Infection	45	125	125	PKR 45 M	PKR 45 M	7
Chronic Cough	22	2190	3030	PKR 33 M	PKR 46 M	8
Typhoid	18	3000	4000	PKR 7 M	PKR 9 M	9
Bronchitis	40	200	243	PKR 6 M	PKR 7 M	10
Hypertension	14	122	176	PKR 2 M	PKR 2 M	11

Source: Authors Calculation, methodology described in the technical appendix.

Table 6-5: Treatment Costs of diseases as a result of exposure to textile and leather sector

6.3 Economic Value of Disability Adjusted Life Years Due to Textile and Leather in Pakistan

This section calculates the economic value of disability adjusted life years (DALY) due to textile and leather industry. Disability adjusted life years are expressed as a number of years lost due to ill health, disability or early death. It is a measure of burden of disease. The economic value of DALY is the amount in dollar terms that is lost as a result of ill health, disability or early death due to a certain disease(s).

Table 6-6 shows the DALY lost due to diseases attributable to textile and leather sector; Pakistan as a whole loses approximately 2.3 million years due to diseases directly attributed to the sectors. The total economic value of this is estimated to be US dollars 3.5 billion, equivalent to 1.16 per cent of the GDP or 26 per cent of our exports of leather and textile. These numbers suggest that the value of our exports is over-estimated as they fail to take into account the detrimental effect our leather and textile industry on the public health.

Table 6-6 shows the economic cost of noncompliance as measured as the number of productive years lost to economy as a percentage of GDP.

	DALY lost due to T&L	Economic Value of DALYs lost due to T&L	% of GDP of Pakistan	% of T&L Exports
Pakistan	2,297,497	\$ 3,517 M	1.16%	26%
Karachi	517777	\$ 793 M		
Lahore	363117	\$ 556 M		
Faisalabad	255527	\$ 391 M		
Sialkot	127763	\$ 196 M		
Kasur	114314	\$ 175 M		

Source: Authors' Calculation, methodology described in the technical appendix.

Table 6-6: Economic Value of disability adjusted life years (DALY) due to textile and leather sector

The table demonstrates that the contribution of the textile and leather sectors in our GDP comes at the cost of almost 2.3 million DALYS which is a significant social as well as economic cost. Table provides estimation for economic burden of specific diseases directly attributable to textile and leather sectors.

Disease	DALY Pakistan	DALY Pakistan Due to T&L	DALY Pakistan - Monetary Value	Rank
Pakistan	11,737,584	2,297,497	\$ 3,517 M	
Gastroenteritis	3,639,404	870,424	\$ 1333 M	1
Diarreha	3,639,404	524,327	\$ 803 M	2
Bronchitis	2,999,867	409,982	\$ 628 M	3
Chronic Cough	2,999,867	225,490	\$ 345 M	4
Asthma	723,420	123,584	\$ 189 M	5
Dermatitis	347,010	59,281	\$ 91 M	6
Typhoid	566,099	33,848	\$ 52 M	7
Hypertension	435,832	20,847	\$ 32 M	8
Scabies	103,011	15,838	\$ 24 M	9
Acute Respiratory Disease	142,149	12,951	\$ 20 M	10
Worm Infection	6,014	925	\$ 1 M	11

Source: Authors' Calculation, methodology stated in the technical appendix.

Table 6-7: Economic Value of disability adjusted life years (DALY) due to textile and leather sector by diseases

6.4 Linking Environmental Compliance and Health Costs

If we look at the fines collected due to non-compliance of textile and leather industries in 2016 it could be seen that the fine calculated by the provincial authorities is far less than the impact on the population.

While it is understandable that health costs and indirect losses do not fall under the purview of EPA, these are a direct result of ineffective monitoring and implementation of environmental standards by the government and therefore need to be seen in terms of the fines collected by the government. In Punjab the fines collected for non-compliance amount to just 0.21 per cent of the health costs attributable to the textile and leather industry in Punjab as per the estimations of this study. The total fine amount collected in the last five years by Punjab from all industries is just 1.43 per cent of the health costs due to textile and leather industry. This is an alarming figure which raises question marks on the effectiveness of the provincial monitoring system for environmental compliance.

In Punjab, the fines collected for non-compliance amount to just 0.21 per cent of the health costs.



Environmental Compliance, GSP+ and Pakistan's Textile and Leather Trade

7 Environmental Compliance, GSP+ and Pakistan's Textile and Leather Trade

Since the inception of GSP+, 51.5 per cent export were increased in Pakistan's textile and leather sector.

Generalized System of Preferences (GSP) is a market access programme for vulnerable developing countries to have few duties or in other cases duty-free access to European Union's markets. The programme seeks to use trade as an instrument for poverty reduction, sustainable development and good governance.

Pakistan was granted duty-free access to the EU under GSP+ scheme in 2013. The status is conditional to ratification and adoption of 27 core international conventions related to human rights, environment, labour rights, drug control and corruption. As per the first report on GSP+ compliance, Pakistan has adopted all seven conventions pertaining to environment and is reporting on compliance of the same as well.

Since the inception of GSP Pakistan's textile and leather exports have risen over time. Table 7-1 shows that the exports increased 51.5 per cent between 2013 and 2016. In particular, the exports to EU have increased by 37 per cent, with leather and textile sectors registering an increase of 6.68 per cent and 55 per cent respectively (Ministry of Finance, 2017).

	2013	2014	2015	2016
Overall Exports (billion euros)	4.54	5.52	6.07	6.28
Home textiles	980.3	1,270.86	1456.29	1563.05
Textile Garments & Hosiery	1,398.55	1,830.50	2,281.55	2,457.3
Cotton & Intermediary Goods of Textile	738.78	765.06	792.37	804.73
Carpets & Rugs	30.3	31.57	37.16	37.92
Leather	418.54	460.02	470.86	446.49

Source: Ministry of Finance 2017

Table 7-1: Pakistan's Textile and Clothing Exports to European Union (million euros)

The published literature, post GSP time period, which assesses the impact of GSP on economy in general and industry in specific is extremely limited. Much of the literature comprises post individual opinion pieces and reports and only one monitoring report has been published by the EU thus far, with the second report due in 2018. It is, therefore, difficult to assess the impact of non-compliance on trade to the EU. Nevertheless, the export data and the initial report suggest that Pakistan has so far complied with the requirements of the European Union and, as a result, has witnessed a significant increase in its exports to the region.

Conclusion and Recommendations



8 Conclusion and Recommendations

8.1 Conclusion

The research leads us to a number of significant conclusions, all of which may have a direct bearing on the overall well-being of our people and the economy. First, the research reaffirms that there is an absolute lack of monitoring and enforcement of environmental compliance by the federal and provincial governments. No reliable and representative data is collected at the federal or even at the provincial levels to provide a baseline for our current state of compliance. This lack of data shall continue to prove a major hurdle in not only research on the subject, but also in sensitizing the general population, industry stakeholders and the policy-makers towards the staggering economic and health costs of non-compliance of the industry.

Leather and textile are two of the major industries in Pakistan and employ almost 50 per cent of the total industrial labour force in the country. However, numerous studies by third-parties have reaffirmed that the level of compliance, at least with local requirements, remains poor. This puts not only the workers at risk of health hazards but also the population living in these areas. The study reveals that these two sectors alone, contribute an additional burden of US\$15 million annually in terms of direct treatment costs for some of the major diseases caused by exposure to leather and textile waste and pollutants.

While this number for direct treatment cost is considerable in its own right, it dwarves in comparison to the economic cost of the years of healthy life lost due to these diseases directly attributed to the leather and textile industries. Our estimations reveal that non-compliance of these two sectors alone results in a loss of almost 2.3 million Disability Adjusted Life Years (DALY). This infers a significant social and psychological cost as well, but due to limitations of time and resources, these were not estimated. However, this study does estimate the economic burden of non-compliance due to the loss of DALYs which amounts to a staggering \$3.5 billion, equivalent to 1.16 per cent of Pakistan's GDP or 26 per cent of the total textile and leather exports. In terms of health spending, the amount is more than double of the total public spending on health in the country.

The results are of immense significance for taking a macro-view of the socio-economic impact of industries. While Pakistan has ratified and adopted international conventions pertaining to environment, which has consequently led to the award of preferential trade terms in GSP+, a lack of implementation and enforcement exact a heavy social and economic cost for the increase in trade. Therefore, even though Pakistan's textile and leather exports have shown an increase during the last four years, especially to the European Union, if the economic burden and treatment costs are included in the analysis, the contribution of these sectors in the economy would decrease significantly. At the moment, the analysis at both federal and provincial level excludes these costs, primarily due to non-availability of data. However, there is a pressing need to document and address these issues if sustainable development is to be achieved.

Textile and leather sector contribute an additional burden of US\$15 million annually in terms of direct treatment of some major diseases.

8.2 Recommendations

In view of the review of literature and the estimations obtained from this study, the following recommendations need urgent attention of all stakeholders:

- There is a dire need for further research on the subject of environmental non-compliance in the industrial sector. While this study can serve as a starting point in this regard, a lack of extensive and exhaustive data makes further research on the subject absolutely essential.
- The federal government as well as the provincial governments need to drastically improve their monitoring and enforcement mechanisms through improved resource allocation. This means publication of compliance and monitoring data on a regular basis, improved collection of data pertaining to environmental indicators across the country, investment in capacity building of the relevant departments and provision of sufficient and necessary resources for the performance of these functions.
- Any analysis of the performance of any industry or sector needs to incorporate the health and environmental costs that are incurred in order to provide an objective assessment of the true contribution of the sector in the socio-economic progress of the country.
- The leather and textile sectors, while perhaps ensuring export-related compliance requirements, have still a long way to go before they can ensure safe working environment for their workers and reduce the risk for environmental hazards for the general population. In view of the high costs associated with these risks, the private sector needs to take a proactive and responsible role in ensuring self-compliance.
- In the absence of strong self-compliance and lack of enforcement, a heavy toll is paid by the people in terms of health and economic costs. The government, therefore, needs to invest in effluent collection, drainage and treatment of waste. Moreover, the government must also work towards increased awareness of environmental hazards a compliance requirements among the workers and general public, so as to create an indigenous demand for environmental and health standard compliance.
- While the international organizations such as the EU and ILO monitor larger compliance requirements, there must be a concerted effort to ensure industrial compliance of local health and environmental standards and put pressure on the government to take a more proactive approach in this regard.
- Occupational Health and Safety Standards should be in place and regular monitoring of these standards should be done in order to assess the damages to the workers and the environment.
- The government must take steps for promotion of cleaner production in textile and leather sector through provision of incentives such as tax rebates and smart loans, so as to encourage the industry to adopt green technologies.
- Government must also invest in research and development of cost-effective indigenous solutions for cleaner production and green chemistry so that inherently environmentally sound processes are deployed.
- While the State Bank of Pakistan has already launched financial schemes for SMEs to improve their environmental compliance, the federal and provincial governments need to launch similar initiatives for the small and medium manufacturers.
- There should be a separate environment cell in the Ministry of Finance that has a focal person from the Ministry of Climate Change.

OHS Standards should be in place and regular monitoring of these standards should be done.

References

- De Nicola, E., Meriç, S., Della Rocca, C., & al., e. (2007). Wastewater Toxicity of Tannin- Versus Chromium-Based Leather Tanneries in Marrakesh, Morocco. Archives of Environmental Contamination and Toxicology, 321-328.
- Directorate of Industries. (2012, November 21). Pre-Investment Studies. Retrieved from http://www.doi.punjab.gov.pk/pre_investment_studies
- Ehsan, S., & Khanum, A. (2014). Compliance with Global Quality Requirements in Pakistan's Export Sector. The Lahore Journal of Economics, 247-266.
- Frankel, J. (2008). Environmental Effects of International Trade. Stockholm: ORDER TheGlobalisation Council.
- GoP. (2015). DHIS Annual Report 2015. Lahore: Directorate General Health Services, Government of the Punjab .
- GoP. (2017). Economic Survey of Pakistan 2016-17. Islamabad: Ministry of Finance, Government of Pakistan.
- Hansen, M., Menne, T., & Johansen, J. (2006). Cr(III) and Cr(VI) in leather and elicitation of eczema. Contact Dermatitis, 278-282.
- ILO. (1998). Encyclopaedia of Occupational Health and Safety. Geneva: International Labor Organisation.
- Khan, M. (2017). The Health Burden of Dust Pollution in the Textile Industry of Faisalabad, Pakistan. Kathmandu: Sandee.
- Malik, O. A., Hsu, A., Jhonson, L. A., & Sherbinin, A. d. (2016). Environmental Performance Index . New Haven, CT: Yale Center for Environmental Law and Policy.
- Mehwish, N., & Mustafa, U. (2016). Impact of Dust Pollution on Worker's Health in Textile Industry: A Case Study of Faisalabad, Pakistan. Islamabad: Pakistan Institute of Development Economics, Pakistan.
- Ministry of Finance. (2017). Economic Survey of Pakistan, 2016-17. Islamabad: Government of Pakistan.
- Ory, F., Rahman, F., Katagade, V., Shukla, A., & Burdorf, A. (1997). Respiratory disorders, skin complaints, and low-back trouble among tannery workers in Kanpur India. Am IndHygAssoc J. , 740-746.
- Samad, G., Gulzar, W., & Ahmed, V. (2015). Environmental Regulations and Compliance in Textile Processing Sector in Pakistan: Empirical Evidence. Sandee Working Paper No 98-15.
- Shafik, N., & Bandyopadhyay, S. (1992). Economic growth and environmental quality : time series and cross-country evidence. Washington DC: The World Bank.
- Shams, S., Butt, N., & Khan, N. (2007). A Study of Occupational Health and Safety Practices and its Health Impacts on Workers in Some leather Industries of Sialkot. Karachi : The Institutions of Engineers.
- Solow, R. (1986). On the Intergenerational Allocation of Natural Resources. The Scandinavian Journal of Economics, 141-149.
- SOMO. (2016). Hell-bent for leather: Labour conditions in the leather industry in Pakistan. Amsterdam : Centre for Research on Multinational.
- Syed, M., Saleem, T., Rehman, S.-u., Iqbal, M. A., Javed, F., Khan, B., & Sadiq, K. (2010). Effects of Leather Industry on Health and Recommendations for Improving the Situation in Pakistan. Archives of Environmental & Occupational Health, 65(3), 163-172.
- Tiwari, R. (2005). Child labour in footwear industry: possible occupational health hazards. Indian Journal of Occupational Environment, 7-9.
- Wahga, A., Blundel, R., & Schafer, A. (2015). Human Capital and Environmental Engagement of SMEs in Pakistan: A Comparative Analysis of the Leather Industry. ISBE Annual Conference 2015. Glasgow: Open University, UK.

Appendix

Technical Appendix

Following is the methodology for estimation of treatment costs and economic burden of DALYs lost as a result of direct attribution to the environmental non-compliance of the leather and textile industry:

Estimating Treatment Costs:

Definition: The treatment costs are the direct average costs borne by the patients for treatment of diseases caused due to leather and textile industry.

Two types of treatment costs were estimated, one based on the prevalence of disease, reflecting the actual treatment cost and the other based on the incidence of disease, which reflect the potential cost in terms of risk associated with these diseases.

Data Sources: Data on average treatment costs of diseases and attribution of diseases to textile and leather industry was collected through a primary survey from basic health centers in industrial clusters of textile and leather industry in the sample cities.

Data on prevalence and incidence of Diseases was collected from Global Health Database published by Institute of Health Metrics and Evaluation for the year 2016.

Methodology: The health costs were calculated in two stages. During the first stage, a primary survey of Basic Health Units was conducted in the vicinity of the industries located in the target cities. This survey used the expert medical professional's input to estimate the cost of disease and its attribution to the textile and leather sector.

The cost of these diseases to the economy was calculated by multiplying the average cost, obtained from the primary survey, with two indicators, namely the percentage share of the sample cities in total prevalence of these diseases in Pakistan and the attribution of the diseases to T&L sectors. The obtained values reflected the treatment costs for these 5 cities, which represent approximately 60 per cent of the total T&L sector. Therefore, in order to estimate the costs of environmental non-compliance of the entire T&L sector, the obtained results were extrapolated to represent the entire industry.

The same methodology was replicated for estimation of the potential treatment cost based on the incidence of disease data.

Estimating Economic Burden of Disability Adjusted Life Years (DALY) due to T&L Sector

Definition: The disability adjusted life year (DALY) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death.

Data Sources: Data on disease-based DALY is collected by Global Health Database published by Institute of Health Metrics and Evaluation 2016. Data on per capita income/GDP was obtained from the official estimates provided by the Bureau of Statistics.

Methodology: The DALYs are used widely in literature to understand the overall burden due to diseases as a number of years lost due to ill health, disability or early death due to exposure to specific diseases. Since DALYs are calculated in number of years lost, different studies have used various approaches to quantify these losses as a loss to economy. One of these approaches, which was adopted in this study, is to calculate macro-economic impact of DALYS by using GDP per capita as a measure to value a productive life year.

The economic burden of DALYs was calculated by multiplying the DALY

with the GDP per capita of Pakistan. These were further multiplied with the population share of the sample cities and the attribution rate due to textile and leather industry. The obtained values reflected the economic burden of these 5 cities, which represent approximately 60 per cent of the total T&L sector. Therefore, in order to estimate the economic burden of environmental non-compliance of the entire T&L sector, the obtained results were extrapolated to represent the costs attributed to the entire industry.

Objective	Issue (weightage)	Indicator (weightage)	Definition	EPI 2016 Scores
Environmental Health (50%)				52.73
	Health Impacts (33%)	Environmental Risk Exposure (100%)	Risk of water and air pollution to human health	57.3
				34.57
	Air Quality (33%)	Household Air Quality (30%)	Percentage of the population using solid fuels as primary cooking fuel and Health Risk from PM2.5 exposure	64.83
		Air Pollution - Average Exposure to PM2.5 (30%)	Population-weighted exposure to PM2.5 (three-year average) and Health Risk from PM2.5 exposure	14.2
		Air Pollution - PM2.5 Exceedance (30%)	Proportion of the population whose exposure is above WHO thresholds (10, 15, 25, 35 micrograms/m3)	10.19
		Air Pollution - Average Exposure to NO2 (10%)	Population weighted exposure to NO2 (three-year average)	78.96
				66.34
	Water and Sanitation (33%)	Unsafe Sanitation (50%)	Exposure to unsafe sanitation and population lacking access to sanitation	67.75
	Drinking Water Quality (50%)	Exposure to unsafe water quality and population lacking access to drinking water.	52.88	

Table A1 – Environmental Performance Index 2016 – Pakistan

Sr. No	Sub-Sector for Textile	No. of Units			
		Faisalabad	Sialkot	Lahore	Kasur
1	Ginning	26			
2	Spinning	63		29	103
3	Weaving or Knitting	35		30	71
4	Woollen textile Spinning and Weaving	1		20	
5	Textile Processing	234		119	13
7	Doubling of Yarn	9		16	
8	Embroidery	47			
9	Hosiery	241		19	
10	Jute Textile	1			1
11	Knitted Textile	34		42	10
12	Ready Made Garments	77	67	210	
13	Raising Cloth	7			
14	Sizing of Yarn	104			
15	Textile Composite	9			8
16	Textile Made-ups	26		11	1
17	Velvet Cloth	1			
18	Polyester Yarn				2
	TOTAL	915	67	496	209

Source: Pre-Investment Reports, Directorates of Industries 2012

Table A2 - Overview of Number of Units in Textile and Leather Industry in Punjab
Source: Pre-Investment Reports, Directorates of Industries 2012