


Karachi's Industrial Estates

An Environmental Assessment by Shehri - Citizens for a Better Environment

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CITIZENS FOR A BETTER ENVIRONMENT

In collaboration with

Friedrich Naumann STIFTUNG FÜR DIE FREIHEIT

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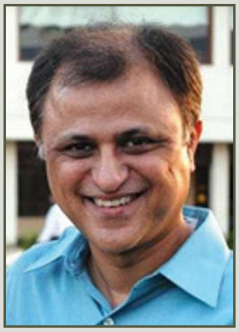
About the Author



Farhan Anwar did his Bachelor in Civil Engineering and Master in Urban and Regional Planning. His portfolio includes urban sustainability planning, smart cities, public policy, climate adaptation, urban resilience, institutional strengthening and change management. He has extended consulting services to the World Bank, Asian Development Bank (ADB), the Japanese International Corporation Agency (JICA), the World Conservation Union (IUCN), WWF Pakistan and several prominent Pakistani consulting firms. Anwar is a Member, Provincial National Climate Change Policy Implementation Committee, Government of Sindh. Anwar is also a Member, IUCN Commission on Environmental, Economic and Social Policy (CEESP) and the Standing Committee on Environment – Federation of Pakistan Chambers of Commerce and Industry (FPCCI). He presently serves as a Visiting Faculty at the Indus Valley School of Arts & Architecture, Karachi, where he teaches Bachelors Course in Architecture on Urban Theories and Urban Open Space Design. He is also a Visiting Faculty, at the Department of Architecture & Planning, NED University of Engineering & Technology, Karachi - teaching Human Development in the Bachelors Course on Development Studies. Anwar is the Lead Author of the Sanitation Strategy, Government of Sindh and the Author of Pakistan's National Strategy and Action Plan for the Mangroves of the Future Regional Program. He has a number of publications to his credit and contributes a weekly column – Elasti-cities focused on urban planning, environment, and development issues of Karachi City in the Express Tribune Newspaper.

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INTRODUCTION

Karachi is faced with a number of development challenges. The city is expanding both vertically and horizontally without any viable planning framework or regulatory mechanisms channeling its growth. Land use is being violated, civic services are crumbling and the many responsible institutions for local and urban governance are facing institutional bankruptcy and failing to deliver on their mandates. A very significant outcome of this urban decay is the rising levels of urban pollution and the resultant environmental degradation.

Pollution is generated from a number of urban activities, including industrial. Karachi has a large industrial base with a number of Industrial Estates spread across the city. These Estates were originally placed on the urban periphery of Karachi but as the city spread over the years these Industrial Estates are now surrounded by human settlements - both residential and commercial in nature.

As is the case with other urban activities in Karachi, the industrial sector is poorly regulated when it comes to monitoring and checking the industrial liquid and solid wastes and air emissions. While some research has been conducted on the scale of untreated liquid industrial discharge on the coastal ecology and urban vegetation, there is very limited data or research available on the adverse impact on the people and land in the surroundings of these Industrial Estates.

Through this research study, Shehri-Citizens has tried to document the views of the people living in close proximity to the largest Industrial Estates in Karachi, the Sindh Industrial Trading Estate (SITE) and Korangi Industrial Trading Estate (KITE). A number of related aspects have been documented such as impacts on health - psychological and physical health, the multiple causes of pollution such as liquid, solid wastes, air and noise pollution etc. The types of pollution have also been related with the type of industrial activities such as air emissions from stacks, vehicular pollution, liquid discharge and solid waste dumping. Also documented have been issues such land encroachments and industrial accidents and the response of government and industry to citizen complaints.

It is hoped that this study would contribute in efforts to bring into the regulatory net the environmental aspects of industrial activities. The issue has now gained even greater importance and urgency in the wake of the realization of how drastically the global climate is being impacted in terms of climate change brought about by concentration of green house gases in the atmosphere.

Amber Alibhai
General Secretary
Shehri-CBE

November, 2015

KARACHI'S INDUSTRIAL ESTATES: AN ENVIRONMENTAL ASSESSMENT

A. Context

Industrialization is important for accelerating economic growth. However, unregulated practices and unchecked industrial processes have a damaging impact on the surrounding settlements and overall environment in general, that can easily not only negate the monetary gains but also cause irredeemable damage to the environment and health of citizens.

Karachi, the largest metropolis of Pakistan, has a population of over 20 million with a significant industrial and financial base. It is a city that generates 65% of the total national revenue and promises economic prosperity and growth for millions in the country. However, the city is also beset with high levels of environmental degradation that are rooted in a crisis of urban governance. Within this context, the weakly regulated industrial estates in Karachi, operating with minimal environmental safeguards are considered as major sources of environmental pollution in the city - both land based and also via discharges of their mostly untreated liquid wastes into precious coastal ecosystems.

There are currently over 6000 big and small registered industrial units operating in Karachi. These industrial units are located in Sindh Industrial Trading Estate (SITE), Landhi, Korangi, Malir and the Port Qasim Authority area (PQA). There are more than 65 categories of industrial plants in the established industrial estates including, textile industries, tanneries , pharmaceuticals, plastic and rubber industries, steel foundries, metallurgical industries, electroplating and metal coating industries, glass, ceramics and tiles industries, cement industry, soap and detergents, fish processing industries, chemical industries, power plants, fertilizers and pesticides, edible oils, automobile cable and conductor manufacturing etc.[1]

This study aims to undertake a systemic study to evaluate the impact of two major industrial estates in Karachi, namely, Sindh Industrial Trading Estate (SITE) and Korangi Industrial Trading Estate (KITE), as perceived and experienced by area residents and industrial employees. While significant research has been conducted on the technical aspects and pollution data of the industrial estates, there is minimal documentation of how those people who are most probably the worst effected in terms of their physical exposure, are being impacted in terms of the social, environmental and economic implications. Industrial emissions are also a major cause of carbon and greenhouse gas emissions that as a consequence are bringing about climate change - now considered as the foremost challenge facing mankind. The aspect of climate change will also be considered and accommodated in the project research work.

B. Profiling the Industrial Estates in Karachi - Focus on SITE and KITE

This section focusses on the industrial sector in Karachi, covering various aspects such as the historical growth of the sector, the system of administration and management and the environmental and social implications relevant to industrial activities in the city.

1. Strategy for Industrial Waste Water and Pollution Control, Pakistan Business Review, October 2010, Dr. Shahid Amjad, College of Computer Science and Information Systems, Institute of Business Management, Karachi.

Historical Growth of Industrial Estates in Karachi

During the colonial period, a few small industries were established at Nishter Road (Lawrence Road) in Karachi. Dalmia Cement Factory was established in 1924 in what constituted as the suburban areas of Karachi at that time. Industrial growth gained momentum after the creation of Pakistan. Adjacent to Karachi Port at the West Warf area, an industrial area was established in 1947, known as Karachi Port Trust Industrial Area. The location of the port and proximity to the city center was considered important incentives to attract investors to this area where infrastructure like roads, railways, electricity etc. were available. Offices of traders, shipping companies and Government offices were located near to the industrial area. The area was also accessible to the industrial workers and as a result, the industrial area was soon occupied by large and medium size industries. In 1948, SITE was established and is now the largest industrial estate of Karachi (Karachi Development Authority-KDA-, 1964). In 1958, under Greater Karachi Resettlement Schemes (GKRS), the Government planned to develop industrial areas at Landhi and Korangi to provide employment to the newly developed satellite towns. The Government policy of denationalization and privatization in the 1970s and 1980s, completion of Malir River Embankment Project in 1987 and improvement in infrastructure accelerated industrial development in the Korangi and Landhi Industrial Areas (KDA, 1974). The small industrial areas of Mansoora (Federal B Area) and North Karachi were developed in the 1960s and 1970s as part of residential schemes located along the Layari River. In the 1980s, the Government established three new industrial areas, Karachi Export Processing Zone, Bin Qasim Industrial Area and Super Highway Industrial Estate at the periphery of the city (KDA, 1990). Textile is the most dominant of all industrial categories in Karachi. Other important industries are food processing, tannery and leather goods, chemical and pharmaceutical, auto industries, shipyard, oil refineries, metal industries and printing.

Salient Features of the Industrial Sector in Karachi

The general pattern of industrial land use in Karachi is that industrial areas are located far away from the more settled and high value residential areas and closer to the residential areas inhabited by lower income communities. Industrial land use occupies about 75 sq. km. area, which is about 4.6 per cent of the total city area. Industries are located in 12 scattered areas. Most of them were originally developed in the suburbs and at the outskirts of the city, but with the growth of the city some of them are now surrounded by residential areas. Industrial areas in Karachi exhibit marked variation in land values.

The Karachi Port Trust Industrial Area is a small industrial area occupying about 2 sq. km consisting of 20 industrial units including two large size industries, namely, the Karachi Shipyard and Engineering and Naval Dockyard. Additionally, oil depots and oil processing plants, ghee, edible oil, pharmaceutical, chemical and motor vehicle assembling factories are also located in this area.

SITE is located about 5 km north-west of the city center and is spread over approximately an 18 sq. km. area. In terms of industrial establishments it is the largest industrial area of the city (SITE, 1995) with textiles, chemical, re-rolling mills, pharmaceutical, food and beverage, and auto vehicle assembling plants being the main industries (Table1).

The Korangi Industrial Area was established in 1960 and is located about 14 km south-east of the city center along the Malir River. Its total area is about 34 sq. km. The major industries in this area include tannery and leather products, textile, chemical, food and engineering. Two large oil refineries are also located in this industrial area (Korangi Industrial Area, 2000).

Table 1

Karachi Industrial Zones Profile

Industrial Zones	Land Area (sq.km)	Type of Industries
Karachi Port Trust Industrial Area	1.92	Shipyard, Automobile, Oil Depots
Sindh Industrial Trading Estate	17.81	Textile, Oil and Ghee, Chemical Beverage, Paint, Tannery, Leather Food, Engineering Pharmaceutical
Korangi Industrial Area	34	
Federal B (Mansoora) Industrial Area	2.20	
North Karachi Industrial Area	1.20	Textile Pharmaceutical, Flour Mills Paint, Chemical, Gemstone
Karachi Export Processing Zone	2.00	
Landhi Industrial Area	2.88	
Super Highway Industrial Area (I)	1.20	Textile, Oil and Ghee, Chemical, Flour Mills, Automobile, Cement, Re-rolling steel, Food, Paint, Engineering
Bin Qasim Industrial Area	3.00	
Manghopir Industrial Area	1.1	
Super Highway Industrial Area (II)	4.00	

Source: *Industrial Land Use and Land Value Pattern in Karachi City, Sindh University Research Journal, Science Series, S. Akhtar and M.R.Dahnani.*

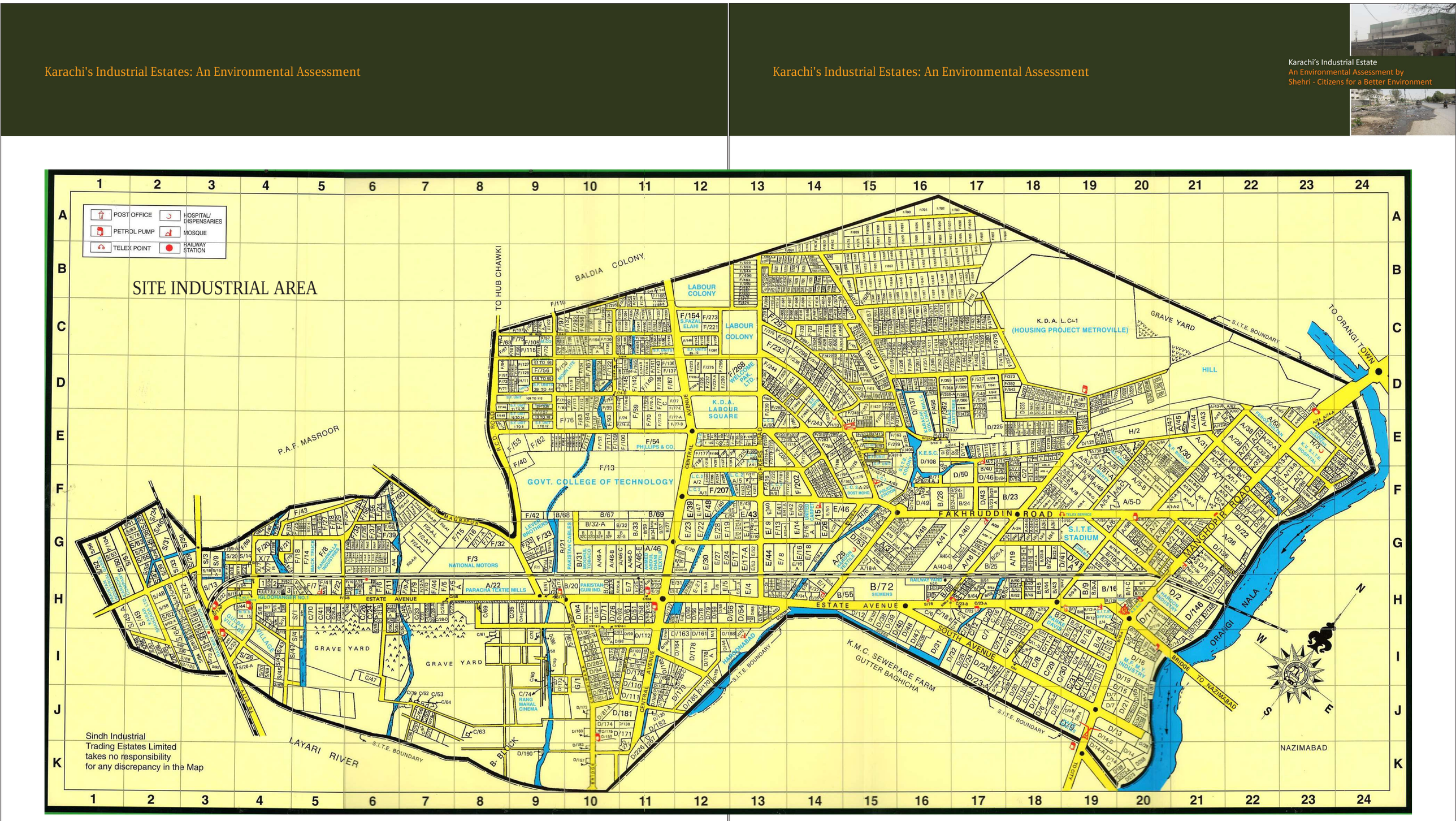
Federal B Industrial Area (Mansoora) is a small industrial area occupying about 2 sq. km located about 15 km from the city center and is mainly dominated by cottage industries. Originally established in 1960 by Karachi Development Authority (KDA) on the periphery of Karachi as a part of Federal B Area (Mansoora) Housing Scheme, with two blocks (21 and 22) allocated for industries, the area now falls within the populated area of Karachi (Federal B Industrial Area, 2000).

Landhi Industrial Area, New Karachi Industrial Area and Karachi Export Processing Zone are all located on the outskirts of the city. Landhi Industrial Area was established in 1958. It is located at a distance of 21 km from the city center. Its total area including extension of Landhi Industrial Area is about 5 sq. km. There are 300 industrial units of different categories mainly textile, food, chemical, pharmaceutical, engineering. North

Organizational Chart of SITE (Board of Directors)

SITE Ltd., is governed by Board of Directors consisting of 15 Members (8 from Government officials and 7 from Tenants of SITE). Managing Director is the Chief Executive Officer of the Company appointed by the Government of Sindh

1. Secretary Industries Department
2. Secretary, Planning & Development Department
3. Secretary, Excise & Taxation Dept.
4. Managing Director, Sui Southern Gas Co. Ltd.
5. Chief Executive Officer, K.E.S.C.
6. Managing Director, KW & SB
7. Chairman, Area Electricity Board, Hyderabad
8. Managing Director SITE Limited
9. M. Nisar Shekhani, Chairman, SITE Association of Industry, Karachi
10. Mr. Arshad Tanveer, Tenant Directors from SITE Karachi
11. Mr. Mr. Abdullah Rafi, Tenant Directors from SITE Karachi
12. Dr. Arshad Vohra, Tenant Director from SITE Super Highway Karachi
13. Mr. Siraj Kasam Taili, Tenant Director from SITE Nooriabad
14. Mr. Mazharul Haq, Tenant Director from SITE Hyderabad/Kotri
15. Mr. Khalad Mehmood Khan, Tenant Director from SITE Sukkur



Karachi's Industrial Estates: An Environmental Assessment

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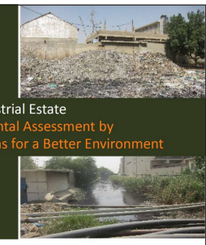

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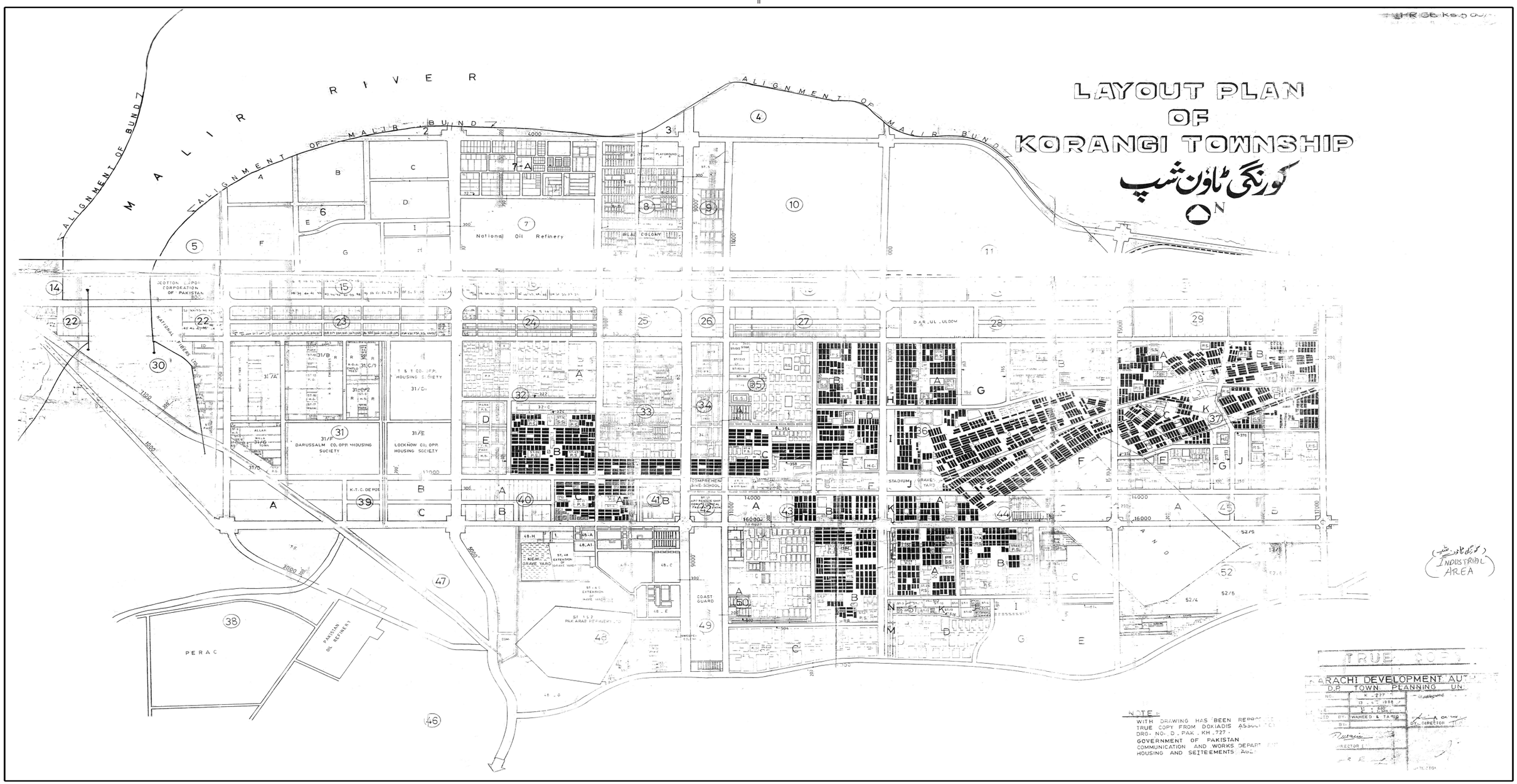


KITE - The Korangi Industrial area is administered by the Korangi Association of Trade & Industry (KATI). All the industries located within the area are members of KATI and the Association's mandate is administered by an Executive Committee headed by a Patron-in Chief and a number of Standing Committees, the names of which are listed below:

Organizational Chart of KATI (Executive Committee)

Patron-in-Chief:	Mr. S.M. Muneer
President:	Mr. Zahid Zaeed
Sr. Vice President:	Mr. Saleem-uz-Zaman
Vice President:	Mr. Syed Wajid Hussain
Member:	Mr. Rashid Ahmed Siddiqui
Member:	Mr. Nadeem Khan
Member:	Mr. Faraz-ur-Rehman
Member:	Mr. Zaki Ahmed Sharif
Member:	Mr. Muhammad Ghazanfar Ali Khan
Member:	Mr. Mahmood Hasan
Member:	Mr. Syed Johar Ali Qandhari
Member:	Mr. AmjadUllah Khan
Member:	Mr. Tariq Malik
Member:	Mr. Muhammad Danish Khan
Member:	Mr. Saleem Uddin
Member:	Mr. Rehan Jawed
Member:	Mr. Juniad Naqi
Secretary, KATI	Mr. Nihal Akhtar

KATI Standing Committees

- Export Insurance
- Health, Safety & Environment
- Information Technology
- FBR, SRB & Taxation
- Investments & Industrial Activities
- KATI Building & Tenants
- SSGC
- Diplomatic Affairs
- KATI Finance & Accounts
- Press & Media

C. Environmental and Social Concerns

Discussed below are some documented (secondary data) concerns regarding the environmental and social implications of industrial activities in a larger context in Pakistan, Sindh province and in particular for the SITE and KITE estates in Karachi.

Environmental Concerns

It is estimated that approximately 362 million gallons (MGD) of sewage and waste-water is generated in Karachi and its adjacent areas everyday from domestic (approximately 40%) and industrial sources (approximately 60%). The industrial waste-water and sewage are discharged into the two seasonal rivers: the Lyari River and the Malir River of Karachi. These rivers act as the main open sewers for liquid waste disposal from the city. The Lyari and Malir Rivers contribute about 59% and 25% of the total pollution load of Karachi City respectively, while 15% of the pollution load is directly discharged into the adjacentopen seacoast or discharged via the Gizri, Korangi and Gharo Creeks (Amjad and Rizvi, 2000).

Much of the sewage effluents discharged through the Lyari River find their way inside the semi enclosed Karachi Harborarea. During high and low tide, the discharged effluents oscillate within the Karachi Harbor (length 8.2 Km). As far back as 1995, Ali and Jilani, conducted a chemical analysis of seawater samples taken from the Korangi industrial area effluent discharge site and found that the values of heavy metal in seawater far exceeded the permissible limits of the National Environment Quality Standards prescribed by the Pakistan Environmental Protection Agency (NEQS, the Gazette of Pakistan 2000).

Harmful components such as heavy metals, suspended solids, oil and grease, salts etc., in the discharged effluents, create a chemical imbalance and alter the chemistry of the seawater which subsequently enters the coastal food chain. The tainted heavy metal seafood if consumed, can negatively impact the human brain, causing nerve damage, damage to the kidneys, and may also cause birth defects. Absorption of excessive levels of carbon dioxide in the surface seawater also lowers the pH of seawater converting it into a weak acid (Carbonicacid) and such altered seawater chemistry can be corrosive for vessels, harbor crafts and coastal installations.[2] Additionally, such altered seawater chemistry is also injurious to the environmental health of a productive coastal ecosystem.

Karachi has a population of about 20 million and generates approximately 12,000 tons of domestic solid waste perday. Essentially, there is no arrangement for the disposal of hazardous solid waste except for the hazardous waste from hospitals and the few garbage / refuse collection sites within the city. The solid waste; about 100 truckloads, is carried from the collection sites and taken away by vehicles (open trucks and specially designed garbage vehicles) to either the composting center or to the two designated dumping / landfill sites for refuse located in the outskirts of the city in Deh Jam Chakro landfill site near Surjani Town and Deh Gond Pass landfill site near Hub Chowki.

The area surrounding SITE is densely populated and includes and is bordered by Gadap Town to the North, Liaquatabad and North Nazimabad to the east across the Orangi stream, Lyari and Saddar to the South across the Lyari River and Kemari to the West. The different types of industries operational in SITE include garments, bonecrushing, coloring, metal processing, pharmaceutical, textile, chemicals and battery manufacturing industries that discharge different kinds of waste effluents and solid waste which are polluting the soil of

2. Strategy for Industrial Waste Water and Pollution Control, Pakistan Business Review, October 2010, Dr. Shahid Amjad, College of Computer Science and Information Systems, Institute of Business Management, Karachi.

nearby places, thus causing deleterious effects to plant communities of the industrial areas. In a study titled 'Vegetation Pattern and Soil Characteristics of the Polluted Industrial Area of Karachi', conducted by M. Kabir, M. ZafarIqbal, Z.R. Farooqi and M. Shafiq of the Department of Botany, University of Karachi in the year 2010, it was found that vegetation of the study area was very disturbed due to constructions of new industries day by day. As during the establishment of new industries natural vegetation is destroyed on large scale if few species survive in such area they are threatened by different types of pollutants discharged from industries.

In February 2006, a factory in the SITE area of Karachi allegedly dumped hazardous chemical waste in an empty plot (F620-621) within the vicinity of SITE Town. The dumping of this waste subsequently led to several serious and minor injuries of young boys who are residents of the surrounding areas. Over a period of three months, a total of 20 such cases were recorded where mainly children from the nearby areas were found seriously injured in the hazardous waste material. Of the injured, one child, Iftikhar, also died (28th April 2006) due to the severity of his burns, while another, Shiraz, has had both his legs amputated and has lost his fingers as well. The family members of the injured children initially thought that their children had been burnt in the garbage set on fire by rag pickers in the area. However, later upon learning that it was actually the toxic chemical waste that had been responsible for their children's condition, they grew more concerned and willing to take action against the offenders.[3]

The pollution problems have arisen due mainly to the indiscriminate discharge of effluent from industrial and agriculture sources and disposal of untreated liquid and solid wastes generated from domestic sources into the coastal environment. The 1991 Pakistan National Environmental Plan estimates that three main coastal industries located near the port with the largest volumes of effluents are the steel mill, power plants, and refineries and notes that many smaller industrial units are having more significant polluting effects on the marine environment. In addition to the growing export industries contribution to the pollution, trade activity in the Karachi Port is expected to rise steadily. Moreover, because "recent changes have led to a major realignment in trading patterns in the region leading to the expansion of the Economic Cooperation Organization (ECO) to include the Central Asian states and Afghanistan along with Pakistan, Iran, and Turkey...Pakistan stands already committed to provide a suitable deep water port for the landlocked countries of the ECO." Without improvements in the shipping industry, pollution is overburden the environment along the Karachi coastline. The heavy metals are being accumulated in the sediments and marine organisms. The accumulation of eight heavy metals (As, Cd, Co, Cr, Cu, Hg, Ni, Pb and Zn) in the fauna of coastal waters of Karachi is especially in higher concentration in marine organisms comprising of resident fauna of the polluted localities. Some of the marine life was contaminated with lead, which if consumed by humans through seafood, has been linked to anemia, kidney failure, and brain damage.

Social Concerns - Occupational Safety and Health

For assessing concerns of a social nature the issue of labor rights and occupational safety are being considered and the following section covering occupational safety issues is sourced from the publication Status of Labor Rights in Pakistan 2014, published by the Pakistan Institute of Labor Education and Research (PILER).

3. Environmental Policy & Urban Pollution, Case Study: Dumping of Hazardous Industrial Waste in SITE. Adnan Millwala and Erum Haider, July 2006.

Occupational Safety and Health

Occupational safety and health, the core element of a decent work environment, remains the lowest priority of the stakeholders despite the rising incidences of work related injuries, diseases and fatalities in recent years. The Baldia Factory Fire 2012- that killed 255 workers - did not compel the state officials and the employers to devise a comprehensive plan for prevention of industrial accidents. Neither the granting of the GSP Plus motivated the stakeholders to push for a preventative safety and health culture.

The International Labor Organization (ILO) has devised more than 40 standards specifically dealing with occupational safety and health, as well as over 40 Codes of Practice. There are three fundamental standards: the Occupational Safety and Health Convention 1981 No. 155, Occupational Health Services Convention 1985 No. 161, and the Promotional Framework for Occupational Safety and Health Convention 2006 No. 187. Pakistan has not ratified any of these conventions reflecting low State priority to the safety and health of workers.

In Pakistan, the most hazardous occupation in terms of safety and health remains agriculture where mechanized farming and pesticide use - combined with workers' lack of access to education and protective measures - cause injuries and diseases to the workers. According to the latest official data, of the workers who reported occupational disease or injury, 49.1 per cent belonged to the agricultural and fisheries sector, 15.2 per cent were engaged in the construction sector and 13.3 percent were involved in the manufacturing sector. The Labor Force Survey does not provide estimates of the number of cases pertaining to accidents, injuries, or occupational diseases. The Pakistan Statistical Year Book records inadequate and outdated data on industrial accidents in registered factories. According to the latest Year Book 2012, there were 326 industrial accidents in the country in 2009 and of them, 45 were fatal. Though the Factories Act 1934 stipulates that the factory managers must notify accidents to the Labor Department, it is seldom done. Pakistan has ratified the ILO Labor Inspection Convention No. 81 and thus committed to evolve an efficient labor inspection system. Under this Convention, labor inspection needs to be placed under the supervision and control of a central authority and should apply to all workplaces to secure the enforcement of the legal provisions relating to conditions of work and the protection of workers. In contravention of the ratified ILO convention, previous national and provincial policies and practices in Pakistan have severely undermined labor inspection. Under the existing system, only registered factories and shops are covered and the larger informal sector, including agriculture and the services sectors are excluded from the ambit of the inspection system. Workers are not consulted in the inspection and are not made aware of what the inspection has revealed. The provincial Labor Departments are mandated to document industrial accidents under various laws. Due to a weak labor inspection system, poor governance, and inefficient functioning, documentation is not done regularly and rarely shared with the stakeholders. Hence the only source of information on industrial accidents is the media.

According to the Human Rights Commission of Pakistan's (HRCP) latest report, 39 industrial accidents causing deaths of 92 workers were reported in the media in 2014. Officially 73.6 per cent workers are employed in the informal sector comprising small to medium-sized industrial units that avoid registration and violate labor laws. In medium-sized units, conditions are not better as the employers evade implementation of related laws and bust unions. Even large production units in the country often do not have adequate occupational health

and safety management systems in place as was manifest in the case of the Baldia factory, Ali Enterprises which employed around 1500 workers.

The factory was not registered with the Labor Department though it was a registered member of the Pakistan Ready made Garments Manufacturers and Employers Association. It is not only at the factories that workers confront risks to their safety and health, a significant number of workers who reside near industrial areas face hazards. Industrial units in Pakistan violate environmental by-laws and often release untreated effluents and dangerous chemical in streams, rivers and water bodies surrounded by the workers settlements. 22 Status of Labor Rights in Pakistan An industrial accident was reported in May 2014 at the Chashma Sugar Mill & Ethanol Distillery, Ramak, and Tandlian-Wala Sugar Mill, Miran. Ten people, including women and children, died of toxic fumes released by the mills and the distillery on to a stream. As there was no bridge, the community used wooden boards to cross over the stream. A girl slipped and fell in the drain. The people who tried to rescue her also succumbed to the toxic fumes. Ensuring safe and healthy work environment is a political choice which the government is not willing to make. Underneath violation of labor and environmental laws, failure of the monitoring and inspection systems and the complicity of the certification agencies with corporate lies a strong nexus between industrialists, state officials and political elite that resists implementation of safety and health laws at work places.

Labor Laws in the Province of Sindh

The Sindh Industrial Relations Act 2010 remained the only labor law enacted by the Provincial Government of Sindh till the end of 2014. The Sindh Labor Department circulated five draft laws - The Sindh Factories Act, Companies' Profit (Workers Participation) Act, Sindh Shops and Establishments Act, Sindh Workers Welfare Fund Act, Sindh Industrial and Commercial Standing Orders Act - in July 2014 seeking input from concerned stakeholders. However, the Labor Department, did not call the tripartite meeting to receive feedback from the stakeholders on the draft laws circulated. The Sindh Labor Department shared the draft of, and received input to, the provincial policy on Occupational Safety and Health with the stakeholders in a tripartite consultation held in September 2014. The policy was drafted as part of the tripartite Joint Action Plan for Promoting Workplace Safety and Health in Sindh. The Joint Action Plan for Promoting Workplace Safety and Health in Sindh (2013-2016) was formulated by the Government of Sindh, Employers Federation of Pakistan and Pakistan Workers Federation after a tripartite consultation in December 2012 as a response to the 2012 factory fire in Baldia, Karachi which claimed lives of 255 workers.

The 3-year plan, launched in January 2013, proposed to formulate policies on occupational safety and health and labor inspection, reform/amend laws and undertake capacity building of the labor department. An 8-member Task Force was created to implement the Plan. With the exception of the formation of the Steering Committee, and its meeting, nothing came out if by the end of 2014. The absence of widely applicable laws in Sindh, such as the Industrial, Commercial, and Employment Standing Order Ordinance 1968, Companies Profit Act 1968, Workers Welfare Ordinance 1972, Workman Compensation Act 1923, Payment of Wages Act 1936, Shops and Establishment Ordinance 1969, Minimum Wages Ordinance 1961, and Road Transport Workers Ordinance 1961, has led to an almost abeyance of the judicial process and prolonged the delay in justice. Also, the labor circle has registered its apprehensions about whether the laws currently being drafted

would prove beneficial to the workers. According to a labor lawyer the labor department has not inducted labor representatives in the drafting process as required under the law. An anti-labor clause was identified by him in the draft Sindh Companies Profit Act where the number of employees in an establishment has been increased from 50 to 100 employees. An official revealed that drafts of 36 laws have been sent to the Labor Department for vetting but these are yet to be forwarded to the Sindh Assembly.

D. Engaging the Citizens - Environmental Assessment Survey

The field survey was conducted in the vicinity of the SITE and KITE areas. Prior to evaluating the findings of the survey, detailed as follows is the way the field research was conceptualized, the survey methodology developed and pre-field work processes conducted. The research process was divided into various components in order to get a holistic view of the research objectives:

Phase I: Literature Review

This included review of the available researches reports and articles of renowned authors and newspapers/journals on the subject matter to develop a better insight and identify knowledge gaps to be addressed through project research interventions, laws relating to industrial estates, SEPA, labour laws, land laws pertaining industrial estates, the number and kind of industries (multi or local) etc.

Phase II: In-Depth Interviews (IDI's)

In order to develop an effective research instrument, In-Depth-Interview (IDI's) with relevant experts and government officials were conducted This methodology facilitated in getting valuable insights in terms of associations, perceptions and attitudes towards environmental and its related practices and behaviors by authorities and industries.

Phase III: Qualitative Survey

In this project component, face to face interviews using a structured questionnaire were undertaken. The questionnaire included pre-coded and close ended responses to gauge the perceptions and attitudes of the respondents. The research instrument allowed gathering relevant and required information without deviating from the main objectives. A total of 200 interviews through random sampling were conducted with residents and workers in the selected industrial estates living around the target industrial areas. The sample split is given below.

Survey Methodology

Selection of starting points: Based on the sample size, the required number of areas (sampling points) was randomly selected.

Once the area list was developed, one starting point (sampling point) was selected in each area. Starting points were mostly famous landmark, market, plaza or important place that is considered the centre of the area. Five interviews around each starting point were conducted. This methodology provided a reasonable number of starting points in each area, thus, providing maximum geographical spread within the area.

Selection of Households (HHs): For the selection of a household around a particular starting point Right Hand Rule (RHR) was used for female and Left Hand Rule (LHR) was used for male respondents. After each successful interview three households were skipped. This methodology enables to adopt a systematic procedure to minimize surveyor's bias.

FIELD OPERATIONS

Training Guides

Interviewing guides were designed based on the questionnaire and survey methodology for the interviewers. These interviewers were (staff and students of the Department of Architecture & Planning, NED University of Engineering & Technology, Karachi) thoroughly briefed before the start of each survey about how respondents will be selected; under what circumstances and how substitution can be made; use of questionnaire; routing instructions given in it, and how questionnaires will be filled out.

Training of Enumerators (Interviewers)

Classroom Training: In line with normal enumerator training procedures, enumerators participated in a thorough training program. In the General Training component sessions are undertaken in the form of class room training and start with general training on the sample selection procedures, recruitment and administration of the questionnaire. Interviewers are also briefed on the expected work timings and control procedures that will be implemented.

Project Specific Training: Once the general training was complete, a more detailed session was conducted specially focusing on the actual questionnaire by reading the questionnaire and identifying any language difficulties, flow etc. Mock sessions were conducted under the guidance and supervision of the Project Coordinator and Field Manager. Trial interviews continued until the Project Coordinator/Field Manager were satisfied that each interviewer is competent (in reading, comprehending and administering) the interview.

Training of interviewers - Field Training

- Each interviewer completed (on average) 2 trial interviews in the field.
- All interviewers were accompanied to their starting points by a Supervisor; questionnaires were edited immediately, so that any possible problems are resolved in time.
- A minimum 10% of each interviewer's questionnaires were back-checked either by telephone or personally for quality check.

Field Quality Controls

Thorough quality controls at each stage of fieldwork and processing ensured consistently high standards of data collection and analysis for all projects. At the field level, back checking is carried out on 10% of all interviewers' work on a daily basis. At the completion of fieldwork, the supervisors also check 100% of the questionnaires for any editing issues.

Phase IV: Data Processing& Report

All questionnaires were manually screened for consistency and quality at two stages:

- In the field after an interview is completed; and
- After the scrutinized questionnaires are received for analysis

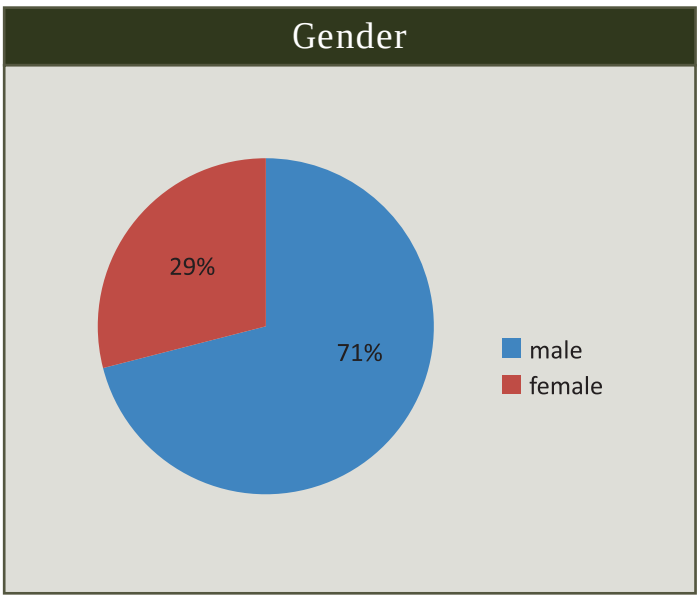
Findings and analysis

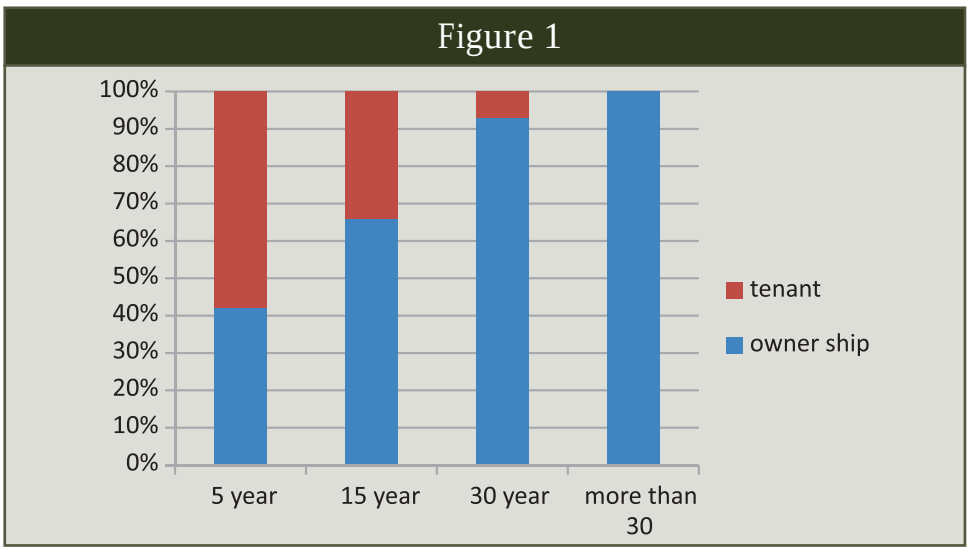
Following are discussed the findings and analysis of the field survey conducted in the SITE and Korangi areas:

Training of Enumerators

KORANGI

The gender split in the respondents in this survey was 71% male and 29% female. It was found that females were a bit reluctant to be interviewed even though there was always a female enumerator available. The question on the occupancy status of the house in relation to the number of years living in the neighbourhood gave an interesting finding (Fig. 1).

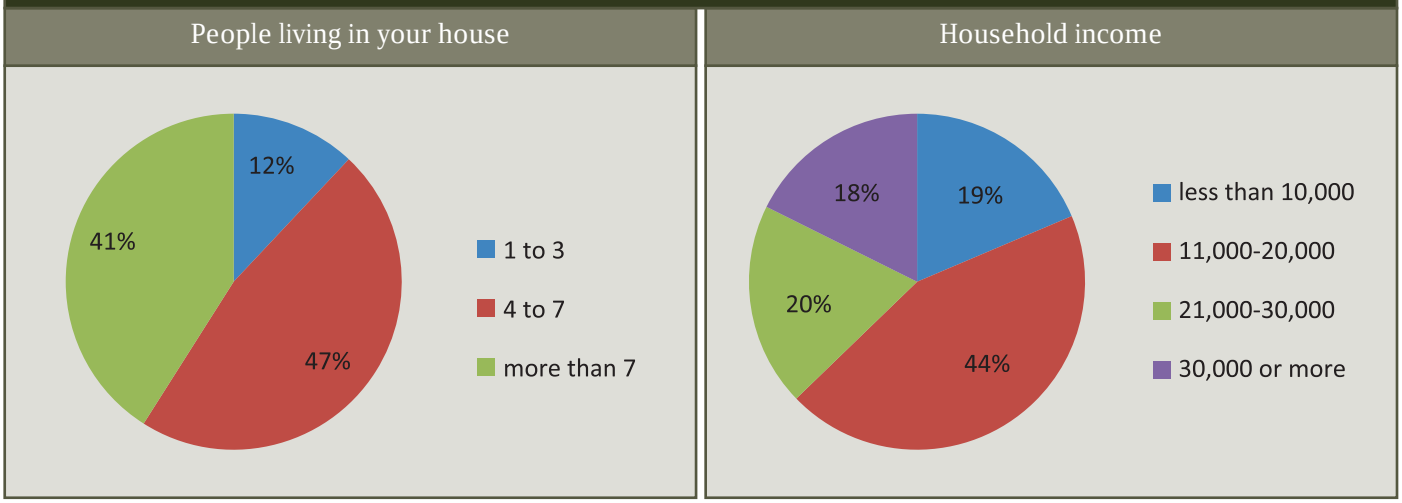




It was found that those living for a period of up to 30 years had over 90% ownership occupancy status and those living beyond 30 years were all residing on an ownership basis. In comparison, those residing for a period of up to 15 years were about 35% on a rental basis and among the most recent residents - those

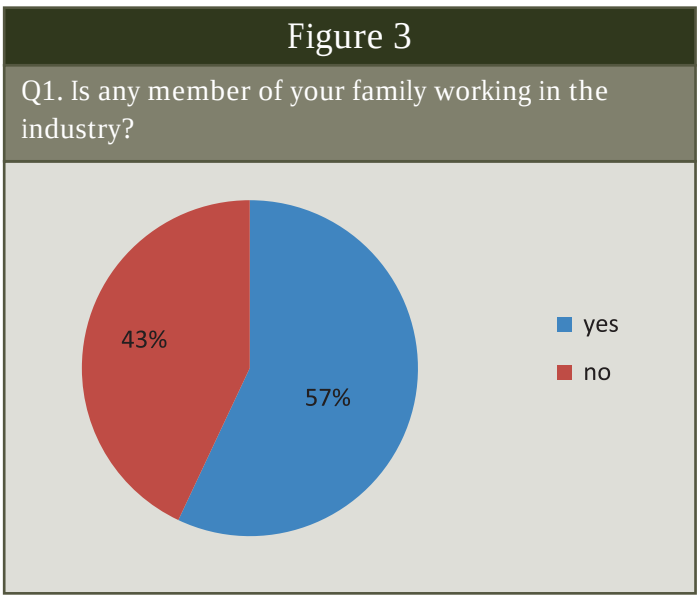
residing for only up to 5 years were predominantly, up to 60% on a rental basis. This finding implies that there has been a progressive change in land use and occupancy status with more people migrating from other urban localities and also people renting out portions of their houses, accompanied by minimal introduction of apartment dwellings. The household size was predominantly 4-7 (47%). The household income indicated a mostly low income community presence with 44% of the households having a household income of less than Rs. 20,000/- per month and only 18% having a household income of more than Rs. 30,000/- per month (Fig. 2).

Figure 2



57% of the households surveyed had a family member working in the Korangi industrial area (Fig 3).

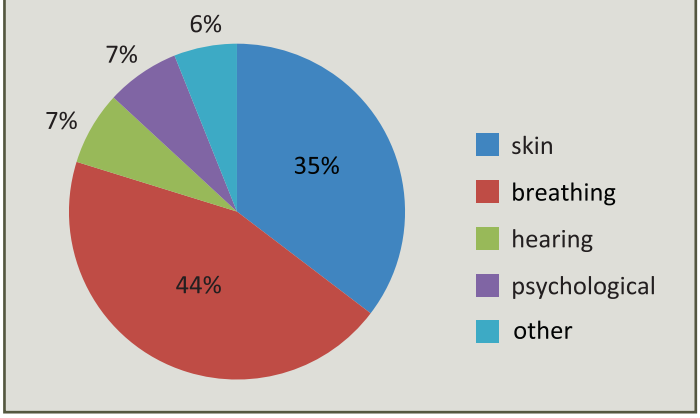
Figure 3



When asked what were the major health related impacts that they were facing as a result of industrial activities than it was found that 44% had breathing problems while 35% were having skin related ailments (Fig. 4).

Figure 4

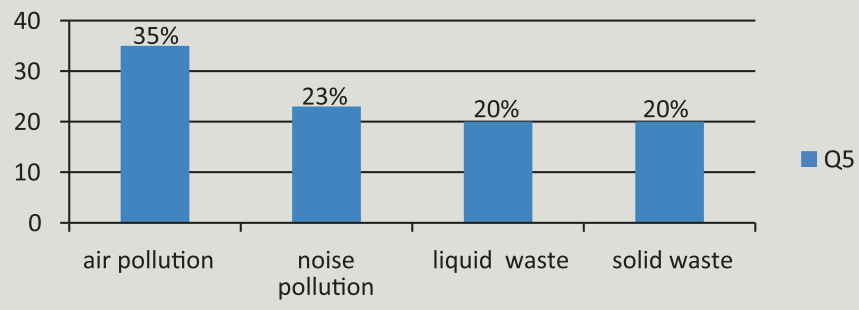
Q4. In your opinion which health concerns you attribute to industrial activities?

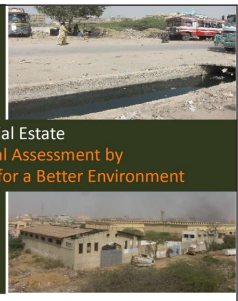


When asked in a multiple choice question as to what were the major environmental impacts being caused than the most predominant impact identified was air pollution (35%), while 23% also opted noise pollution (Fig. 5).

Figure 5

Q5. Environmental issues that are causes of major concern





When asked to specify as to where the air pollution was mainly sourced from, most (39%) felt that it was directly coming from the industries themselves. For noise pollution, most felt (42%) that it was because of the industrial vehicular movement. When asked to rate the noise levels, the highest percentage (44%) opted for the worst 'very noisy' option (Fig. 6).

Figure 6-A

Q6. If industrial air pollution is a concern, then identify the major causes of air pollution

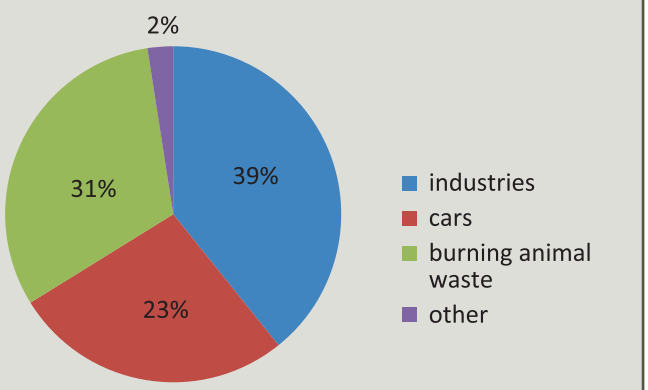


Figure 6-B

Q7. If industrial noise pollution is a concern, then identify the major causes of noise pollution

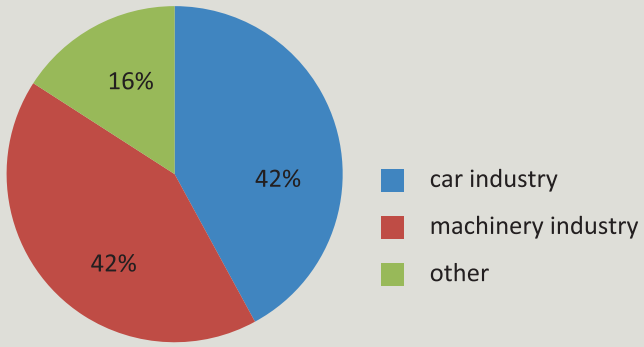
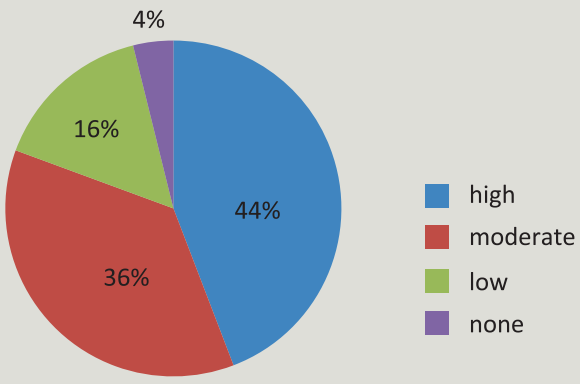


Figure 6-C

Q8. Rate the amount of noise made by industries in your area?



It was interesting to find that when asked in a multiple choice question to indicate their major concern regarding the spillage of liquid waste coming from industries on the streets, the highest percentage (27%) opted for the option that liquid waste on the streets serves as an accident hazard. Solid waste management came out as a major concern as a whopping 96% of the respondents said that solid waste gets randomly dumped in the neighbourhood, most of which they said either gets dumped on the streets (43%) or in drains (42%). A very revealing finding came when asked as to which agency then collects the waste. Only 3% of the respondents felt that industries engaged in collection while the largest percentage (36%) came for the 'others' option where it was implied that people largely themselves found ways to take care of the garbage, rather than official agencies (Fig 7).

Figure 7-A

Q9. Major concern if industrial liquid waste discharge is a concern

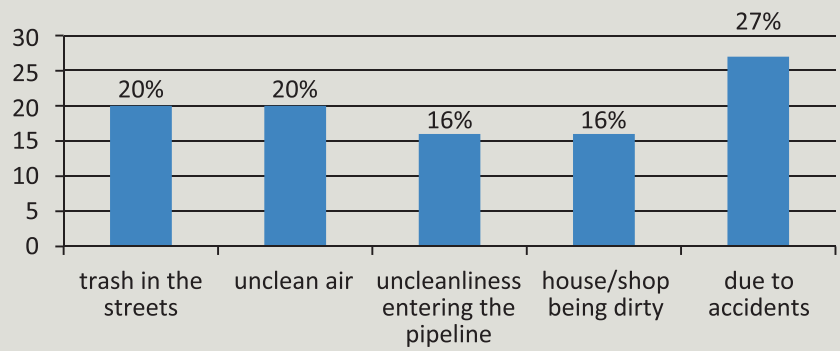


Figure 7-B

Q12. If solid industrial waste is dumped, who collects it?

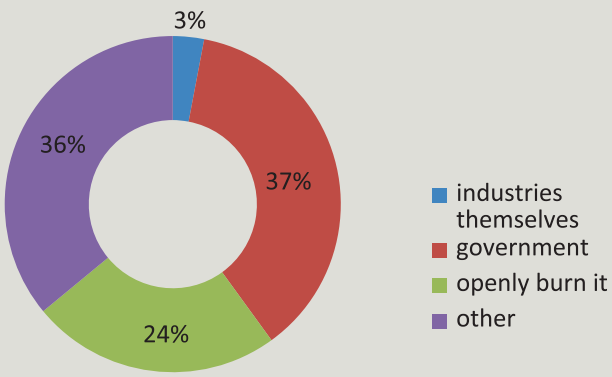
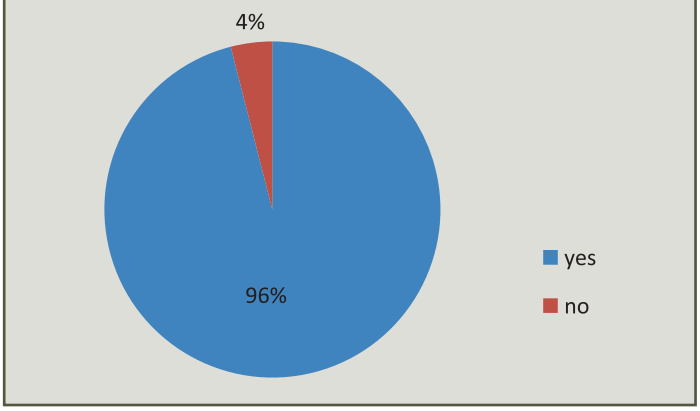


Figure 7-C

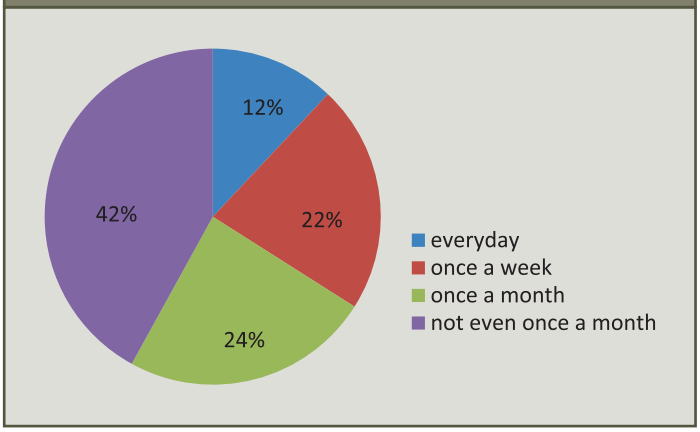
Q10. Does the industrial solid waste get randomly dumped in neighbourhoods?



When asked as to how frequently the garbage was collected, the highest percentage of respondents (42%) said 'not even once a month' (Fig. 8).

Figure 8

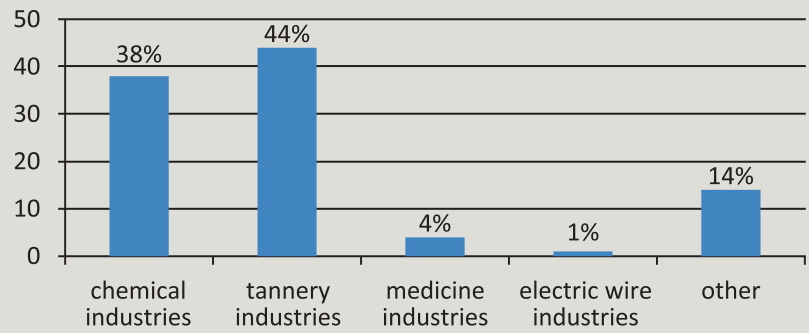
Q13. How often is industrial solid waste collected?



When asked to identify the worst industrial polluters, (44%) indicated the tanneries, while next came (38%), the chemical industries (Fig. 9).

Figure 9

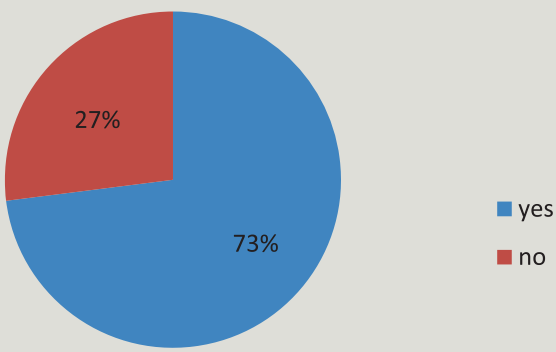
Q14. Which type of industry causes the most environmental concerns?



When the respondents were asked as to whether industrial activities result in the neighbourhood spaces being encroached, then 73% answered in the affirmative (Fig. 10).

Figure 10

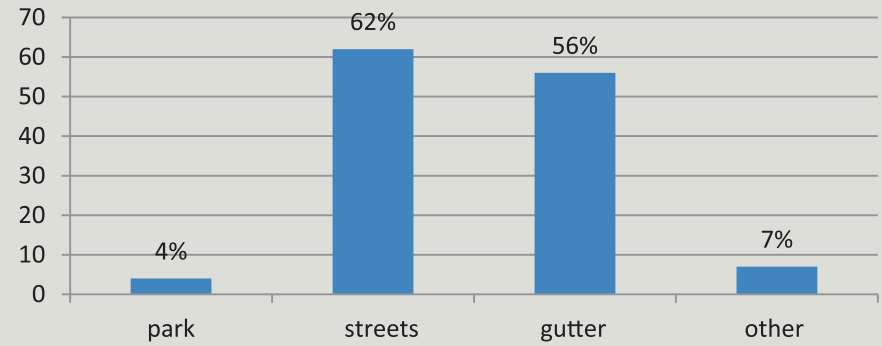
Q15. Does industrial activities in any way result in encroachments?



As to which spaces were most encroached, in a multiple choice question, 62% said streets, while 56% also said that storm drains and open drains were being encroached (Fig. 11).

Figure 11

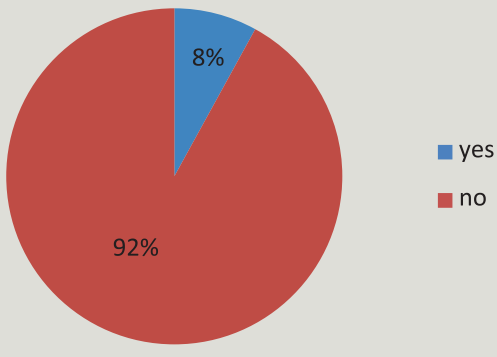
Q16. Which type of spaces are encroached?



A very revealing answer came when the respondents were asked if any industry had done some neighbourhood improvement works in their localities. Of all the respondents surveyed, 92% replied in the negative (Fig. 12).

Figure 12

Q17. Has any industry done some neighbourhood improvement or community help works in your locality?



When asked if some accident has happened in their locality as a result of industrial activity then quite a significant percentage (64%) replied in the affirmative and identified fire incidents as the most predominant (31%) and then traffic (23%) incidents (Fig. 13).

Figure 13-A

Q19. Has there been any accident in your locality due to industrial activity

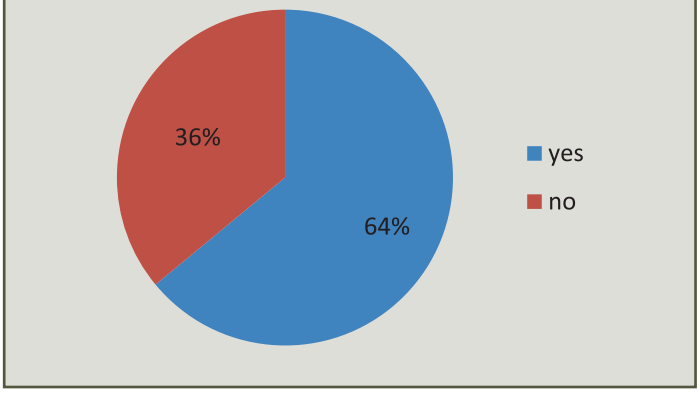
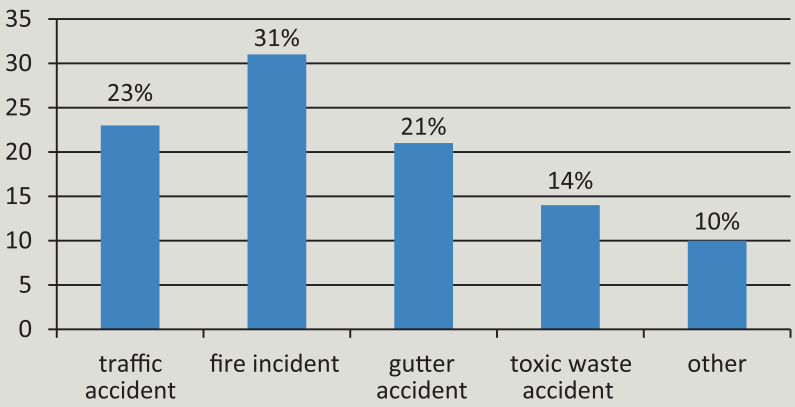


Figure 13-B

Q20. What type of accident has happened?



When asked if when they made a complaint with any agency what was the response than none of the respondent indicated that the problem got solved and 47% respondents indicated that they had to mobilize themselves to get their issues resolved (Fig. 14).

Figure 14-A

Q20

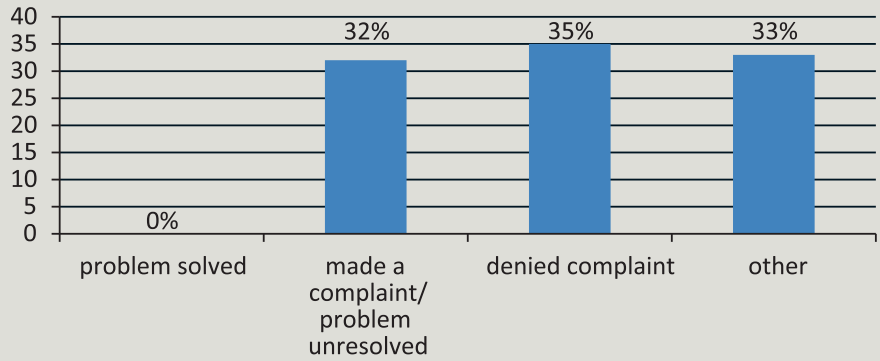
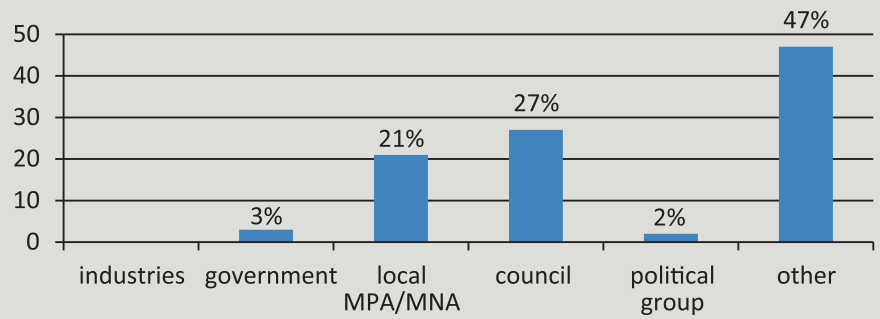


Figure 14-B

Q21



SITE

The gender split in the respondents in this survey was 62% male and 38% female. It was found that female were a bit reluctant to be interviewed even though there was always a female enumerator available. The question on the occupancy status of the house in relation to the number of years living in the neighbourhood gave an interesting finding different to what was the finding in Korangi (Fig. 15).

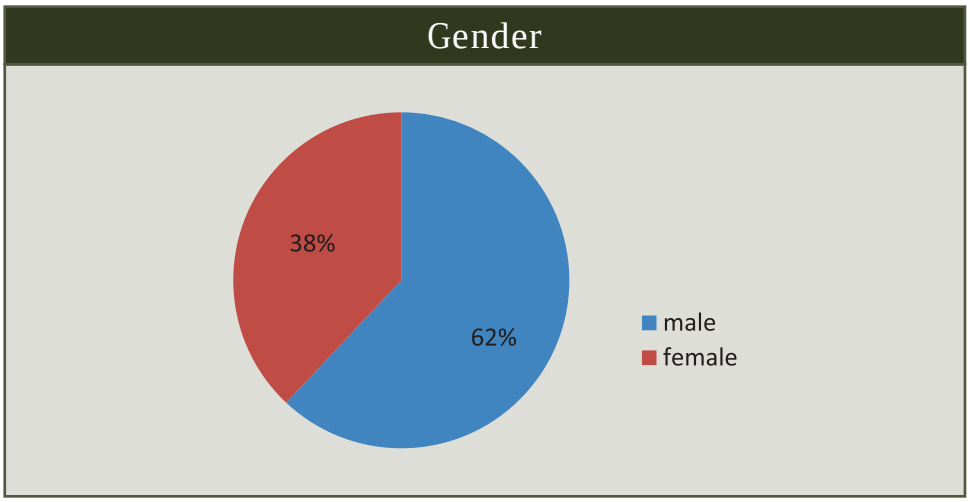
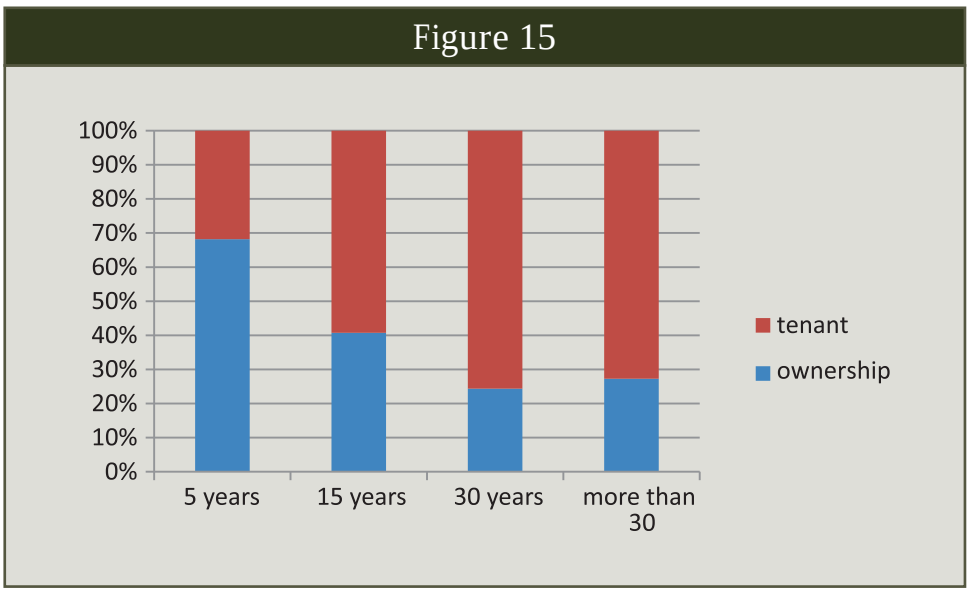


Figure 15



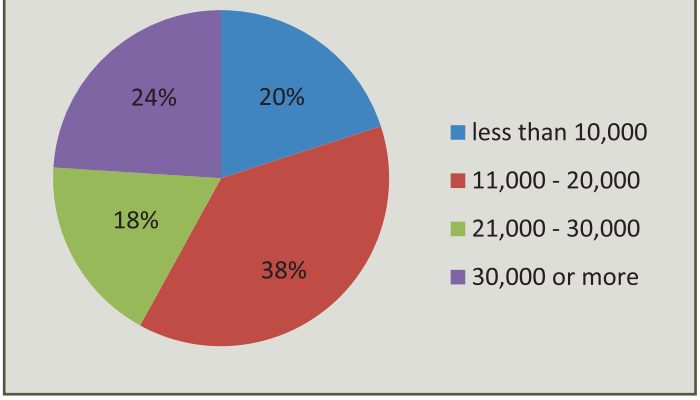
It was found that those living for a period of more than 30 years had over 72% tenancy occupancy status. In comparison, those residing for a period of up to 15 years were about 60% on a rental basis and among the most recent residents - those residing for only up to 5 years were predominantly, up to 70% on an ownership

basis. This finding implies that there has been a progressive change in land use and occupancy status with more people begging to buy property in the area. Comprehensive land us and demographic studies are needed to understand the reasons and implications of these interesting findings.

The household size was predominantly more than 7 (58%). The household income indicated a mostly low income, 38% with less than Rs. 20,000/- per month household income., though a more mixed variable was found as compared to Korangi with 24% having a household income of more than Rs. 30,000/- per month (Fig. 16).

Figure 16

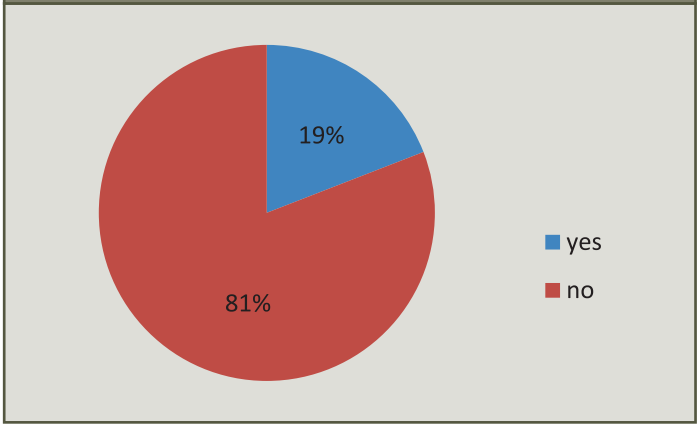
Household income



19% of the households surveyed had a family member working in the SITE industrial area (Fig. 17).

Figure 17

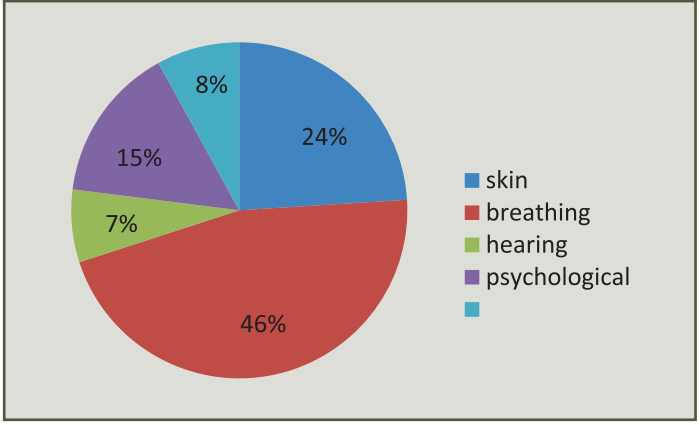
Q1. Is any family member working in the industry?



When asked what were the major health related impacts that they were facing as a result of industrial activities than it was found that 46% had breathing problems while 24% were having skin related ailments (Fig. 18).

Figure 18

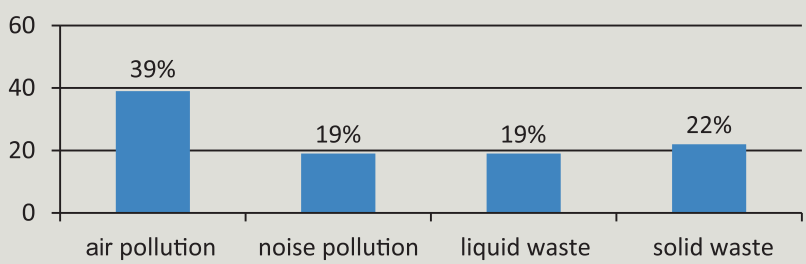
Q4. In your opinion which health concerns you attribute to industrial activities?



When asked in a multiple choice question as to what were the major environmental impacts being caused than the most predominant impact identified was air pollution (39%), while 22% also opted for solid waste pollution (Fig. 19).

Figure 19

Q5. Environmental issues that are causes of major concern



When asked to specify as to where the air pollution was mainly sourced from, most (36%) felt that it was directly coming from the industries themselves. For noise pollution, most felt (52%) that it was because of the industrial vehicular movement. When asked to rate the noise levels, the highest percentage (49%) opted for the worst 'very noisy' option (Fig. 20).

Figure 20-A

Q6. If industrial air pollution is a concern, then identify the major causes of air pollution

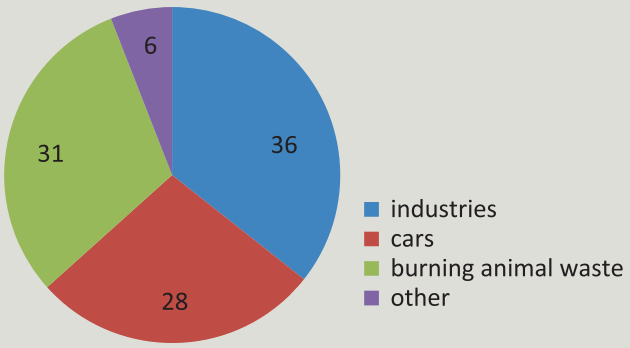


Figure 20-B

Q7. If industrial noise pollution is a concern, then identify the major causes of noise pollution

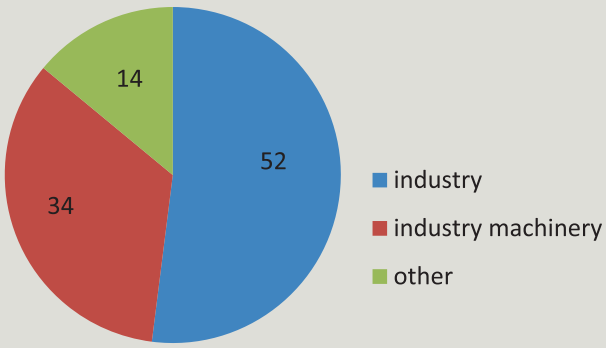
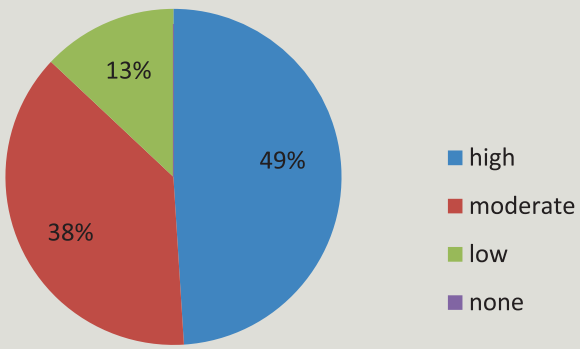


Figure 20-C

Q8. Rate the amount of noise made by industries in your area?



It was found when asked in a multiple choice question to indicate their major concern regarding the spillage of liquid waste coming from industries on the streets, the highest percentage (56%) opted for the option that solid waste got dumped in the streets. Solid waste management came out as a major concern as 78% of the

respondents said that solid waste gets randomly dumped in the neighbourhood, most of which they said either gets dumped on the streets (42%) or in drains (31%). A very revealing finding came when asked as to which agency then collects the waste. Only 9% of the respondents felt that industries engaged in collection while the largest percentage (37%) came for the 'others' option where it was implied that people largely themselves found ways to take care of the garbage, rather than official agencies (Fig. 21).

Figure 21-A

Q9. Major concern if industrial liquid waste discharge is a concern

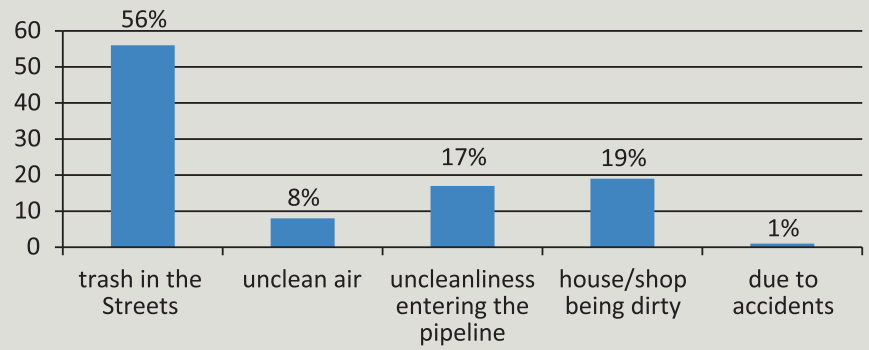


Figure 21-B

Q11. If solid waste is randomly dumped then where is it dumped?

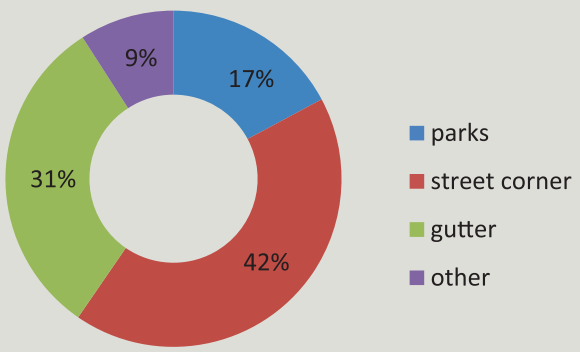
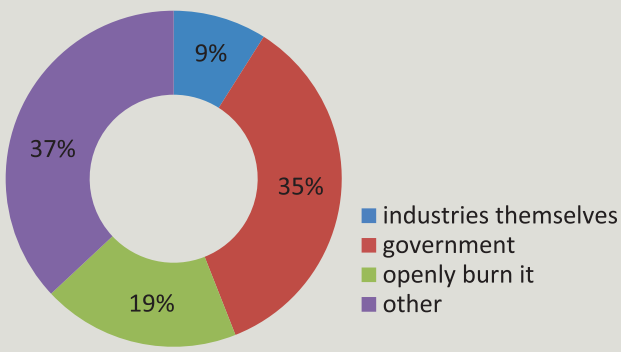


Figure 21-C

Q12. If solid industrial waste is dumped, who collects

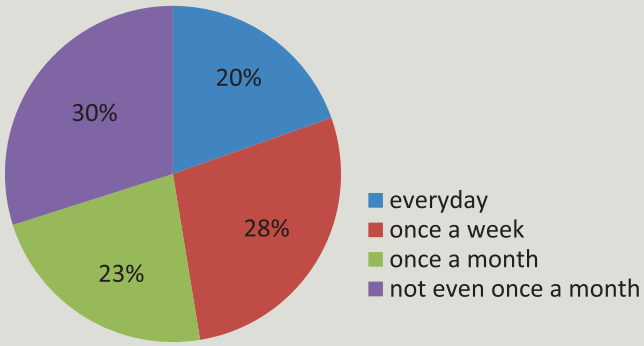


When asked as to how frequently the garbage was collected, the highest percentage of respondents (30%)

said 'not even once a month' (Fig. 22).

Figure 22

Q8. Rate the amount of noise made by industries in your area?



When asked to identify the worst industrial polluters, (28%) indicated the chemical industries. When the respondents were asked as to whether industrial activities result in the neighbourhood spaces being encroached, then 62% answered in the affirmative (Fig. 23).

Figure 23-A

Q14. Which type of industry causes the most environmental concerns?

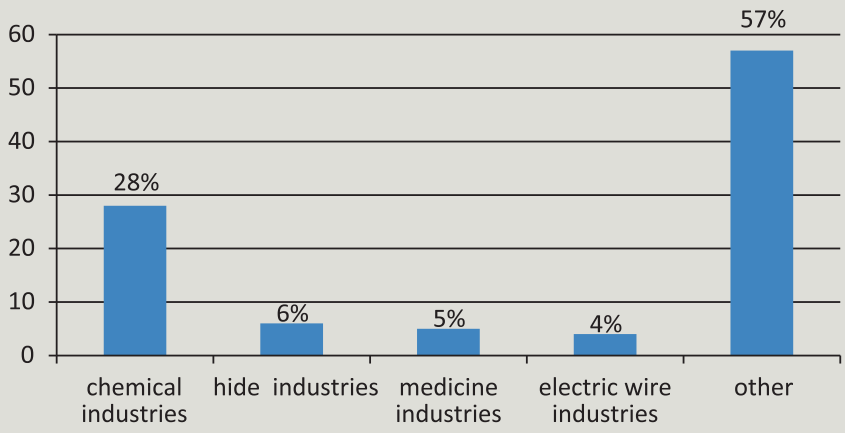
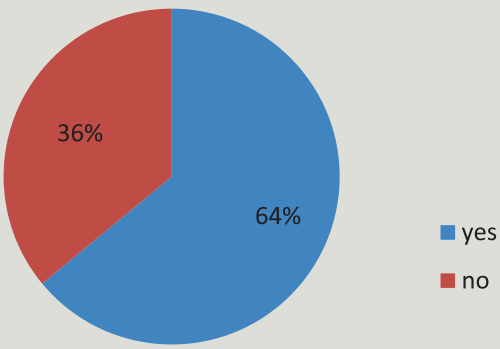


Figure 23-B

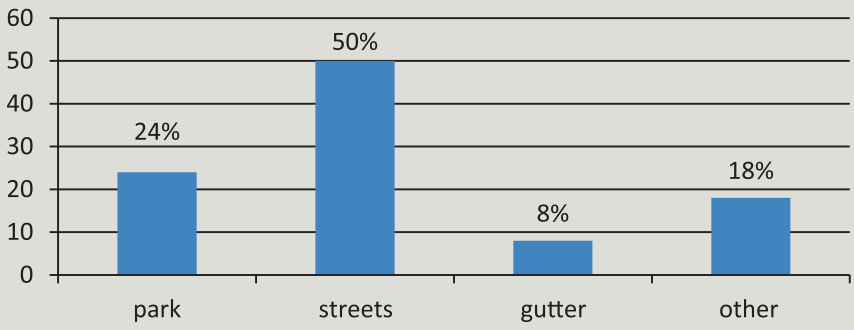
Q15. Does industrial activities in any way result in encroachments?



As to which spaces were most encroached, in a multiple choice question, 50% said streets, while 24% also said that parks were being encroached (Fig. 24).

Figure 24

Q16. Which type of spaces are encroached?



When asked if some accident has happened in their locality as a result of industrial activity then quite a significant percentage (54%) replied in the affirmative and identified drain incidents as the most predominant

(31%) and then traffic (27%) incidents (Fig. 25).

Figure 25-A

Q19. Has there been any accident in your locality due to industrial activity?

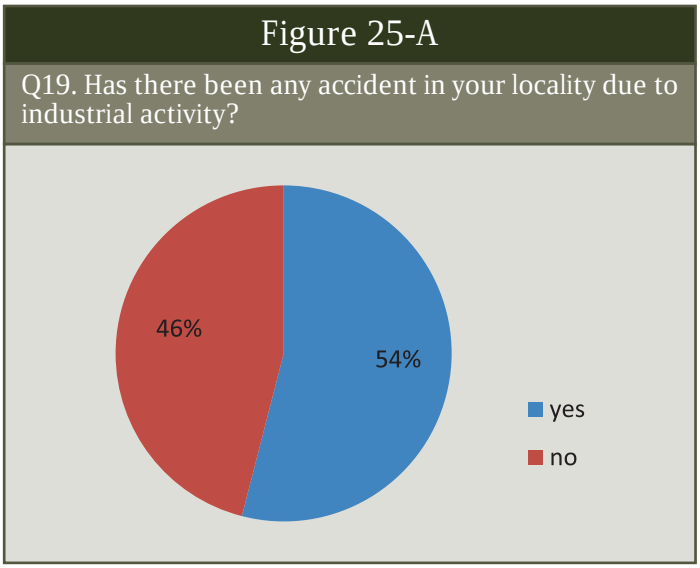
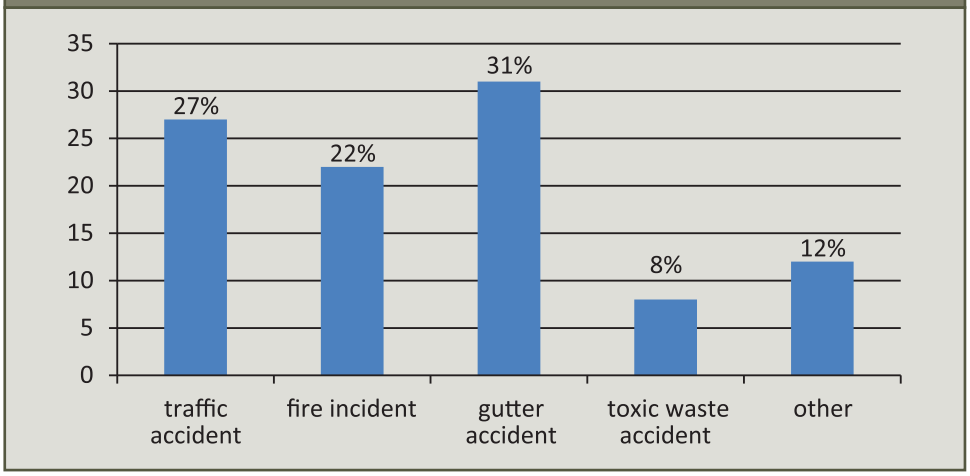


Figure 25-B

Q20. What type of accident has happened?



When asked if when they made a complaint with any agency what was the response than 5% of the respondent indicated that the problem got solved and 68% respondents indicated that they had to mobilize themselves

to get their issues resolved (Fig. 26).

Figure 26-A

Q21. If a complaint has been registered with a polluting industry then how has been the response?

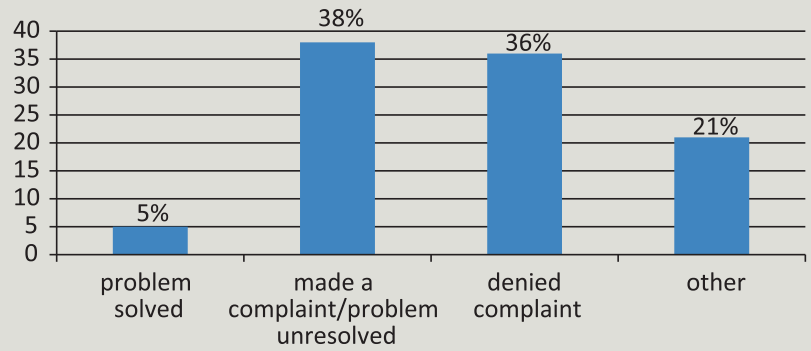
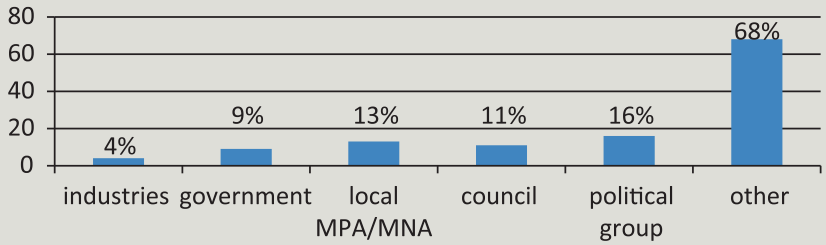


Figure 26-B

Q22. Who has been the most helpful in resolving the environmental issues in the area related with industrial activities?



Following are comparative findings for the surveys between SITE and Korangi areas:

Figure 27

Age

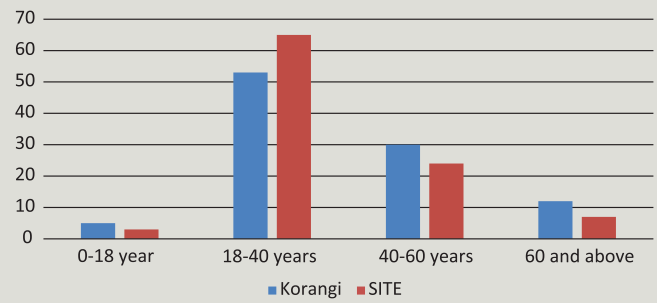


Figure 28

Gender

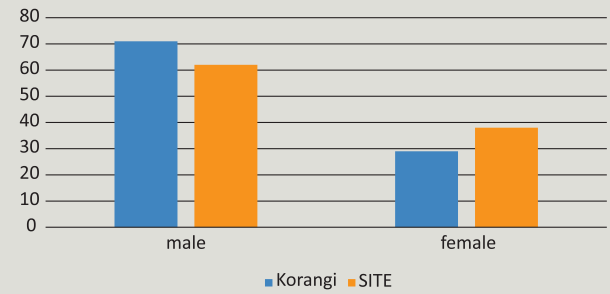


Figure 29

People living in your house

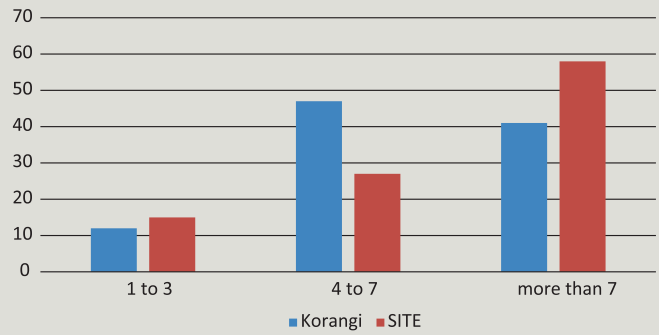


Figure 30

Household income

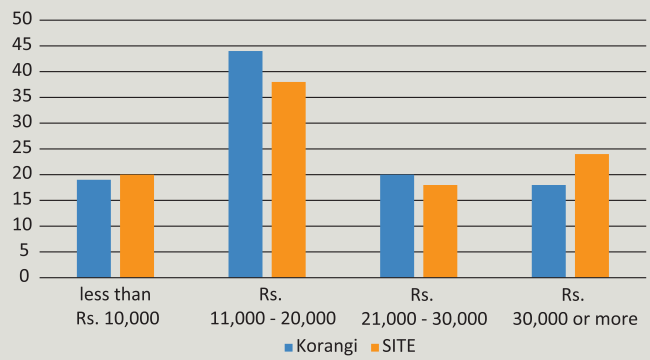


Figure 31

Is any member of your family working in the industry?

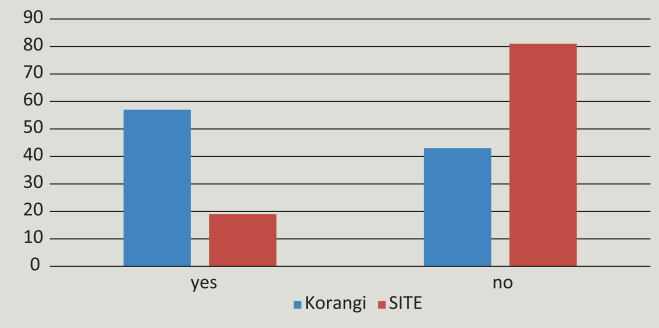


Figure 32

No. of family members working in a factory

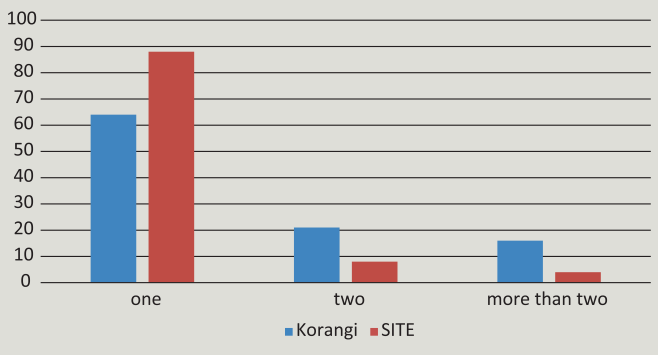


Figure 33

In what ways has your quality of living been impacted?

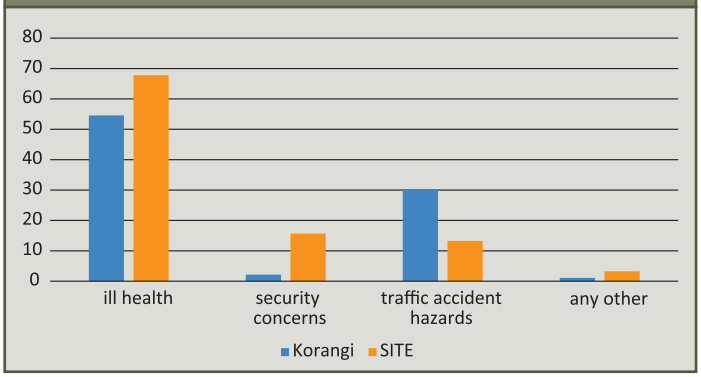


Figure 34

In your opinion which health concerns you attribute to industrial activities?

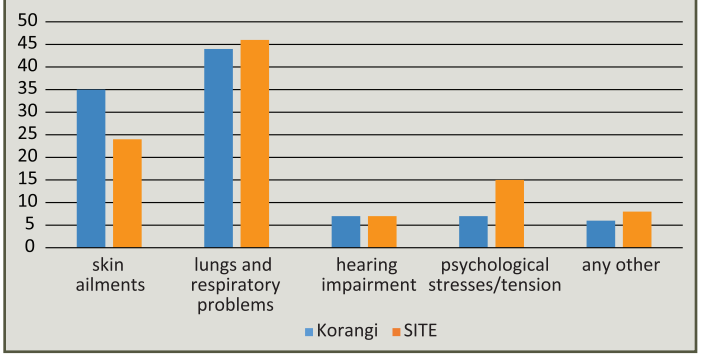


Figure 35

Environmental issues that are causes of major concern

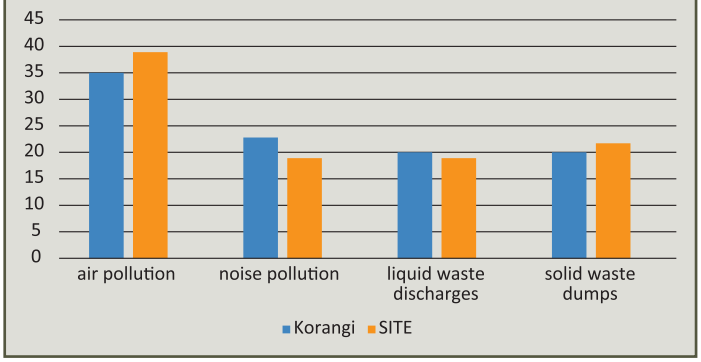


Figure 36

If industrial air pollution is a concern, then identify the major causes of air pollution

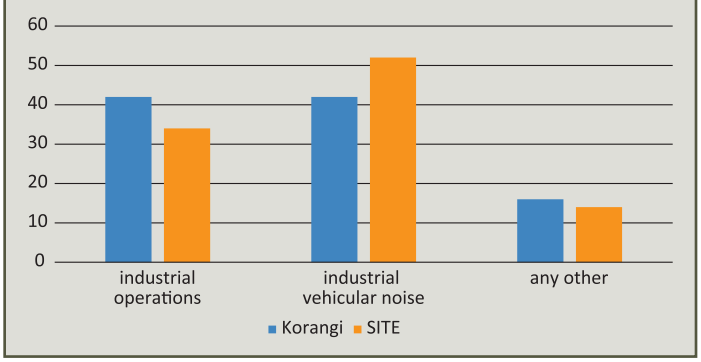


Figure 37

If industrial noise pollution is a concern, then identify the major causes of noise pollution

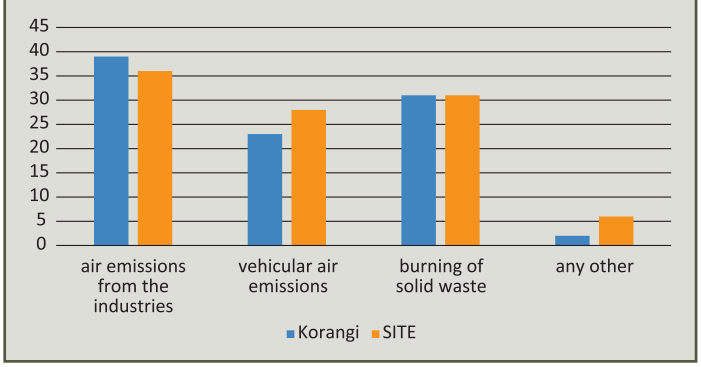


Figure 38

Rate the amount of noise made by industries in your area?

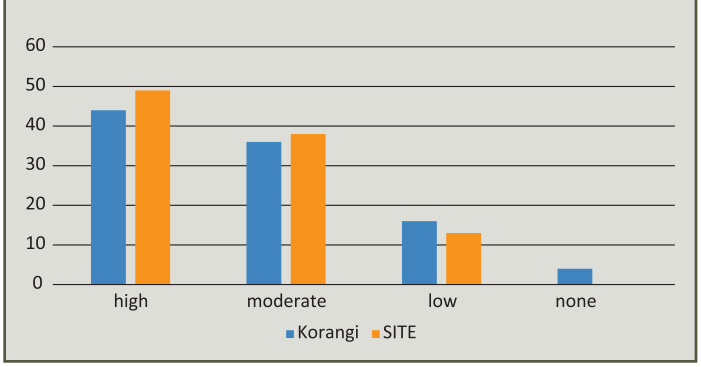


Figure 39

Major concern if industrial liquid waste discharge is a concern

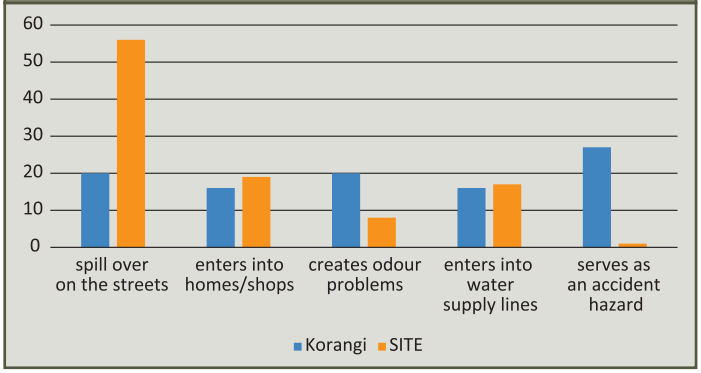


Figure 40

Does the industrial solid waste get randomly dumped in neighbourhoods?

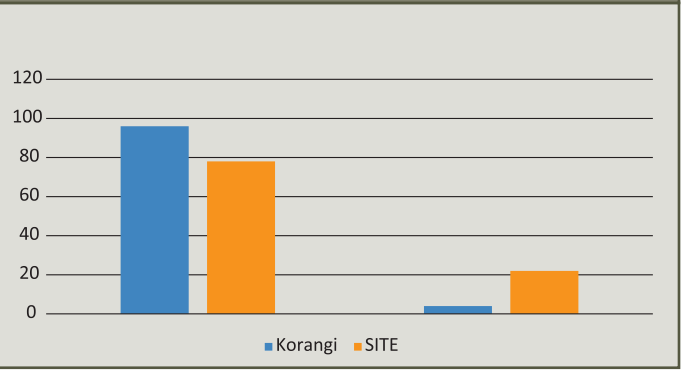


Figure 41

If solid waste is randomly dumped then where is it dumped?

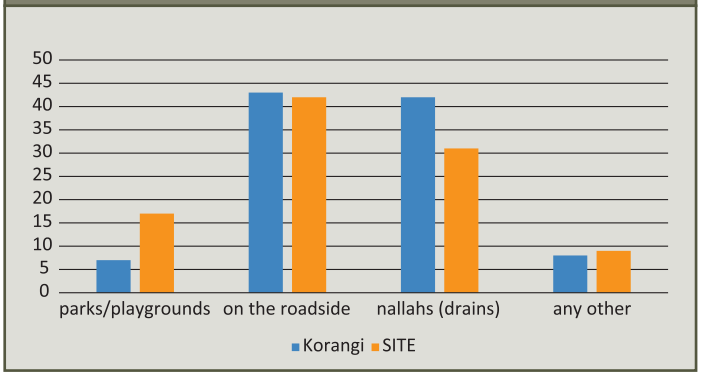


Figure 42

If solid industrial waste is dumped, who collects it?

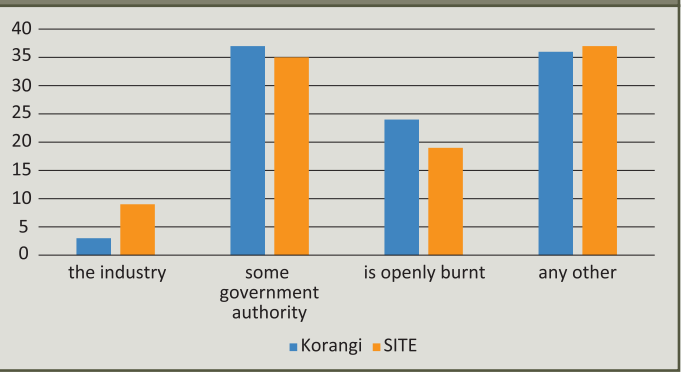


Figure 43

How often is industrial solid waste collected?

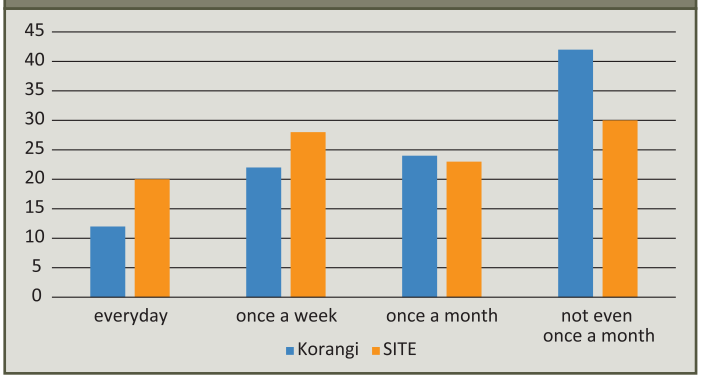


Figure 44

Which type of industry causes the most environmental concerns?

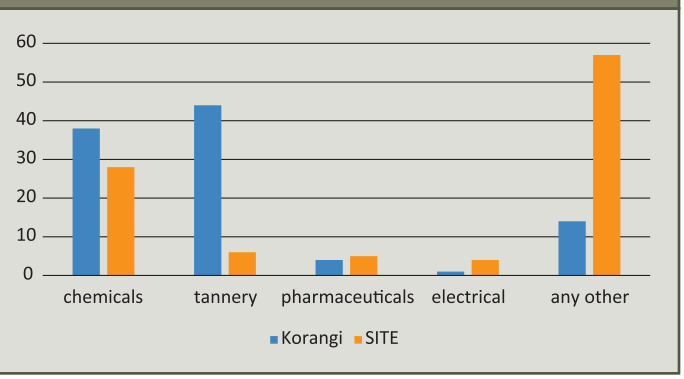


Figure 45

Does industrial activities in any way result in encroachments?

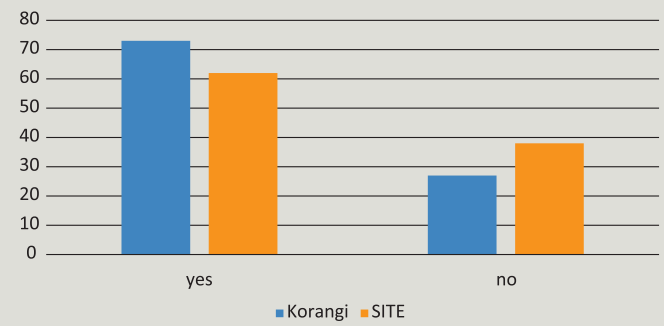


Figure 46

Which type of spaces are enroached?

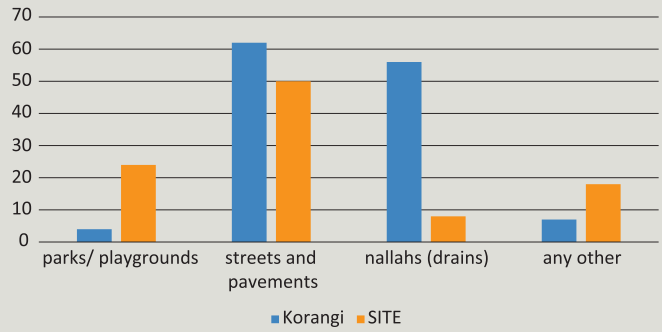


Figure 47

Has any industry done some neighbourhood improvement or community help works in your locality?

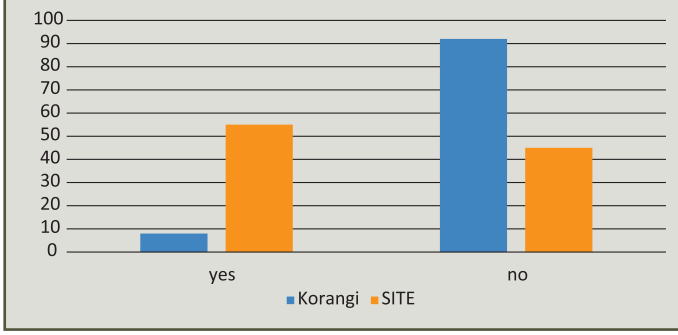


Figure 48

What type of industry has done neighbourhood improvement or community help?

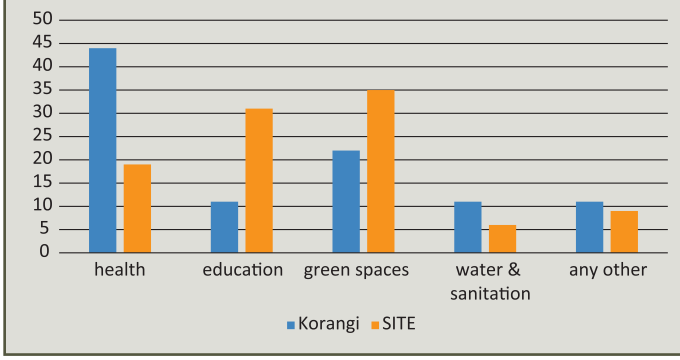


Figure 49

Has there been any accident in your locality due to industrial activity?

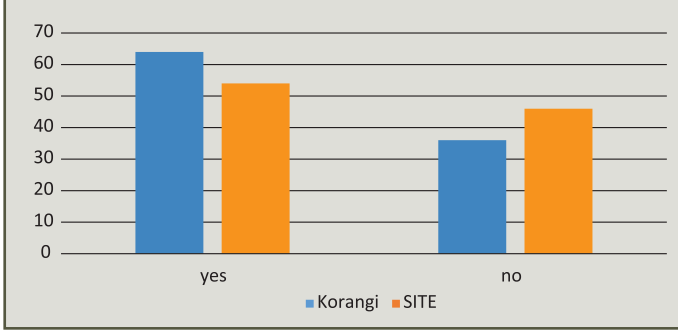


Figure 50

What type of accident has happened?

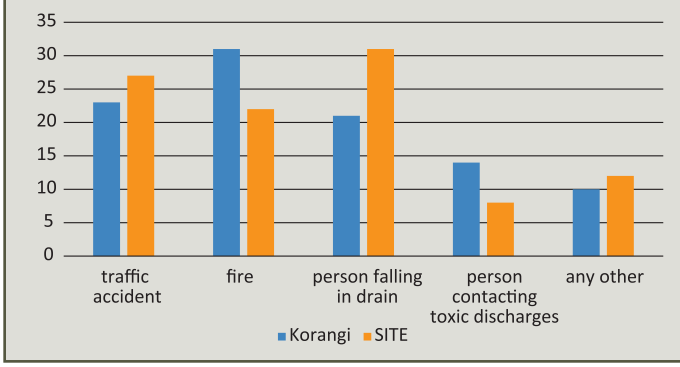


Figure 51

If a complaint has been registered with a polluting industry then how has been the response?

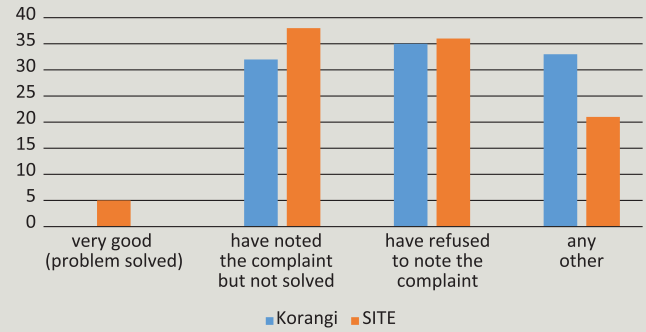
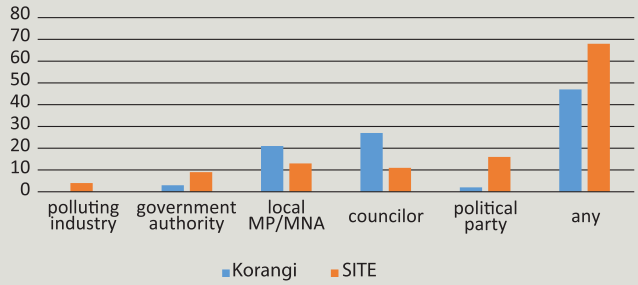


Figure 52

Who has been the most helpful in resolving the environmental issues in the area related with industrial activities?



Conclusions

There are a number of interesting findings which have been documented that demand consideration. They are assessed as follows:

It has been indicated quite clearly that the industrial estates housing hundreds of industrial units are located in densely populated localities with average household sizes mostly in the range of about 7 and more household members. This is not proper practice. Anywhere in the world where industrial zones are properly planned and developed they are located at a distance from human settlements. However, there is not much that can be done about this now. But this implies even greater provision of environmental safeguards that are presently missing as has been indicated by various survey findings.

With regards the health impacts of environmentally unregulated industrial activities, the major concern has been in both the localities, breathing and skin ailments. This finding also gets correlated with the finding that the major environmental concerns are related with air pollution and random dumping and burning of solid waste.

The air pollution problems in turn has mostly been associated with industrial vehicular activity that is an activity that is happening round the clock thus adding to the complexity of the problem. When it comes to solid waste management, it was revealed that the solid waste in many cases does not even get picked up on once a month basis and that forces the residents to dispose themselves which often is through open burning. Physical handling of the garbage and also open burning can find a direct relation with the finding of respiratory and skin problems.

Noise pollution also registers and that too in the most-noisy category. It was again interestingly found that respondents related noise mostly with industrial vehicular movement.

The drainage network that needs to be managed by the industrial estates is a source of multiple concerns. Mostly untreated liquid discharges from industries find their way in the drains, garbage also gets dumped in the drains while the drains are also being encroached upon by constructions taking place on the drains, mostly it was observed, commercial structures.

In terms of grievance redress, a very negative response was received with mostly the residents having to take it on their own to handle the environmental concerns. Neither from the government, political representatives or the industries a positive response it seems has been received that indicates a total collapse of governance.

What is indicated is a complete absence of working systems and mechanisms for resolving of the multiple environmental issues that are being faced by the residents on a daily basis. It is not that administrative and regulatory systems do not exist. The Industrial estates are both empowered and financially capable to take the required actions. The relevant government agencies also have a mandate when it comes to residential

areas. Then we have the Sindh Environmental Protection Agency that has the required regulatory role to play. It would appear that these responsibilities are not being assumed and the mandate not being enforced. Discussions with the industrial estate officials, government agency representatives including the environmental protection agencies has indicated that while they recognize that problems exist but generally engage in passing the buck and a blame game. Cited are weak enforcement powers when it comes to the regulatory agencies, lack of finances when it comes to the government civic agencies and lack of government support when it comes to the industrial estates. What is needed is an effort to bring all stakeholders on the table to resolve their conflicts and find a greater clarity in terms of powers, functions and accountability mechanisms. The problems also find a resonance in the larger land use management crisis in the city. Land has become a financial commodity rather than as a means for providing a social good. This means to corruption and subsequent violation of land use regulations.

There is now a growing focus on climate change globally that is being considered as the most urgent challenge that is faced by humanity at large. Subsequently, a lot finances and planning is being directed to make cities more environment friendly having a lesser carbon footprint. When it comes to the urban context, industrial activities are considered as a major cause contributing to climate change if being operated in the absence of relevant social and environmental safeguards. Pakistan can avail of this opportunity by directing the available funding and resources to making their industrial operations compatible with the requirements of the time. A beginning can be made from Karachi where already a vibrant mix of relevant stakeholders exists - the industry, civil society, government. There needs to be an effort to merge the potentials and capacities of all stakeholders to develop and implement a policy and implementation framework for positive change.

ENVIRONMENTAL LAWS RELEVANT TO NON-EXTRACTIVE INDUSTRY, COMMERCIAL OPERATIONS APPLICABLE IN THE PROVINCE OF SINDH

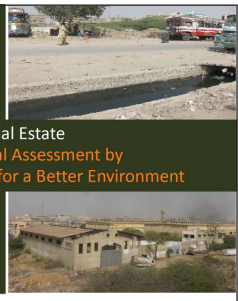
Provincial laws governing this sector provide for the promotion and development of industries, and regulate matters related to the general administration of factories and the employment of labor. These laws contain no provisions concerning the disposal of industrial waste.

Even where older provincial laws have been amended in recent years, no environmental provisions have been added. The Sindh Small Industries Corporation Act 1972, for example, was amended to gradually phase out small industry and focus on large-scale operations without any provisions to manage or mitigate the greater pollution impacts of larger industries. Similarly, the Sugar Factories Control Act 1950 was amended in 1995, making it mandatory to install quality control devices, but pollution control devices are not required.

Specified industrial and commercial activities are, however, subject to the restrictions imposed by PEPA 1997 regarding EIAs and the regulation of emissions. At the provincial and local level, industrial and commercial operations are also governed by local government, building control and development authority laws which aim, with varying degrees of coverage, to regulate the location of industrial units, particularly those involved in processes or products considered to be dangerous, flammable or hazardous.

Karachi Building and Town Planning Regulations 2002
Notification No. SO (Land) HTP/KBCA-3-39/2000
These Regulations, issued under the Sindh Buildings Control Ordinance 1979, provide exhaustive rules and procedures governing construction and development activities in the city (section 1-2). They apply to all of Karachi except for cantonment areas (section 1-1.3). The government may also declare "special areas" that are exempt from the application of these Regulations (section 1-3). Specified "dangerous trades" (section 25-6.12.1) and "offensive trades emanating obnoxious smells/effluents" (section 25-6.12.2) may only be carried out in "specially designated/approved areas" (section 25-6.12). Zoning provisions require all industrial effluent to be discharged "in keeping with" federal, provincial or local government "environmental standards" (section 25-6.7). All "hazardous waste" is to be disposed of according to the provisions of the NEQS (section 25-6.11). Waste treatments plants are required to comply with the NEQS, as are hospitals and industries (section 12-3). The Regulations also contain "general standards" for various development activities (chapters 20-23). General standards with respect to industrial development, defined to include extractive industry (section 22-1.1.3), include requirements for the removal of waste (section 22-3.1.1) and the elimination of noise pollution (section 22-3.1.2).

6.4.4 Pakistan Environmental Protection Act 1997 (No. XXXIV)
Industrial activity is defined in PEPA as "any operation or process for manufacturing, making, formulating, synthesizing, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purposes" (section 2 (xxii)). The wide scope provided by the definition for regulating industrial activity is reflected in the operative provisions of the law, particularly the prohibition



on certain emissions with provisions for levying pollution charges (section 11); IEE/EIA (section 12); licensing (sections 14 and 15); and environmental protection orders (section 16).

A project is defined to include construction, operation, alteration, expansion, repair, decommissioning or abandonment of factories or other installations (sections 2 (xxxv) (c) and 2 (xxxv) (f)). PEPA requires parties desiring to commence a project to submit an EIA or IEE to the Federal Agency (section 12). Meanwhile, the Federal Agency may issue an environmental protection order in cases where discharges, emissions, waste disposal or the handling of hazardous substances are causing or likely to cause an adverse environmental effect (section 16).

The penalty for violating provisions governing discharges and emissions (section 11), and environmental protection orders (section 16), is a fine that may extend to 1 million rupees for a first offence (section 17 (1)). For non-compliance with provisions governing the handling of hazardous substances (section 14), fines may extend to 100,000 rupees (section 17(2)). In addition to imprisonment for up to two years, penalties for repeat offenders may include closure and confiscation of the factory, machinery and equipment; an order to restore the environment at the violator's own cost; and an order to pay compensation for any loss, bodily injury or damage to health or property caused by the violation (section 17 (5)).

Hospital Waste Management Rules 2005
SRO 1013(1)/2005 dated 3 August 2005
These Rules, framed under section 31 of PEPA 1997, make hospitals responsible for the "proper management" and disposal of waste (section 3). Several categories of waste are specified in the Rules, including chemical (section 2 (1) (a)), "genotoxic" (section 2 (1) (c)), infectious (section 2 (1) (h)) and radioactive (section 2 (1) (n)).

Every hospital is required to set up a waste management team (section 4) which prepares, implement and monitors a waste management plan (sections 4 and 15). Hospitals are defined broadly to include clinics, laboratories, pharmacies and a wide range of health care, research and veterinary institutions and centers (section 2 (1) (f)). The remaining provisions of the Rules deal with the responsibilities of hospital officials; matters related to waste segregation, storage, transportation and disposal; and measures to be taken in case of accidents or "spillages". The federal government may exempt any class of hospitals from any or all of the provisions of these Rules (section 25).

Pakistan Environmental Protection Agency Review of Initial
Environmental Examination and Environmental Impact Assessment Regulations 2000
SRO 339(I)/2000 dated 13 June 2000
Under these Regulations, manufacturing and processing projects are required to undergo prior IEE or EIA. Relatively small-scale industries and commercial operations, which require a prior IEE, are listed In Schedule I, part C. Larger-scale manufacturing and processing operations requiring a prior EIA are Listed in Schedule II, part B. At the local level, the district law office is responsible for assisting in the implementation of PEPA

1997 (Sindh District Government (Conduct of Business) Rules 2001, section 3(2), read with schedule II, item 8 (ii)).

National Environmental Quality Standards SRO 742 (I)/93 dated 29 August 1993
This Order was issued under the Pakistan Environmental Protection Ordinance 1983 (No. XXXVII). although the 1983 Ordinance is repealed, these standards remain in force. The NEQS specify maximum limits for various types of effluent and emissions, including liquid industrial effluent (section 2, read with annex I) and industrial gaseous emissions (section 2, read with annex II). The NEQS have been revised and amended periodically, and substantively so in the year 2000.

Box 1
National Environmental Quality Standards (SRO 742 (I)/93 dated 29 August 1993) amended by:
• SRO 1023 (I)/95 dated 16 October 1995 • SRO 549 (I)/2000 dated 8 August 2000

Coastal Development Authority Act 1994 (No. XXVIII)
This Act establishes an Authority for the development, improvement and beautification of the coastal areas of Thatta and Badin districts. The Authority is responsible for planning and implementing schemes in a number of areas including "entrepreneur development" (section 7 (2) (i)), and providing credit for industrial development and "other allied activities" (section 7 (2) (d)). It also assists in the establishment of coconut palm plantations, and makes arrangements for extraction and refining (section 7 (10)).

Sindh Small Industries Corporation Act 1972 (No. XXVI)
This Act establishes a Sindh Small Industries and Handicrafts Development Corporation (section 3), which was re-named the Sindh Small Industries Corporation in 1979. The Corporation assists in the establishment of cottage and small industry (section 16 (1)), providing loans and furnishing bank guarantees (section 16 (2)) for industries operating in small industries estates (section 19). The Corporation establishes small industries estates (section 25 (xiv)), and carries out a wide range of functions related to the promotion and operation of small industries, including the supply of raw materials (section 25 (xviii)). It is also required to introduce "better means of production" (section 25 (xx)) and to establish "model projects" (section 25 (v)). Although the law contains no provisions that directly address the environmental impact of industrial operations, these clauses allow the Corporation to promote projects with minimal adverse effects on natural resources and the environment.

At the time of its inception, the Corporation was responsible for developing small industries with total fixed assets, excluding land, worth up to 2 million rupees (section 2 (n)). By 1987, it was responsible for relatively larger industries with an "original value" of fixed capital investment, including land and buildings, of up to

10 million rupees (section 2 (n), as amended in 1987). The functions of the Corporation, however, remain unchanged.

Box 2
Sindh Small Industries and Handicrafts Development Corporation Act 1972 (No. XXVI) Adapted and amended by:
• Sindh Adaptation of Laws Order 1975 • Sindh Repealing and Amending Act 1975 (No. XVII) • Sindh Small Industries and Handicrafts Development Corporation (Amendment) Ordinance 1977 (No. XI) • Sindh Small Industries and Handicrafts Development Corporation (Amendment) Ordinance 1978 (No. VIII) • Sindh Small Industries and Handicrafts Development Corporation (Second Amendment) Ordinance 1978 (No. XII) • Sindh Small Industries and Handicrafts Development Corporation (Amendment) Ordinance 1979 (No. II) • Sindh Small Industries Corporation (Amendment) Ordinance 1979 (No. XIV) • Sindh Small Industries Corporation (Amendment) Ordinance 1983 (No. XIV) • Sindh Small Industries Corporation (Amendment) Act 1987 (No. III) • Sindh Small Industries Corporation (Amendment) Act 1989 (No. I of 1990 [sic]) Repeals: • Sindh Small Industries and Handicrafts Development Corporation Ordinance 1972 (No. XXIII)

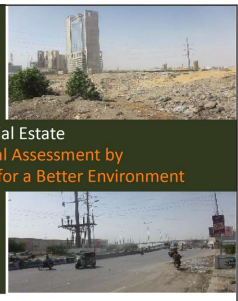
Sindh Industries (Control on Establishment and Enlargement) Ordinance 1963 (WP No. IV)
This Ordinance allows a prohibition to be imposed on the establishment of new industry or the expansion of an existing industrial concern in any "local area" to which its provisions are extended (section 1(3), read with section 3). For the purposes of this Ordinance, an industrial undertaking is defined as any industry manufacturing or processing goods or commodities, and employing 20 or more workers "without the aid of power" or 10 or more workers "with the aid of power" (section 2 (c)). Exemptions may be granted at the discretion of the government (section 11) but no criteria for exemptions have been provided in the law. The provincial government may delegate its powers and make rules to carry out the purposes of this Ordinance. The law contains no other provisions. This Ordinance appears to have been promulgated for the sole purpose of keeping industrial operations from being set up in certain areas. It is specifically saved by the Constitution of 1973, where it is included in the list of instruments that must be brought into conformity with the fundamental rights guaranteed to all citizens within a specified period of time (article 8(4), read with the First Schedule, part II, item V (4)). The law was adapted specifically for the province of Sindh in 1975. No legal instrument specifically repealing this Ordinance could be identified.

Box 3
West Pakistan Industries (Control on Establishment and Enlargement) Ordinance 1963 (No. IV) Adapted and amended by:
• Sindh Adaptation of Laws Order 1975 • Sindh Repealing and Amending Act 1975 (No. XVII) • Sindh Amendment of Laws Act 1976 (No. V)

Sugar Factories Control Act 1950 (NWFP No. XXII)
This NWFP Act was adapted first for all of West Pakistan, and subsequently amended and adapted for the province of Sindh. It regulates the supply of sugarcane to sugar factories (section 14), the price at which it may be purchased (section 16), and other related issues. The provincial government may designate "reserved" areas (section 10), establish a Sugar Factories Control Board (section 3) and appoint inspectors (section 7).

Box 4
Sugar Factories Control Act 1950 (NWFP No. XXII) Adapted and amended by:
• North West Frontier Province Sugar Factories Control (Amendment) Ordinance 1961 (No. III) • Sugar Factories Control (West Pakistan Amendment) Ordinance 1963 (No. XLV) • Sugar Factories Control Act (Sindh Amendment) Ordinance 1971 (No. XI) • Sindh Adaptation of Laws Order 1975 • Sindh Repealing and Amending Act 1975 (No. XVII) • Sugar Factories Control (Amendment) Ordinance 1980 (No. XVI) • Sugar Factories Control (Amendment) Ordinance 1985 (No. II) • Sugar Factories Control (Sindh Amendment) Act 1993 (No. VIII of 1994 [sic]) • Sugar Factories Control (Sindh Amendment) Act 1995 (No. IX) Also see: •Sugar Factories Control Rules 1950

Factories Act 1934 (No. XXV)
This law governs the employment of labor, working hours, working conditions and facilities to be provided in the workplace. The Act deals primarily with matters related to labor relations but contains a detailed chapter on the health and safety of workers (chapter III, sections 13-33). The law requires that factories be kept clean and that "effluvia arising from any drain, privy or other nuisance" be removed at regular intervals (section 13). These and other health and safety stipulations apply only to workers within the premises of a factory. The Act does not mention the disposal of waste generated during the manufacturing process or require measures to mitigate the impact of such waste on the environment. All powers under this Act, including the power to make rules, lie with provincial governments (section 59).



Box 5
Factories Act 1934 (No. XXV) Amended by:
• Central Laws (Statute Reform) Ordinance 1960 (No. XXI) • Factories (West Pakistan Amendment) Ordinance 1966 (No. IV) • Factories Act (Sindh Amendment) Ordinance 1971 (No. V) • Federal Laws (Revision and Declaration) Ordinance 1981 (No. XXVII)

Sindh Factories Rules 1975

These Rules, made under the Factories Act 1934, govern the employment of factory labor, providing For the health and safety of workers. They contain detailed provisions regarding facilities and safety Equipment to be provided to workers.

Boilers Act 1923 (No. V)

This federal Act consolidates and amends the law relating to steam boilers exceeding a capacity of five gallons, and requires that all boilers be registered (section 6). The law does not apply to boilers on board a ship or mechanically propelled vessel, boilers belonging to the Pakistan Navy, or boilers less than 20 gallons in capacity if they are used by hospitals for sterilizing equipment (section 3). The provincial government has the power to make rules (section 29) while the Boilers Board constituted under this Act may make regulations (section 28). Although most powers under this law lie with the provincial government, the federal government retains the power to appoint members of the Board (section 27-A) and may grant exemptions to certain classes of boilers operated by the railways (section 3(2)).

Box 6
Boilers Act 1923 (No. V) Amended and adapted by:
• Boilers (West Pakistan Amendment) Ordinance 1958 (No. XXXIII) • Central Laws (Statute Reform) Ordinance 1960 (No. XXI) • Central Adaptation of Laws Order 1964 (President's Order No. 1) • Boilers Act (Sindh Amendment) Ordinance 1971 (No. VIII) • Federal Adaptation of Laws Order 1975 (President's Order No. 4) • Boilers (Amendment) Act 1975 (No. XXX) • Federal Laws (Revision and Declaration) Ordinance 1981 (No. XXVII)

PAKISTAN ENVIRONMENTAL LEGISLATION AND THE NATIONAL ENVIRONMENTAL QUALITY STANDARDS

Major Pakistan Environmental Legislation	
Sector	**Legislation**
Environmental protection	The Pakistan Penal Code (1860) Pakistan Environmental Protection Ordinance, No. XXVII of 1997
Land use	The Land Improvement Loans Act (1883) The Punjab Development of Damaged Areas Act (1952) The Punjab Soil Reclamation Act (1952) The West Pakistan Agricultural Pests Ordinance (1959) and Rules (1960) The Islamabad (Preservation of Landscape) Ordinance (1966) The Punjab Development Cities Act (1976) The Balochistan, NWFP, Punjab and Sindh Local Government Ordinance(s) (1979/80) The NWFP Salinity Control and Reclamation Act (1988)
Water quality and resources	The Pakistan Penal Code (1860) The Canal and Drainage Act (1873) The Factories Act (1934) West Pakistan (?) Act (1958) The Balochistan Ground Water Rights Administration Ordinance (1978) The Balochistan, NWFP, Punjab and Sindh Local Government Ordinance(s) (1979/80) On-Farm Water Management and Water Users' Associations Ordinance (1981) Indus River Water Apportionment Accord-(1991) Statutory Notification S.R.R. 742 (1993)
Air quality	The Pakistan Penal Code (1860) The Factories Act (1934) The West Pakistan Prohibition of Smoking in Cinema Houses Ordinance (1960) The Motor Vehicles Ordinance (1965) and Rules (1969) The Balochistan, NWFP, Punjab and Sindh Local Government Ordinance(s) (1979/80) Statutory Notification S.R.R. 742 (1993) Statutory Notification S.R.R. 1023 (1995)

Sector	Legislation
Noise	The West Pakistan Regulation and Control of Loudspeakers and Sound Amplifiers Ordinance (1965) The Motor Vehicle Ordinance (1965) and Rules (1969)
Toxic or hazardous substances	The Pakistan Penal Code (1860) The Explosives Act (1884) The Factories Act (1934) The Agricultural Pesticides Ordinance (1971) and Rules (1973)
Solid wastes and effluents	The Factories Act (1934) The Balochistan, NWFP, Punjab and Sindh Local Government Ordinance(s) (1979/80) Pakistan Environmental Protection Ordinance, No. XXVII of 1997
Marine and fisheries	The West Pakistan Fisheries Ordinance (1961) Balochistan Sea-Fisheries Ordinance (1970) and Rules (1971) The NWFP Fisheries Rules (1976) Territorial Waters and Maritime Zones Act (1976)
Forest conservation	The Punjab Forest (Sale of Timber) Act (1913) The Forests Act (1927) The NWFP Hazara Forest Act (1936) The West Pakistan Firewood and Charcoal (Restrictions) Act 1964 The Punjab Plantation and Maintenance of Trees Act (1974) The Cutting of Trees (Prohibition) Act (1975) The NWFP Management of Protected Forests Rules (1975) The Balochistan, NWFP, Punjab and Sindh Local Government Ordinance(s) (1979/80) The NWFP (Conservation and Exploitation of Certain Forests in Hazara Division) Ordinance (1980) The NWFP Forest Development Corporation Ordinance (1980)

Sector	Legislation
Parks and wildlife conservation protection	The West Pakistan Ordinance (1959) The Kohat Marzri Control Act (1954) The Sindh Wildlife Protection Ordinance (1972) and Rules (1972) The Punjab Wildlife (Protection Preservation Conservation and Management) Act (1974) and Rules (1974) The Balochistan Wildlife Protection Act (1974) and Rules (1975) The NWFP Wildlife (Protection Preservation Conservation and Management) Act (1975) and Rules (1976) The Pakistan Plant Quarantine Act (1976) Islamabad Wildlife (Protection Preservation Conservation and Management) Ordinance (1979/80) The Balochistan, NWFP, Punjab and Sindh Local Government Ordinance(s) (1979/80) Export and Control Order (1982)
Mineral development	The Regulation of Mines and Oil-Fields and Mineral Development (Government Control) Act (1948)
Cultural environment	The Antiquities Act (1975) The Punjab Special Premises (Preservation) Ordinance (1985)
Livestock	West Pakistan Goats (Restriction) Ordinance (1959) West Pakistan Punjab Animal Slaughter Control Act (1963) The Grazing of Cattle in the Protected Forests (Range Lands) Rules (1978) Pakistan Animal Quarantine (Import and Export of Animals and Animal Products) Ordinance (1979/80) The Balochistan, NWFP, Punjab and Sindh Local Government Ordinance(s) (1979/80)
Public health and safety	The Pakistan Penal Code (1860) The Boilers Act (1923) The Public Health (Emergency Provisions) Ordinance (1944) The West Pakistan Factories Canteen Rules (1959) The Balochistan, NWFP, Punjab and Sindh Local Government Ordinance(s) (1979/80) The West Pakistan Epidemic diseases Act (1979/80)
Principal source: Table 5.8, The Pakistan National Conservation Strategy	

National Enviromental Quality Standards for Municipal and Liquid industrial Effluents (mg/l, unless otherwise defined)					
S No	Parameter	Existing Standards	Revised Standards		
			into inland waters	into sewage treatment	into sea
1	Temperature / Temperature increase*	40°C	≤3°C	≤3°C	≤3°C
2	pH value	6-10	6-9	6-9	6-9
3	5-days Biochemical Oxygen Demand (BOD) at 20°C.1	80	80	250	80**
4	Chemical Oxygen Demand (COD) (1)	150	150	400	150
5	Total suspended solids	150	200	400	200
6	Total dissolved solids	3500	3500	3500	3500
7	Grease and oil	10	10	10	10
8	Phenolic compounds (as phenol)	0.1	0.1	0.3	0.3
9	Chloride (as Cl)	1000	100	1000	SC
10	Fluoride (as F)	20	10	10	10
11	Cyanide (as CN) total.	2	1	1	1
12	An-ionic detergents (as MBAS) (2)	20	20	20	20
13	Sulphate (SO_4)	600	600	1000	SC
14	Sulphate (S)	1.0	1	1	1
15	Ammonia (NH_3)	40	40	40	40
16	Pesticides, herbicides, fungicides and insecticides (3)	0.15	0.15	0.15	0.15
17	Cadmium (4)	0.1	0.1	0.1	0.1
18	Chromium (trivalent & hexavalent) (4)	1.0	1	1	1
19	Copper (4)	1.0	1	1	1
20	Lead (4)	0.5	0.5	0.5	0.5
21	Mercury (4)	0.01	0.01	0.01	0.01
22	Selenium (4)	0.5	0.5	0.5	0.5

S No	Parameter	Existing Standards	Revised Standards		
			into inland waters	into sewage treatment	into sea
23	Nickel (4)	1.0	1	1	1
24	Silver (4)	1.0	1	1	1
25	Total toxic metals	2.0	2	2	2
26	Zinc	5.0	5	5	5
27	Arsenic (4)	1.0	1	1	1
28	Barium (4)	1.5	1.5	1.5	1.5
29	Iron	2.0	8	8	8
30	Manganese	1.5	1.5	1.5	1.5
31	Boron (4)	6.0	6	6	6
32	Chlorine	1.0	1	1	1

1. Summing minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1:10 dilution means for example, that for each one cubic meter of treated effluent the recipient water body should have 10 cubic meter of water for dilution of this effluent.
2. Modified Benzene Alkyl Sulphate; assuming surfactant as bio-degradable.
3. Pesticides, herbicides, fungicides, and insecticides.
4. Subject to total toxic metals discharge.
5. Applicable only when and where sewage treatment is operational and BOD5=80 mg/l is achieved by the sewer treatment system.
6. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries.

SC discharge concentration at or below sea concentration.

The effluent should not result in temperature increase of more than 3°C at the edge of the zone where initial mixing and dilution take place. In case zone is not defined, use 100 meters from the point of discharge.

Note: Dilution of gaseous emissions and liquid effluents to bring them to the NEQS limiting value is not permissible through excess air mixing/blowing in to the gaseous emissions or through fresh water mixing with the effluent before discharge into environment.

** The value of BOD and COD is 200 and 400 respectively.

National Environmental Quality Standards for Industrial Gaseous Emission (mg/Nm3, unless otherwise defined)				
S No	**Parameter**	**Source of Emission**	**Existing Standards**	**Revised Standards**
1	Smoke (1)	Smoke opacity not to exceed	40% or 2 (Ringle-mann scale)	40%
2	Particulate matter (2)	Boilers and furnaces:		
		(i) Oil fired	300	300
		(ii) Coal fired	500	500
		(iii) Cernent kilns	200	200
		Grinding, crushing, clinker coolers and related processes, metallurgical processes, converter, blast furnaces and cupolas	500	500
3	Hydrogen chloride (3)	Any	400	400
4	Chlorine (3)	Any	150	150
5	Hydrogen fluoride (3)	Any	150	150
6	Hydrogen sulphide (3)	Any	10	10
7	Sulphur oxides	Sulfuric acid / Sulphonic acid plants	400	5000
		Other		1700
8	Carbon monoxide (3)	Any	800	800
9	Lead (3)	Any	50	50
10	Mercury (3)	Any	10	10
11	Cadmium (3)	Any	20	20
12	Arsenic (3)	Any	50	50
13	Copper (3)	Any	20	20
14	Antimony (3)	Any	200	200
15	Zinc (3)	Any	200	300

S No	Parameter	Source of Emission	Existing Standards	Revised Standards
16	Oxides of nitrogens	Nitric acid manufacturing unit	400	3000
		Gas fired	400	400
		Oil fired		600
		Coal fired		1200

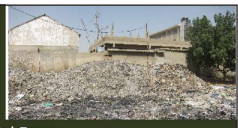
1. Or 2 on the Ringlemann scale
2. Based on the assumption that the size of the particulates is 10 micron or more.
3. Any source
4. In respect of emissions of sulphur dioxide and nitrogen oxides, the power plants operating on oil or coal as fuel shall, in addition to national Environmental Quality Standards (NEQS) specified above, comply with the following standard.

Sulphur Dioxide and Nitrogen Oxide Ambient Air Requirements

A. SULPHUR DIOXIDE
Sulphur Dioxide Background Levels (ug/m3)

Background Air Quality (SO2 Basis)	Annual Average (ug/m3	Max. in 24 Hour Interval (ug/m3)	Standards	
			Criterion I Max. SO_2 Emission (Tons/day/Plant)	**Criterion II** Max. Allowable Ground Level Increment to Ambient (one year average, ug/m3)
Unpolluted	<50	<200	<500	50
Moderately				
Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	>100	>400	100	10

* For intermediate values between 50 and 100 ug/m3 linear interpolations should be used.
.** No project with sulphur dioxide emissions will be recommended.



Sulphur Dioxide and Nitrogen Oxide Ambient Air Requirements	
B. NITROGEN OXIDES Ambient air concentrations of nitrogen oxides, expressed as NO_2, should not exceed the following:-	
Annual Arithmetic Mean	100 ug/m3 (0.05 ppm)
Emission levels for stationary sources discharges, before mixing with the atmosphere, should be maintained as follows: For fuel fired stream generators, as nanogram (10E-9 gram) per joule of heat input:	
Liquid fossil fuel	130
Solid fossil fuel	300
Lignite fossil fuel	260

NEQS INDUSTRIAL GAS

National Environmental Quality Standards For Industrial Gaseous Emission (mg/Nm3, unless otherwise defined)				
S No	**Parameter**	**Source of Emission**	**Existing Standards**	**Revised Standards**
1	Smoke	Smoke opacity not to exceed	40% or 2 (Ringle-mann scale)	40% or 2 (Ringle-mann scale) or equivalent smoke number 40%
2	Particulate matter (1)	(a) Boilers and furnaces:		
		(i) Oil fired	300	300
		(ii) Coal fired	500	500
		(iii) Cement kilns	200	200
		(b) Grinding, crushing, clinker coolers and related processes, metallurgi-cal processes, converter, blast fur-naces and cupolas	500	500
3	Hydrogen chloride	Any	400	400
4	Chlorine	Any	150	150
5	Hydrogen fluoride	Any	150	150
6	Hydrogen sulphide	Any	10	10
7	Sulphur oxides(2)(3)	Sulfuric acid / sulphonic acid plants	400	5000
		Other plants except power plants operating on oil and coal	400	1700
8	Carbon monoxide	Any	800	800
9	Lead	Any	50	50
10	Mercury	Any	10	10
11	Cadmium	Any	20	20
12	Arsenic	Any	20	20
13	Copper	Any	50	50
14	Antimony	Any	20	20
15	Zinc	Any	200	200

S No	Parameter	Source of Emission	Existing Standards	Revised Standards
16	Oxides of nitrogens (3)	Nitric acid manufacturing unit	400	3000
		Other plants except power plants operating on oil or coal:		
		Gas fired	400	400
		Oil fired	———	600
		Coal fired	———	1200

Explanations:

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 percent sulphur content in fuel oil. Higher content of sulphur will cause standards to be pro-rated.
3. In respect of emissions of sulphur dioxide and nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to National Environmental Quality Standards (NEQS) specified above, comply with the following standards:

A. Sulphur Dioxide				
Sulphur Dioxide Background Levels Microgram per Cubic Meter ug/m3 Standards				
Background Air Quality (SO2 Basis)	Annual Average (ug/m3	Max. in 24 Hour Interval (ug/m3)	**Criterion I** Max. SO_2 Emission (tons/day/plant)	**Criterion II** Max. Allowable Ground Level Increment to Ambient (one year average, ug/m3)
Unpolluted	< 50	< 200	500	50
Moderately polluted*				
Low	50	200	500	50
High	100	400	100	10
Very polluted**	> 100	> 400	100	10

* For intermediate values between 50 and 100 ug/m3 linear interpolations should be used.
** No projects with sulphur dioxide emissions will be recommended.

B. NITROGEN OXIDES	
Ambient air concentrations of nitrogen oxides, expressed as NO2, should not exceed the following:	
Annual Arithmetic Mean	100 ug/m3 (0.05 ppm)
Emission levels for stationary source discharges, before mixing with the atmosphere, should be maintained as follows:-	
For fuel fired steam generators, as nanogram (10-gram) per joule of heat input:	
Liquid fossil fuel	130
Solid fossil fuel	300
Lignite fossil fuel	260
Note: Dilution of gaseous emissions to bring them to the NEQS limiting value is not permissible throughexcess air mixing blowing before emitting into the environment.	

SURVEY QUESTIONNAIRE

Name:
Age:

- 0-18 years
- 19-40 years
- 41-60 years
- Above 60 years

Gender:

- Male/Female

Occupation:
Type of Residency:

- Ownership/Rental

Period of residence:

- 0-5 years
- 6-15 years
- 16-30 years
- More than 30 years

No. of family members:
(including the interviewed)

- No family member (living alone)
- 1-3
- 4-7
- More than 7

Household income range:

- Less than Rs. 10,000
- Rs. 11,000 – Rs. 20,000
- Rs. 21,000 – Rs, 30,000
- Rs. 31,000 or more

Contact #
Address:

1. Is any member of your family working in the _____ industries?
   Yes/No
   If answer to Q.1 is 'yes',

2. Then how many family members are working in the industries?
   - One
   - Two
   - More than two

3. In what way has your quality of living been impacted?
   - Ill health
   - Security concerns
   - Traffic accident hazards
   - Any other

   (Multiple choice possible)
   (If ill health is not a choice indicated by the respondent, go to Q. 5)

4. In your opinion which health concerns you attribute to industrial activities?
   - Skin ailments
   - Lungs and respiratory problems
   - Hearing impairment
   - Psychological stresses/tension
   - Any other

   (Multiple choices possible)

5. Rate according to priority from the following industry related environmental issues as causes of major concern:
   - Air pollution
   - Noise pollution
   - Liquid waste discharges
   - Solid waste dumps

6. If industrial air pollution is a concern, then identify the major causes of air pollution:
   - Air emissions from the industries
   - vehicular air emissions
   - Burning of solid waste
   - Any other

   (Multiple choices are possible)

7. If industrial noise pollution is a concern, then identify the major causes of noise pollution:
   - Industrial operations
   - Industrial vehicular noise
   - Any other

8. Rate the amount of noise made by industries in your area?
   - very noisy
   - Moderate noise
   - Less noise
   - No noise at all

9. If industrial liquid waste discharges is a concern, then rate according to priority, the major concerns:
   - Spills over on streets
   - Enters into homes/shops
   - Creates odor problems
   - Enters into water supply lines
   - Serves as an accident hazard (Prompt - example fire, people falling in drains carrying the waste)

   (Multiple choices is possible)

10. Does the industrial solid waste get randomly dumped in the neighborhoods?
    Yes/No

11. If the solid waste is randomly dumped then where is it dumped?
    - Parks/playgrounds
    - On the roadside
    - Nallahs (drains)
    - Any other

    (Multiple choices are possible)

12. If industrial solid waste is randomly dumped then who collects it?
    - The industry
    - Some government authority
    - Is openly burnt
    - Any other

13. How often is the industrial solid waste collected?
    - Every day
    - Once a week
    - Once a month
    - Not even once a month

14. Rate according to your opinion as to which type of industrial activity causes the most environmental concerns?
    - Chemicals
    - Tannery
    - Pharmaceutical
    - Electrical
    - Any other

15. Do industrial activities in any way result in encroachments?
    Yes/No
    (If answer to Q.17 is No, then go to Q.20)

16. Which types of spaces are encroached?
    - Parks/playgrounds
    - Streets and pavements
    - Nallahs (Drains)
    - Any other

    (Multiple choices are possible)

17. Has any industry done some neighborhood improvement or community help works in your locality?
    Yes/No

18. If any industry has done some neighborhood improvement or community help works in your locality, then what has been the nature of work?
    - Health
    - Education
    - Green spaces

- Water & sanitation
- Any other
  (Multiple choices are possible)

19. Has there been any accident in your locality due to industrial activity?
    Yes/No

20. What type of accident has happened?
    - Traffic accident
    - Fire
    - Person falling in drain
    - Person contacting toxic discharges
    - Any other
      (Multiple choices are possible)

21. If a complaint has been registered with a polluting industry than how has been the response?
    - very good (problem solved)
    - Have noted the complaint but problem not solved
    - Have refused to note the complaint
    - Any other
      (Multiple choices are possible)

22. Who has been the most helpful in resolving the environmental issues in the area related with industrial activities?
    - Polluting industry
    - Government authority
    - Local MP/MNA
    - Councilor
    - Some political party
    - Any other
      (Multiple choices are possible)
      Name/signature of enumerator

Sindh Industrial Trading Estate (SITE) designated as an Industrial Area in 1963. It is the oldest designated Industrial Area of Pakistan, encompassing 4700 acres (19 km²) of land. It contains approximately 2,400 factories.

Korangi Industrial Area (KIA) is one of the largest industrial estates of Pakistan having an area of around 8500 acres. It was established in mid 60s and made operational in 1970. According to a rough estimate more than 4500 industrial, commercial, and service concerns operate here. Leading garment export industries are located in KIA, it supplies about 78% of the total petroleum products in Pakistan. About 90% of Tanneries and leather industries of Sindh are clustered in KIA and 75% of leather export is catered from KIA. The largest biscuit factory English Biscuit Manufacturers, top two spices manufacturers companies like Shan Foods (Pvt) Ltd and Mehran Spice and Food Industries located in KIA. 80% industries in KIA are export oriented.




شہری
CITIZENS FOR
A BETTER
ENVIRONMENT