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# Final Report

Livelihood and Income from the Environment Program  
Lead Pollution Cleanup in Qalyoubia



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## DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

## ACKNOWLEDGEMENTS

The United States Agency for International Development, Livelihood and Income from the Environment Program's Lead Pollution Cleanup in Qalyoubia Project (LIFE-Lead) would like to recognize the significant efforts of our counterparts, the Egyptian Environmental Affairs Agency and the Governorate of Qalyoubia.



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وزارة الدولة لشئون البيئة  
جهاز شئون البيئة

# CONTENTS

Executive Summary	I
Chapter One Introduction: Why Shoubra El Kheima?	7
Chapter Two Technical Tasks Summary and Outputs	11
Remediation Activities	11
Training and Capacity Building	13
Chapter Three Public Participation/Local Governance Tasks Summary and Outputs	17
Bahteem Culture Center	17
Schools	17
Shoubra El Kheima Library	18
Others	21
Chapter Four Project Impacts	23
Blood Lead Levels	23
Knowledge, Attitudes, Practices	25
Chapter Five Lessons Learned	27
Chapter Six The Future of Remediation in Egypt	31
Appendices	
Appendix A: Project Success Stories	35
Appendix B: List of Project Deliverables	49
Appendix C: Project Deliverables – Electronic Format (DVD)	53



## EXECUTIVE SUMMARY

The City of Shoubra El Kheima, Governorate of Qalyoubia is located immediately to the north of the City of Cairo, Egypt. It was originally considered a suburb of Cairo and well outside the city limits. Due to Egypt's explosive population growth over the past 30 years, it is now densely populated and one of the most polluted industrial areas in Egypt.

The lead smelting industry in Shoubra El Kheima has perhaps the greatest negative human health and environmental impact of all the metals industries. Operations for these relatively small enterprises have included the collection of used automobile batteries, splitting the battery casings to remove the metal core, melting the metal core to form lead ingots, and marketing the lead to industry for reuse.

The United States Agency for International Development (USAID) has been working in the Governorate of Qalyoubia for nearly a decade to assist in the closure and cleanup of the lead smelters. In 2004, USAID initiated its Livelihood and Income from the Environment Program's Lead Pollution Cleanup in Qalyoubia (LIFE-Lead) project. The project consisted of the following two primary activities:

- **Activity 1: Lead Smelter and Foundry Remediation.** This activity included the technical work required to remediate the selected sites as well as the technical capacity building and institutional strengthening required for project sustainability.
- **Activity 2: Public Participation and Local Governance.** This activity focused on linking project stakeholders through community participation and communication efforts. Emphasis was placed on building stakeholder capacity in the areas of public awareness, education, and participation activities.

The pollution problems are not specific to lead smelting. The lead smelters as well as those smelting other metals lack modern pollution controls. This results in the emission of large amounts of hazardous materials, including lead and other heavy metals which are a substantial threat to the public health and the environment.

Lead is a toxic, non-degradable element. Its presence onsite at the smelters and in the surrounding areas constitutes a major health hazard, even after the smelters cease operations. In addition to lead, the sites contained a wide spectrum of heavy metals including lead, arsenic, antimony, cadmium, chromium, copper, and mercury. Accordingly, risk assessment studies concluded that all sites posed an unacceptable health risk to humans. The

health risk to the population is aggravated due to the location of the smelters within the densely populated residential areas with more than 500,000 people living in the zone of impact.

LIFE-Lead remediated eight heavy metal sources (i.e., smelters) as well as two schools, and a medical center in Shoubra El Kheima. Near the end of the project, an additional site, a lead battery assembly facility owned and operated by Arab Contractors, was remediated by the owner with remediation compliance oversight from the Egyptian Environmental Affairs Agency with assistance for the LIFE-Lead team.

The remediation activities were designed to reduce the risk to human health and the environment through implementing selected remedial design alternatives. By cleaning up the sources (the smelters and other sites contaminated by the smelters), the exposure of receptors to heavy metal contamination was reduced.



Photo: LIFE-Lead Team

### **El Mahy Secondary Lead Smelter (before remediation)**

Through completion of the technical work, the team trained local engineering and construction companies on the approaches and methods for site assessment and remediation. Also a comprehensive community participation program was developed with the objective of empowering local residents to improve their living conditions. The experience gained by our stakeholders through their involvement in the project provided a unique opportunity to build sustainable capacity that will allow them to address future environmental concerns in their community.

Although most, if not all of the lead smelter operations have been cleaned up in Shoubra El Kheima, other metal foundries that still operate in the community pose



Photo: LIFE-Lead Team

**El Mahy Secondary Lead Smelter (after remediation)**



Photo: LIFE-Lead Team

**El Shahid Ahmed Shalaan School (after remediation)**

significant risk to human health and the environment. LIFE-Lead assisted the Governorate of Qalyoubia in developing a plan for the relocation of approximately one hundred ferrous and non-ferrous foundries. These industries are in the process of relocating to the Al Safa Industrial Zone in the Abu Zaabal area of the Governorate of Qalyoubia. This relocation of industries will further improve the environment in Shoubra El Kheima and it will also improve industry in the Governorate of Qalyoubia. All relocated foundries will use cleaner production technologies which includes pollution control systems to ensure compliance with Egyptian environmental laws. The export capability of the industries is expected to be enhanced and new jobs have been created.

One of the two schools that were remediated by the project, El Shahid Ahmed Shaalan, was determined to be a receptor of the contaminants emitted by lead smelters in Shoubra El Kheima. At the time of construction, the school was designed to accommodate approximately 1,500 students between the ages of 6 and 12 years. Being located within close proximity of one of the largest lead smelters, the School administration became aware of the potential environmental impacts to the school from secondary lead smelter operations and reduced the enrollment from 1,500 to 830 students. After remediation of the school with the potential impacts from the smelters being reduced significantly, the school increased its enrollment back to full capacity with an accompanying number of new jobs and school staff.

LIFE-Lead's involvement with the schools has proven to be transformative. At the schools which were remediated, the dropout and absence rates have fallen sharply and students have more school pride. Prior to

the remediation of the El Shahid Ahmed Shaalan School, one boy's father had refused to send him because of the poor conditions of the school, even though it was the school closest to their home. Once it was remediated, his father changed his mind, and now the boy is one the school's best students.

The El Kablat Medical Center in Shoubra El Kheima was remediated and rehabilitated by LIFE-Lead. The medical center was contaminated by lead, mercury, and antimony. In addition, the poor condition of the center hindered many of its activities. On an average day prior to the project, approximately 350 patients visited the center for medical services. After remediation, a healthy environment and new layout of the center allowed the provision of better medical services. Accordingly, the number of patients visiting the site daily was increased to 750.

The LIFE-Lead project also engaged a wide variety of stakeholders in community outreach activities including schools, health centers, NGOs, religious organizations, and the local government. The working relationships established with these organizations allowed the project to leverage its efforts and reach thousands of local residents with its message. The community was reached using a variety of venues such as school competitions, plays, community cleanup days, installation of a "Industrial Pollution Desk" at a public library, and informational seminars for various group in Shoubra El Kheima. Communication strategies in the Shoubra El Kheima community were focused on the following:

- Health hazards of lead pollution.
- The lead remediation process and the difference between remediation and structural renovations.

- USAID’s previous and current efforts to address lead pollution in the area.
- Steps local residents, NGOs, and government officials can take in solving the area’s environmental problems.
- Positive impacts on the community from smelter relocation/remediation such as increased land values.



Photo: LIFE-Lead Team

**Delta Solb School (during LIFE-Lead reconstruction)**

An environmental education curriculum for primary and middle school students, developed in partnership with local teachers, has become an essential element of the educational program for several area schools and will remain in use for the foreseeable future. As an example of outreach programs at the schools, competitions and other activities were organized to help increase the students’ awareness of the hazards of lead and other pollution from local industries. In one competition, students were asked to come up with creative ideas for improving environmental conditions at their school.

After learning about the dangers of lead through the project, the Bahtem Cultural Center decided to raise awareness using homegrown methods such as the creation and staging of a play called “Our Beautiful Life” which uses music and humor to educate children about the hazards of lead pollution. The play has been a huge success, seen by thousands, including top Egyptian officials. Most importantly, activities such as the play are now built into the program at the center and will continue long after LIFE-Lead ends.

With project assistance, the Shoubra El Kheima Public Library created a new Industrial Pollution Desk reference section that provides community members with books and other reference materials on pollution, as well as access to multimedia equipment. The desk will help the

community continue to sustain its focus on industrial pollution awareness following the project. Schools are sending classes to the library on a regular basis to use the materials of the desk and the library.

All together, the LIFE-Lead project, organized more than 300 meetings and events with an attendance of nearly 12,000 people. These activities helped educate the community about the nature and severity of industrial pollution in Shoubra El Kheima, while encouraging residents to take part in the remediation process and adapt measures to reduce their families’ exposure to lead. Prior to all remediation activities, scoping sessions provided residents with the opportunity to meaningfully participate in the remediation process and to voice their concerns. These opportunities developed by the project helped the community develop a model for public participation for this project as well as others in the future.

The project made significant investments of both time and money to build the human and technical capacity of its local partner and stakeholder organizations. By focusing on building the leadership capacity of these community organizations, the project leaves behind a legacy in the form of a core group of informed and empowered local leaders who will continue championing the vision of the project. Local partners have already held more than 120 community education events and reached approximately 4,000 people without any direct project assistance.



Photo: LIFE-Lead Team

**Children of Shoubra El Kheima**

The objective of the LIFE-Lead project is the “empowerment of local residents to improve their living conditions in select polluted, low income urban communities”. Meeting this objective was documented in part through the results of the “Blood Lead Level” (BLL) Study as well as “Knowledge, Attitudes, and Practices” (KAP) Study.

In early 2004, the Egyptian government established baseline BLLs in a study of selected Shoubra El Kheima residents. The epidemiological study concluded that elevated BLLs were associated with lead contamination in the study area and that there was a substantial risk to those living near secondary lead smelters in Shoubra El Kheima.

The LIFE-Lead project conducted a similar BLL study during 2007. The purpose of the study was to determine the changes in BLLs, if any, compared with the prior 2004 data. Between the time of the 2004 study and the 2007 Study, the BLLs higher than 10 µg/dL (the maximum acceptable level) dropped from 66.7% to 15.9% for men, from 63.4% to 8.5% for women, and from 48.9% to 20.3% for children under the age of seven. The maximum BLL in the study area dropped from 41.0 to 33.6 µg/dL and the mean BLL dropped from 13.7 to 6.5 µg/dL. The results of the 2007 study demonstrate significant improvement to the health and quality of life of the citizens living near the smelters following the remediation of the secondary lead smelters and the community awareness activities that were completed by the project.

The KAP Survey results revealed improvements in knowledge by 36%, in attitudes by 7%, and in practices by 22%. The greatest increase in knowledge levels illustrates that residents interacted substantially with the awareness activities conducted directly by the LIFE-Lead team and through other awareness activities conducted by local community organizations which had been trained and assisted by the project. The results also demonstrate that site remediation conducted by the project represents a means of raising the awareness of the community concerning lead smelters as a source of contamination.

What was learned through implementation of the LIFE-Lead Project?

1. That the remediation sector is a novelty in Egypt and needs to be expanded to other industrial areas.
2. Engaging stakeholders in the technical planning, discussions, and execution of site remediation, can lead to a heightened priority of the remediation sector.
3. Egyptian contractors, engineering companies, and consultants have embraced the opportunity to enter this new market.
4. Completing a project in a new (to the country) technical area can foster the participation of other donors.

5. Practice makes perfect! The quality of the bids in terms of thoroughness and meeting all specifications clearly improved as the project progressed.
6. Greater Cairo lacks, but desperately needs, a permitted hazardous waste landfill site to support its local industries.
7. Health and safety measures must be enforced by the governmental authorities.



Photo: LIFE-Lead Team

#### Industrial Site in Shoubra El Kheima

8. Egypt would benefit from improvements in environmental enforcement with its attendant benefits.
9. Building a culture of public participation is critical prior to community planning activities.
10. Practicing consistent and frequent communication and engagement with stakeholder groups is key to gaining trust.
11. To help ensure appropriate community participation, “champion” individuals and organizations must be discovered and participation started with them.
12. Promise results to the community, then deliver them.
13. The environmental pollution message may be reinforced by integrating it into different venues.
14. Advantage should be taken of community resources and those resources leveraged to maximize impact.
15. Community resources need to be coordinated.
16. Effective strategies can be “win-win” to all stakeholders.

- 17.The message and the medium need to be relevant to the target audience.
- 18.External factors outside a project's control can impact project work and must be acknowledged.
- 19.Even severe environmental problems may not be among a community's biggest concerns.
- 20.Additional environmental legislation and regulations are needed if there is any hope of sustaining a concerted effort to address industrial pollution in Egypt.



## CHAPTER ONE INTRODUCTION: WHY SHOUBRA EL KHEIMA?

The City of Shoubra El Kheima, Governorate of Qalyoubia is located immediately to the north of the City of Cairo. It was originally considered a suburb of Cairo and well outside the city limits. But because of Egypt's explosive population growth over the past 30 years, it is now densely populated and one of the most polluted industrial areas in Egypt. Inefficient and unregulated industries, such as metal foundries and smelters, operate next to apartment buildings, schools, and health clinics. A typical lead smelter operation collected used automobile batteries and melted the metal cores to form lead ingots for resale.

Many of the local metal smelters, lacking modern pollution controls, emit large quantities of hazardous materials including lead, mercury, and arsenic, which threaten the health of local residents, especially children.

*USAID Assistance.* The United States Agency for International Development (USAID) has been working in the Governorate of Qalyoubia and Shoubra El Kheima for nearly a decade to close the worst smelters and cleanup their toxic legacy. The Cairo Air Improvement Project (CAIP) was conducted from 1997 into 2004. The CAIP was followed by the Egyptian Environmental Policy Program from 2003 into 2004 to begin addressing the environmental and health impacts of the lead smelters located in Shoubra El Kheima. The improvements in air quality with respect to lead concentrations are depicted in Figure 1.

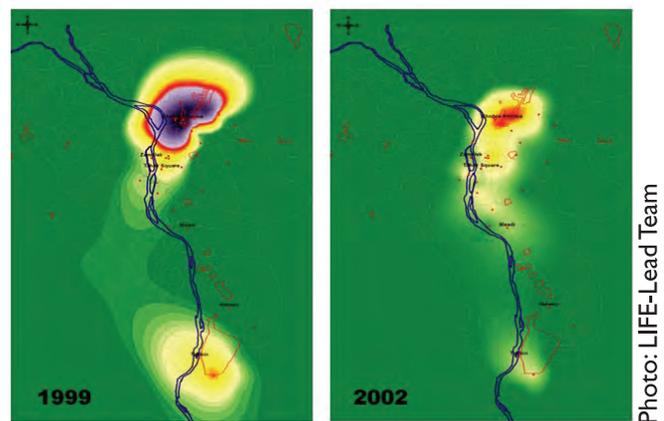
Several smelters have already been shut down and relocated, leading to a 75 percent decrease in lead emissions in Shoubra El Kheima. Previous USAID projects also planned and designed the modern Al Safa Industrial Zone outside the city to house foundries and smelters relocated from the area.

Lead is a non-degradable element and its presence in the sites of the smelters and the surrounding areas still constitute a major health hazard, even after the smelters cease to operate. Lead can potentially affect any system or organ in the human body including the gastrointestinal tract, blood formation process, cardiovascular system, central and peripheral nervous systems, kidneys, immune system, and reproductive system. Lead can also interfere with vitamin D metabolism.

To protect human health and the environment, the Governor of Qalyoubia issued a decree to prevent using the sites, establishments, and equipment of lead smelters

in Shoubra El Kheima until these sites were fully remediated.

In 2004, USAID commenced its "Livelihood and Income from the Environment Program's Lead Pollution Cleanup in Qalyoubia" (LIFE-Lead) project. Millennium Science & Engineering, Inc. (MSE) and its team partners, Chemonics International, Chemonics Egypt, and Environics were selected to complete the initial two year project which was eventually extended for a total of 32 months through April 2008.



**Figure 1: Relative Lead Concentration in Air in the Greater Cairo Area, 1999 and 2002**

The LIFE-Lead project was designed and implemented with two primary activities. Activity 1 included the technical work required to complete site remediation and remediation sustainability activities. Activity 2 provided community awareness and participation pertaining to environmental issues from industrial facilities and communications support for the technical activities.

Activity 1 was designed to address the remediation of heavy metal industrial sources (e.g., smelters) as well as impacted institutions including two schools and a medical center in the Shoubra El Kheima area as shown in Figure 2.

Through completion of the technical work, the team trained local engineering and construction companies on the approaches and methods for site assessment and remediation.

In addition to the technical aspects of the project, a comprehensive community participation program was developed with the objective of empowering local residents to improve their living conditions. The

experience gained from the LIFE–Lead Pollution Cleanup initiative and the individual remediation projects provided the stakeholders with a unique opportunity to build sustainable capacity for addressing present and future environmental concerns facing Egypt.

### THE PROBLEM WITH LEAD IN CAIRO

- **Very high lead in soil: >1,000 times US urban levels.**
- **Multiple “hot spots” - includes homes and schools.**
- **Blood lead concentrations are 10 times U.S. levels; prior to USAID projects - exceeded safe levels in 100% of people in “hot” areas.**
- **Unknown broader impact through water and food contamination.**

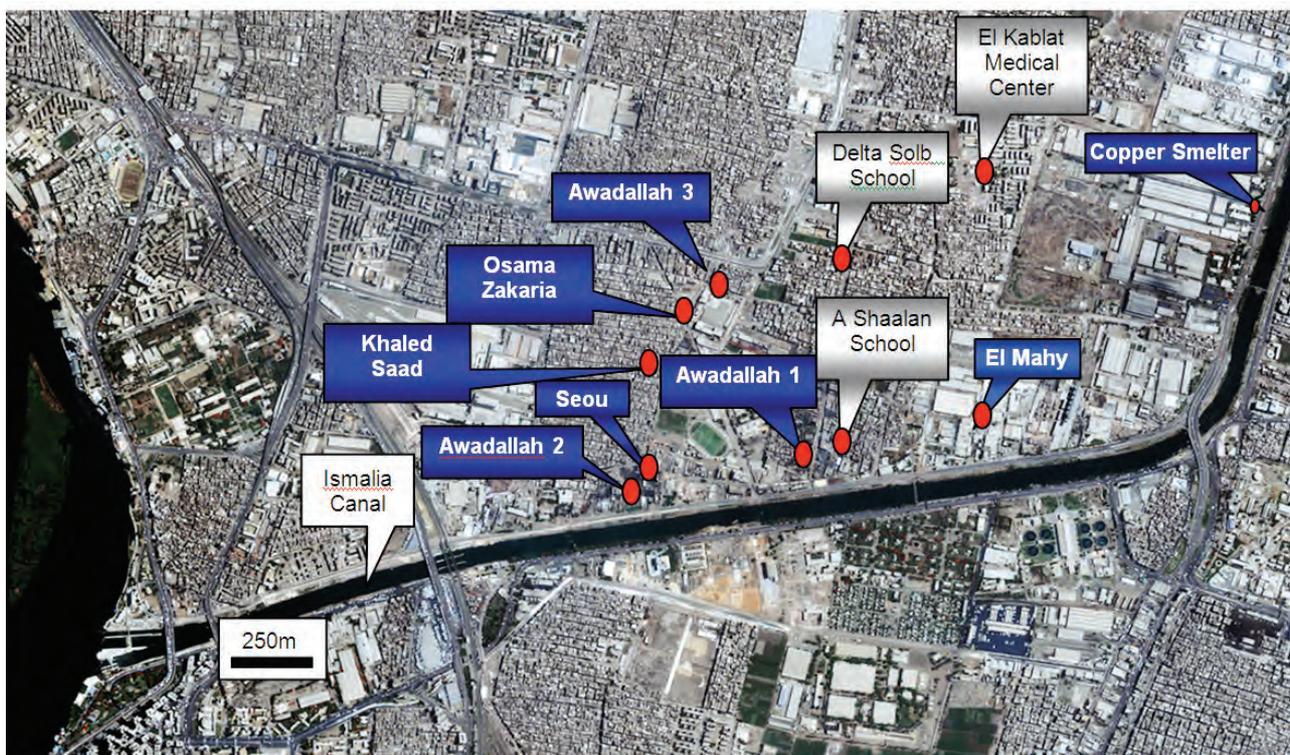


Figure 2: Area Map for Shoubra El Kheima Showing Sites Remediated by the LIFE-Lead Project



Photo: MSE/Richard Kelsey

**Lead smelter in Shoubra El Kheima – Heavy oil-burning furnaces like this have been used for years to recover the lead from automotive batteries to form lead ingots for sale to the industrial market. A rotary furnace typically processes 15 – 20 tons of lead ingots per day.**



Photo: MSE/Richard Kelsey

**Lead recovery – Workers at one of the lead smelting operations in Shoubra El Kheima look over the sea of lead acid batteries that will be cracked open to remove the inner lead plates and terminals prior to smelting in a rotary furnace.**

# SUCCESS STORY

## Puppets speak kids' language on lead

A puppet show in a Shoubra El Kheima has been teaching children how to avoid exposure to lead, a powerful neurotoxin that can cause permanent damage in early childhood. Performed at local schools, the show has reached thousands of kids in Shoubra El Kheima, where residents have long suffered from lead pollution generated by unregulated smelters.

Children are especially vulnerable to lead pollution because they can easily ingest the harmful substance while playing in polluted streets. To make matters worse, their underdeveloped digestive systems tend to absorb lead more readily than in adults. Prolonged exposure to high levels of lead can impair cognitive function, causing lower IQs — a largely irreversible effect that often results in a lifetime of academic underachievement and lost income.

Through stories told by the puppets, children between the ages of 5 and 9 learn about simple ways to protect themselves, such as washing their hands and eating foods that strengthen the immune system. The puppet show is part of a multifaceted approach used by the USAID-funded LIFE-Lead project to educate local residents about the health dangers of lead.

**A puppet show created by the LIFE-Lead project educates children about ways to keep themselves safe from lead pollution**



Photo: Madiha Afifi / LIFE-Lead project



Photo: Madiha Afifi / LIFE-Lead project

## CHAPTER TWO

# Technical Task Summary and Outputs

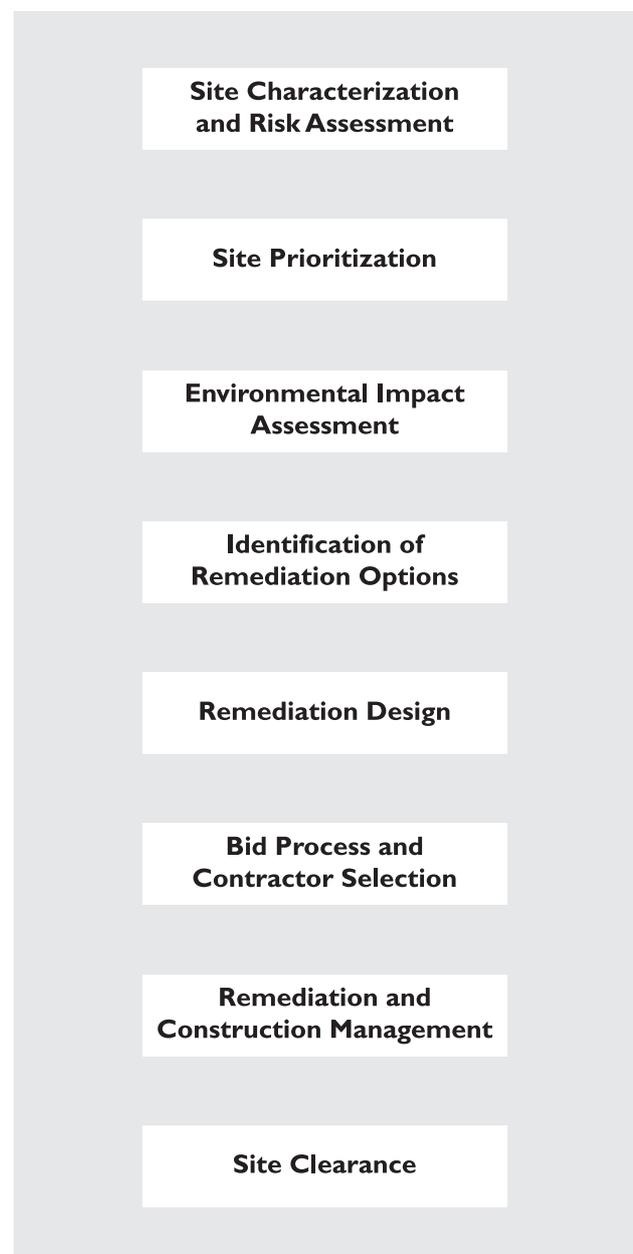
*Remediation Activities.* The LIFE-Lead team completed the clean-up of seven secondary lead smelter sites, two schools, a medical center, and a copper smelter in Shoubra El Kheima. By the end of the project, an additional site, a battery assembly facility owned and operated by Arab Contractors, was remediated by the owner with LIFE-Lead team assistance. The project team applied U.S. Environmental Protection Agency guidance to all technical tasks. For each site, a remediation action plan was prepared incorporating site characterization data, a human health risk assessment, remediation alternative analysis, and an environmental impact assessment.

The major steps in the approach used by the team to cleanup contaminated sites are shown in Figure 3. The goal of the site characterization step is to define the nature and extent of contamination, to collect the information needed to complete a health risk assessment, and to carry out the appropriate site remediation. Typical contaminated media at the sites included surface and subsurface soils, building structures, and equipment and furniture. Most of the sites were determined to have a wide spectrum of heavy metals contamination, typically lead, arsenic, antimony, cadmium, chromium, copper, and mercury. Accordingly, the risk assessment studies concluded that all sites posed an unacceptable risk to human health. The high risk to the population is aggravated due to the location of the smelters within the densely populated areas, one of the highest in Greater Cairo. Risk assessment results were used to develop and apply cleanup levels in project planning and remediation design. In addition, an environmental impact assessment was completed for each site to comply with USAID and Government of Egypt requirements.

The remediation activities were designed to reduce the risk to human health and the environment through implementing selected remedial design alternatives. By cleaning up the sources (the smelters and other sites contaminated by the smelters), the exposure of receptors to heavy metal contamination was significantly reduced. Representative of the seven secondary smelter sites that were characterized and remediated in the Shoubra El Kheima area, two smelter sites, El Mahy and Awadallah No. 3 are depicted in Figure 4 regarding pre-cleaning and post-cleanup lead concentrations. These two examples as well as the other five smelter sites that were remediated, each have final (post-cleanup) lead concentrations that were below the acceptable concentrations for all specific site features (e.g., walls, floors, surface soils, etc.).

One of the two schools that were remediated in the project, El Shahid Ahmed Shalaan, was determined to be a receptor of the contaminants emitted by lead smelters in Shoubra El Kheima. At the time of construction, the school was designed to accommodate approximately 1,500 students between the ages of 6 and 12 years. Being located within close proximity of one of the largest lead smelters (Awadallah Smelter No. 1 located approximately 150 meters northwest of the school on El Magary Street), the children at the school were considered to be potential receptors of contamination produced by the smelter.

**Figure 3 - Sequence of Remediation Activities**



# SUCCESS STORY

## Center Cleanup Boosts Numbers, Morale

Until recently, the Kablat Medical Center in Shoubra El Kheima, north of Cairo, was an unpleasant place for staff and patients. The facility was in disrepair, and staff morale was low. Dr. Gamal Moawad, director of Kablat since 1997, recalled that the situation was so bad that proper urinalysis tests were impossible because of the condition of the toilets. Kablat was also highly contaminated with heavy metals due to hazardous emissions from unregulated factories operating nearby. When experts from USAID's Livelihood and Income from the Environment (LIFE) Lead Pollution Clean-up project in Qalyoubia conducted tests at Kablat they found dangerous levels of arsenic, lead, mercury, and cadmium in the buildings and grounds.

In response, LIFE-Lead spent four months remediating and renovating the facility according to U.S. Environmental Protection Agency (EPA) standards, and USAID's TAKAMOL project provided new furniture and medical equipment. The renovated space, free of heavy metal contamination, provides staff and patients with a functional and pleasant environment. According to Dr. Moawad, "The community noticed the difference immediately," and the number of patients per day nearly tripled as word spread that Kablat had changed. The increased patient numbers also helped Kablat secure more funding and medication from the Ministry of Health and Population.

Medical center staff enjoys the breath of fresh air too. Morale has improved significantly, and Dr. Moawad said attracting and retaining doctors and nurses has become much easier. Before, staff, including emergency room nurses, did not want to stay at their posts, and the conditions led to short tempers and disagreements. Now, staff happily stays at their posts, and some even come to work on their days off. The staff and patients now see the medical center as a sustainable part of the community and are working together to keep it clean and well maintained.



Photos: Adel Shafik/LIFE-Lead

**A hallway (top) in the polluted and dilapidated Kablat Medical Center before remediation and renovation by the LIFE-Lead project. LIFE-Lead's work shows the difference for the same hallway after remediation (bottom).**

The El Shahid Ahmed Shaalan School administration became aware of the potential environmental impacts to the school from secondary lead smelter operations near the school and responded by reducing the enrollment from 1,500 to 830 students. After remediation of the school with the potential impacts from the smelters being reduced significantly, the school administration decided to operate the school at full capacity. The school staff was increased accordingly, with new jobs created as a result. Pre-cleanup and post-cleanup data for the school are shown in Figure 4.

The Kablat Medical Center is also located in a densely populated area of Shoubra El Kheima. Sample analyses from the walls and floors at the center indicated lead, mercury, and antimony contamination. Furthermore, the poor condition of the center hindered many of its activities. On an average day prior to the project, approximately 350 patients visited the center for medical services. After remediation, a healthy environment and new layout of the center allowed the provision of better medical services. Accordingly, the number of patients visiting the site daily was increased to 750. The medical center senior management insured that:

- The number of outpatient clinics increased from one to three.
- A family club was introduced for the first time at the clinic.
- Most of the center departments are working more efficiently.
- The immunization department is working at no risk to the newborn and children.
- The maternity service department is working efficiently at no risk to pregnant women.

Although most, if not all of the lead smelter operations have been cleaned up in Shoubra El Kheima, other metal foundries that still operate in the community pose a significant environmental and health risk. LIFE-Lead assisted the Governorate of Qalyoubia in developing a plan for approximately one hundred ferrous and non-ferrous metal foundries to be relocated to the new Al Safa Industrial Zone. This plan will further improve the environment in Shoubra El Kheima but it will also improve industry in the Governorate. All relocated foundries will use state-of-the-art production equipment and pollution control systems to ensure compliance with environmental standards. The export capability of the industries is expected to be enhanced and new jobs have been created.

*Training and Capacity Building.* Eager to expand his family business, Ahmed Ismail answered a newspaper advertisement from the LIFE-Lead project looking for local environmental contractors. Ismail's firm, Al Eman Engineering Company, had no experience with remediation work, but he sensed a good business opportunity. Though Egypt has hundreds of polluted sites, many caused by unregulated and inefficient industries, new government regulations and stepped up enforcement are starting to push firms to clean up hazardous waste from their industrial sites.

Al Eman and seven other Egyptian companies attended a free two-week training course on how to set up and run a complete remediation operation. Training was provided by the LIFE-Lead team.

Ismail immediately saw the value of the training, but was initially skeptical about the focus on health and safety. Real-world experience quickly changed his mind. Al Eman won contracts with LIFE-Lead to remediate three former lead smelters in Shoubra El Kheima. Due to the severely contaminated sites, Ismail realized the importance of keeping his employees safe while working in these dangerous conditions.



Photo: MSE/Randy Spiers

**Ahmed Ismail tests safety equipment for his workers before they enter the job site at a former lead smelter.**

With the training, Al Eman was able to implement the necessary safety measures at each site and to complete the work ahead of schedule. LIFE-Lead provided expert guidance throughout the remediation process, but Ismail knows that his firm will soon be on its own. Still, he is positive about the future. With the training and remediation experience gained through working with LIFE-Lead, Al Eman plans to compete in a new marketplace.

Nearly 50,000 man-days were required for cleanup of the 11 sites in the LIFE-Lead project. For this work, several workers were hired locally from Shoubra El Kheima. The percentage of the work force at cleanup sites that were hired from Shoubra El Kheima ranged between 7 to 10% (See Table 1).

**Table I - Man Days by Project Site**

Site	Total Man Days	Shoubra El Kheima Man Days
Awadallah Lead Smelters (3)	8.250	577
El Mahy Lead Smelter	6.600	600
Seoudi Lead Smelter	2.100	150
Osama Zakaria Lead Smelter	1.225	100
Khaled Saad Lead Smelter	1.000	100
Ahmed Shaalan School	7.700	385
Delta Solb School	8.550	600
El Kablat Medical Center	9.075	635
Sayed Hussein Copper Smelter	1.150	100
<b>Total</b>	<b>45.650</b>	<b>3.247</b>

**Figure 4: Pre-Cleanup and Post-Cleanup Lead Analysis**

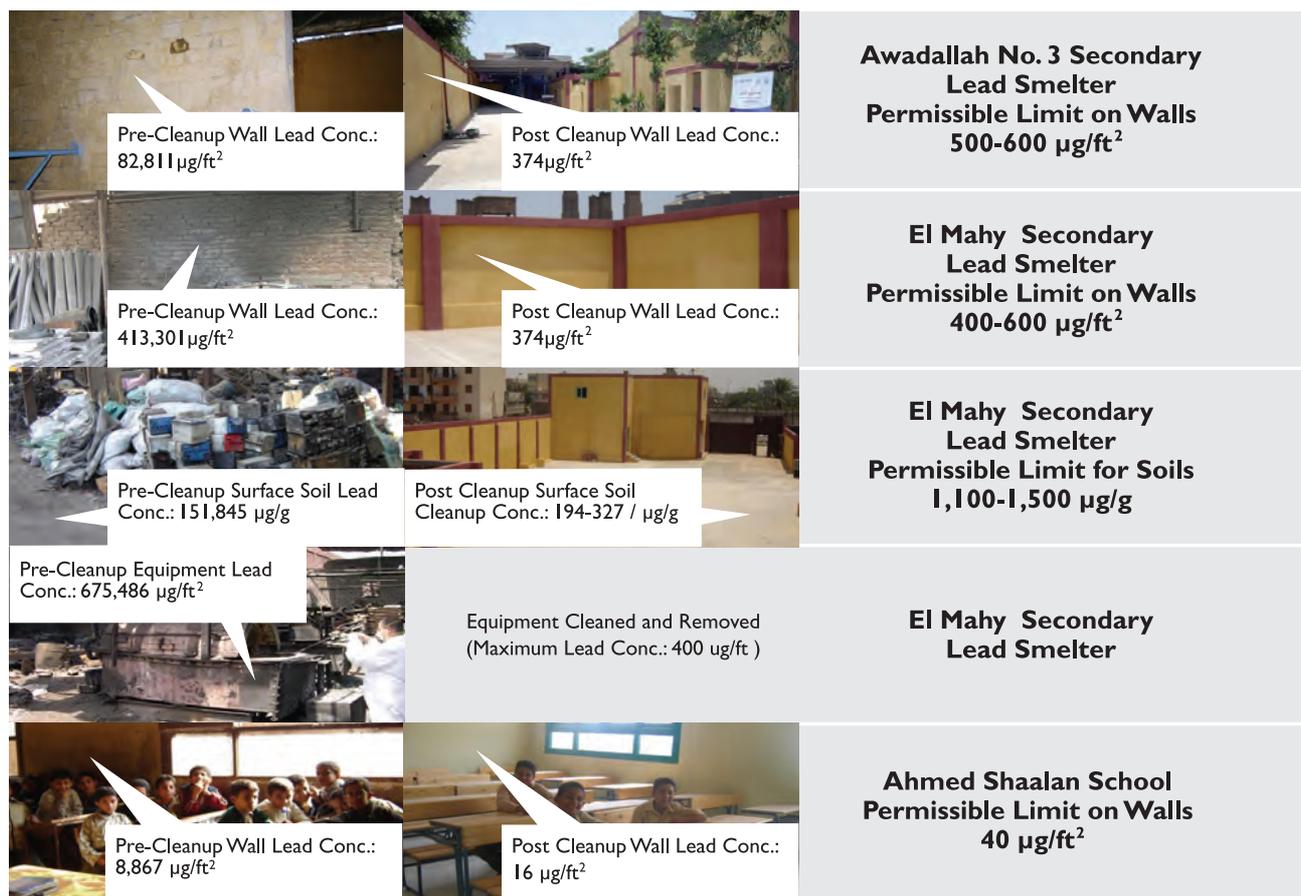


Photo: LIFE-Lead Team



Photo: MSE/Dale Rice

**Getting ready for the new school year – new surfaces are applied to the walls at the Delta Solb School following lead remediation by the LIFE-Lead team and prior to painting.**



Photo: MSE/Dale Rice

**Summer school – children at the Delta Solb School participate in the lead awareness program at the summer “camp” program developed by the LIFE-Lead team.**



## CHAPTER THREE PUBLIC PARTICIPATION/LOCAL GOVERNANCE TASKS SUMMARY AND OUTPUTS

*Bahtem Cultural Center.* “The LIFE-Lead project made us realize how dangerous lead is and our role is to make the community more aware of this,” said Hamid Abdel Aziz, Director of the Bahtem Cultural Center in Shoubra El Kheima. After learning about the dangers of lead through the project, Aziz decided to raise awareness using homegrown methods. He led a community effort to create and stage a play called *Our Beautiful Life* which uses music and humor to educate children about lead. The play follows the story of a local girl who gets sick from lead, portrayed by a monster called Peebee (after lead’s chemical symbol, Pb). She recovers after visiting the local medical center, where her mother learns how to keep her safe from lead. All the roles are played with zeal by local schoolchildren. The play has been a runaway success, seen by thousands, including the Egyptian Minister of Environment and the Governor of Qalyoubia. Under Aziz’s direction, Bahtem has been a center of community education efforts. The hundreds of children who visit daily learn about lead through environmental competitions, art projects, and a slideshow developed by Aziz’s staff, which uses the story of a school field trip to teach children how to protect themselves from lead contamination. Most importantly, these activities are now built into the program at Bahtem and will continue long after LIFE-Lead ends.



**School children perform a play produced by the Bahtem Cultural Center to raise awareness about the dangers of lead pollution.**

In addition to the technical work, the project has focused on reaching out to the residents of Shoubra El Kheima through teachers, students, religious leaders, and others.

*Schools.* One of the teachers at Ahmed Shalaan School, one of the schools remediated and rehabilitated by LIFE-Lead, Mahmoud Gad had this to say, “Now, my students are not only interested in environmental problems, they are leading activities by themselves.”

“The school was covered in black dust. It was so bad that no matter how hard they cleaned, they couldn’t get the school clean. My doctor told me I had an allergy to the smoke from the smelter, but this stopped after remediation. Now I can learn better,” said Gehad, age 11, student at the same school.

One of the approaches used by the project has been organizing competitions and other activities in the schools that will help increase the students’ awareness of the hazards of lead and other pollution from local industries. As part of this effort, a quiz-bowl style tournament provided a forum for children to show off their environmental knowledge. Winning teams earned savings bonds and bragging rights. Another competition asked students to come up with creative ideas for improving environmental conditions at their school. Students at one school started a recycling program, while others fashioned decorations from old potato chip bags.

Mr. Gad’s class won the best environmental school competition. His students are now dedicated to keeping the school clean and have set aside a day every month for cleaning. More importantly, Mr. Gad sees LIFE-Lead’s work with the schools contributing to other positive changes in Shoubra El Kheima. “Students

### Main Topics for Communication with the Shoubra El Kheima Community

- Health hazards of lead pollution.
- Lead remediation process and the difference between remediation and structural renovations.
- USAID’s previous and current efforts to address lead pollution in the area.
- Steps local residents, NGOs, and government officials can take in solving the area’s environmental problems.
- Positive impacts on the community from smelter relocation/remediation such as increased land values.

naturally tell their parents about what they did at school and this is starting to affect the whole area. There is a sense of change in the community. Even the government is moving towards solving problems. Streets which used

to be full of garbage are now clean.”

LIFE-Lead’s involvement with the schools has proven to be transformative. At the schools which were remediated, the dropout and absence rates have fallen sharply and students have more school pride. The story of an 11 year-old, Ahmed, is illustrative of these changes. Prior to the remediation of the El Shahid Ahmed Shaalan School, his father had refused to send him there, even though it was the school closest to his home, because of the poor conditions. Once it was remediated, his father changed his mind, and Ahmed is now one the school’s best students. Ahmed notes, “Before kids didn’t know about the lead problems, but now they know the danger.”

*Shoubra El Kheima Public Library.* LIFE-Lead partnered with the public library in Shoubra El Kheima to organize workshops and contests designed to raise awareness about industrial pollution and attract new library patrons. Library staff assisted by leading workshops which taught contestants how to conduct research and write articles, and the project held public information sessions at the library. The contests generated more than 75 entries. This successful collaboration helped quadruple the number of daily visitors to the library. Many first-time visitors became paying members who now take advantage of the library’s other resources, including low-cost English and computer courses.

With project assistance, the library has also created a new Industrial Pollution Desk reference section that provides community members with books and other reference materials on pollution, as well as access to multimedia equipment. The new space, unique in Egypt, is a resource that will help the community continue to sustain its focus on industrial pollution awareness following the project. LIFE-Lead also facilitated a meeting between the library and local schools, who had not had a formal relationship previously. Now the schools are sending classes to the library on a regular basis. There, students visit the Industrial Pollution Desk and use its multimedia equipment to watch the videos and plays produced by the project.



Photo: LIFE-Lead Team

**A staff member at Shoubra El Kheima public library shows off the Industrial Pollution Desk’s resources to a local resident.**

# SUCCESS STORY

## Community Finds Common Ground in Cleanup

As part of its efforts to encourage community participation in the Shoubra El Kheima neighborhood north of Cairo, the LIFE-Lead Pollution Clean-up in Qalyoubia project helped the community tackle some of its biggest pollution problems by raising awareness about environmental issues and convincing residents that they can have an active role in keeping their environment clean. This heavily populated industrial area lacked a tradition of community involvement in environmental issues. To raise awareness about its efforts and promote community initiatives, LIFE-Lead's Local Advisory Committee in Shoubra El Kheima organized the "Do Your Part Cleanup Campaign." Committee members recruited volunteers from the area's schools, community centers, mosques, and churches to involve residents, especially youth, in a massive campaign to remove trash and debris. LIFE-Lead provided volunteers with shirts, hats, tools, and safety equipment, while the local sanitation department provided the trucks and heavy equipment necessary to transport the trash to proper disposal areas. The results showed residents how they can have a positive impact on their community by working closely with each other and the local government. In September 2006, more than 70 volunteers worked over two weekends to remove nearly 160 tons of solid waste that had blighted the community.

### Students, teachers, and residents work together to clean up the streets of Shoubra El Kheima.



Photo: Adel Shafik/LIFE-Lead



Photo: Adel Shafik/LIFE-Lead



Photo: Adel Shafik/LIFE-Lead



Photo: Adel Shafik/LIFE-Lead



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لتحمي نفسك و أسرتك من التلوث بالرصاص

إزالة أتربة الرصاص بطريقة غير سليمة يمكن أن يزيد  
الخطر على أسرتك بزيادة انتشار غبار الرصاص بالمكان



• عدم استخدام الكلور في تنظيف  
أماكن الأتربة لتفاعله مع الرصاص

• استخدام قطعة قماش  
مبللة لتنظيف الأتربة

• غسل قطعة قماش  
التنظيف بعد استخدامها



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*Others.* In addition to the Bahtem Cultural Center, Shoubra El Kheima Public Library, and schools, the LIFE-Lead project also engaged a wide variety of other stakeholders in the community including health centers, NGOs, religious organizations, and the local government. The working relationships established with these organizations allowed the project to leverage its efforts and reach thousands of local residents with its message. Over the course of the LIFE-Lead project, more than 300 meetings and events were organized with an attendance of nearly 12,000 people. These activities helped educate the community about the nature and severity of industrial pollution in Shoubra El Kheima, while encouraging residents to take part in the remediation process and adapt measures to reduce their families' exposure to lead. Prior to all remediation activities, scoping sessions provided residents with the opportunity to meaningfully participate in the remediation process and to voice their concerns. These opportunities developed by the project helped the community develop a model for public participation for this project as well as others in the future. Prior to the remediation of each smelter site, the project helped negotiate an agreement between the smelter owners and the Governorate of Qalyoubia. These agreements clearly delineated the steps to be taken, the timeline, and defined each side's respective roles and responsibilities in the remediation process. Remediation activities were then conducted in accordance with the agreement.

The project made significant investments of both time and money to build the human and technical capacity of its local partner organizations. By focusing on building the leadership capacity of these community organizations, the project leaves behind a legacy in the form of a core group of informed and empowered local leaders who will continue championing the vision of the project. Local partners have already held more than 120 community education events and reached about 4,000 people without any direct project assistance. An environmental education curriculum for primary and middle school students, developed in partnership with local teachers, has become an essential element of the educational program for several area schools and will remain in use for the foreseeable future. The project website, which contains a wealth of information in both Arabic and English, will be incorporated into the Egyptian Environmental Affairs Agency's website after the project ends and remain a resource for future remediation work in Egypt.



Photo: Adel Shafik/LIFE-Lead

**A young child recites a poem about the dangers of lead to an audience in a Shoubra El Kheima school.**



Photo: LIFE-Lead Team

An environmental education curriculum for primary and middle school students was developed in partnership with local teachers. The teachers worked in groups to develop exercises that can be included in the current curricula to disseminate environmental messages, especially protection against lead pollution and its prevention. The curriculum has become an essential element of the educational program for several area schools and will remain in use for the near future.

# SUCCESS STORY

## Getting the message on protection against Lead

In order to better reach female residents of Shoubra El Kheima, many of whom are illiterate or semi-literate, the project created a video drama. The video's lead character, a homemaker named Nabiha ('smart' in Arabic), explains to her neighbor the health problems associated with lead and how she can protect her family. It was filmed at an apartment building in Shoubra El Kheima and features local actors. The video has proved an effective means of changing the perspective of many area women. One woman said that before watching the video she "did not know that my neighbors and I can have a role in protecting ourselves and our children from pollution." Another said she was happy to learn that "there are very cheap and available foods that can reduce the risk of pollution for us and our children." The video has been seen by thousands of local women, many of whom now spread the message to friends and family.

**Scene from a video drama funded by USAID, featuring a homemaker who teaches her neighbor how to protect her family from lead exposure through proper nutrition. These video messages have been viewed by thousands of people in the Shoubra El Kheima area of Cairo.**



Photo: Fady Nessim/LIFE-Lead

The objective of the LIFE-Lead project is the “empowerment of local residents to improve their living conditions in select polluted, low income urban communities.” Meeting this objective was demonstrated in part through the documented reduction in blood lead levels between 2004 and 2007 as well as community perception/awareness changes resulting from LIFE-Lead activities. Impacts on each of these factors were evaluated at the conclusion of the project.

*Blood Lead Levels.* The most common means of determining lead exposure is the measurement of blood lead levels (BLLs). The World Health Organization (WHO) and the Center for Disease Control and Prevention have set a blood lead concentration of 10 mg/dl as the level of concern (EPA, 1997; WHO, 2000). However, based on recent studies, any exposure to lead is unhealthy, especially for infants and children. Children and pregnant women can absorb up to 70 percent of ingested lead, while adults absorb up to 20 percent. In addition to their sensitivity to lead, children come in contact with it more often with their propensity for playing on the floor or ground and with their hand-to-mouth activities.

For adults, a number of serious health issues can be caused by lead poisoning including high blood pressure, neuropathies, infertility in men, miscarriages in women decreased hemoglobin synthesis, and anemia.

In early 2004, the Egyptian Environmental Policy Program (EEPP) completed an epidemiological study in collaboration with the Egyptian Ministry of Health and Population to establish a baseline BLL in the population of Shoubra El Kheima living within a 1-kilometer radius of the former Awadallah Secondary Lead Smelter No. 1 exhaust stack. Blood samples were collected from 284 subjects in 86 residences within the study area. The results of the study are shown in Table 2. As can be seen, a high percentage of all residents sampled had elevated BLLs.

The EEPP study indicated that the elevated BLLs were associated with lead contamination in soil and dust in the study area (EEPP, 2004). The epidemiological study concluded that there was a substantial risk to those living near secondary lead smelters in Shoubra El Kheima and recommended that the sites be immediately remediated to protect residents from lead hazards.

The LIFE-Lead project conducted a similar BLL study in the same area as the 2004 study during late spring 2007 in collaboration with the Ministry of Health and Population. The purpose of the study was to determine the changes in BLLs, if any, compared with the prior 2004 data for the population living in the vicinity of the secondary lead smelters. Located within the study area are seven remediated secondary lead smelters sites and the El Shahid Ahmed Shaalan School. To be statistically viable, LIFE-Lead selected a high percentage of individuals from the 2004 study. Approximately 75% of the original study participants were recruited to participate in the 2007 study. For the 25% of participants that were not available from the original survey, replacements were asked to participate in the 2007 study. These replacements were selected from another family or matched (by age/sex) subject group from the nearest residence who has resided in the study area for at least 12 months.

The results presented in this study are reflective of the remediation and community activity efforts of LIFE-Lead. Between the time of the 2004 study and the 2007 Study, the BLLs higher than 10 µg/dL dropped from 66.7% to 15.9% for men, from 63.4% to 8.5% for women, and from 48.9% to 20.3% for children under the age of seven. The maximum BLL in the study area dropped from 41.0 to 33.6 µg/dL and the mean BLL dropped from 13.7 to 6.5 µg/dL. These data are depicted in Figure 5.

The results of the 2007 Study demonstrate significant improvement to the health and quality of life of the population living near the smelters following the remediation of the secondary lead smelters and the community awareness activities that were completed by the project.

**Table 2: Blood Lead Levels Sampling Results (Shoubra El Kheima Study - 2004)**

Group	Percent BLL > 10 µg/dL	BLL (µg/dL)
Men	66.7%	
Women	63.4%	
Children (< 7 yr)	48.9%	
Max. BLL		41
Mean BLL		13.7



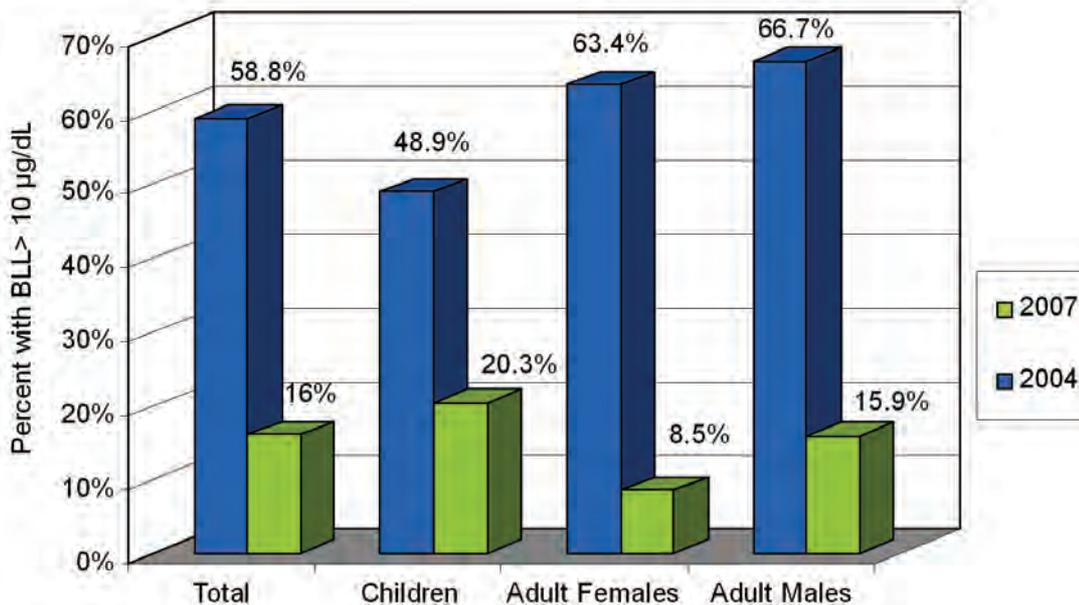
**Ahmed Shalaan students work to keep their school clean during the LIFE-Lead Cleanup Campaign in 2006.**

*Knowledge, Attitudes, and Practices Study.* At the beginning of the project, baseline information was collected through a socio-economic profile of the project area and its residents, and a study which documented the community's knowledge, attitudes, and practices (KAP) relating to environmental pollution. One of the main conclusions of this KAP Study was that environmental problems were not considered to be a high priority by area residents.

Several important findings (see box, "Before LIFE-Lead") emerged from the KAP Study which helped shape the project's communication strategy.

The KAP Study revealed not only the necessity of community education and awareness raising, but also a need to build the capacity of local NGOs and community organizations, which had little experience dealing with environmental problems.

After the KAP survey revealed that religious leaders are highly trusted by the community, the project sought their support for delivering its messages. Through a series of workshops organized by LIFE-Lead, 41 Muslim and Christian leaders learned about the severity of the community's industrial pollution problem. The leaders then worked with project staff to develop community outreach plans and created brochures for their congregations that discuss environmental concerns from a religious perspective. After participating in the workshops, leaders of both faiths began talking about local environmental issues during religious services and community meetings. By incorporating awareness messages into their weekly sermons, the priests and sheikhs taught thousands of people about the effects



**Figure 5: Percentage of Various Population Groups in Shoubra El Kheima with Blood Lead Levels Exceeding 10 mg/dl in the 2004 and 2007 Studies**



Photo: Dina Alaa/LIFE-Lead

**Priests and sheikhs work together to design a strategy for raising environmental awareness in the Shoubra El Kheimacommunity.**

of pollution and how they can protect their families.

The KAP Study was updated near the end of the project to determine the potential changes in knowledge, attitudes, and practices that could be attributed to the project. A number of variables were identified and indexed between the earlier KAP Study and the one completed at the end of the project. The knowledge, attitudes, and practices variables included in the statistical index included are described below.

**Knowledge Variables**

- The persistence of the lead pollution problem.
- Measures for controlling lead pollution.
- LIFE-Lead efforts as a source of knowledge.
- Dust, exhaust, and lead as sources of contamination of food materials.
- Pollution as a potential danger to children playing in the streets.
- High risks of lead pollution.
- Smelters being one of the polluting sources in the area.
- Health effects of lead pollution.

**Attitude Variables**

- Attitudes supporting the transfer of smelters from the area.
- Negative attitudes supporting keeping smelters in the area.

**Practice Variables**

- Using cosmetic eye liner containing lead, especially by children.

- Using the best means for cleaning, such as using a wet cloth and washing it after each use.
- Clean cooking practices such as washing the vegetables before cooking, washing the utensils, etc.
- Good nutritional habits.

The results revealed measurable changes in all three aspects: improvements in knowledge by 36%, in attitudes by 7%, and in practices by 22% (Figure 6). The greatest increase in knowledge levels illustrate that residents interacted substantially with the awareness activities conducted directly by the LIFE-Lead team and through other awareness activities conducted by local community organizations which had been trained and assisted by the project for implementing such events. The results also demonstrate that site remediation conducted by the project represent a means of raising the awareness of the community concerning lead smelters as a source of contamination.

The progress in practices reflects that the residents have adopted positive actions to protect themselves and their environment from lead pollution. However, the percentage change in practices lags behind the change

**Before LIFE-Lead**

**Environmental problems were not considered by most to be a high priority.**

**Many community members, especially men, were unaware of the severity of lead pollution problems and did not believe that high levels of lead and other pollutants had an impact on their children’s health.**

**Many residents believed it was the government’s responsibility to address the area’s pollution problems.**

**Important demographic groups, such as school teachers were unaware of the health hazards of lead exposure for both themselves and their students.**

**The majority of women were not aware of how to cook and clean in a manner that would reduce their family’s risk to lead exposure.**

in knowledge. This indicates that changes in practices are more difficult to achieve as individuals might be aware of the hazards of a certain practice, but remain influenced by other factors that do not enable them to change their behavior. An example of this phenomenon as documented in the KAP Post Study is that smelter workers are aware of the necessity of using personal protective equipment, but they do not use this equipment for one or more of the following reasons:

- The equipment is not available.
- They cannot afford to buy the equipment.
- The smelter owner does not provide the equipment.
- They are convinced that using such equipment will not be comfortable and will impact their work.

The results also reveal that attitudes were the least improved aspect of the study. A person’s awareness and knowledge of pollution problems and hazards might increase, and he/she might adopt the right practices to protect oneself and one’s family from such hazards; however, other factors might prevent changes in attitudes. The study results confirm that the positive change in the residents’ attitudes towards transferring the smelters

from their area was only minor. It is probable that this is caused by economic reasons: residents are aware of the hazards caused by these smelters (as indicated by the results of the knowledge and practices sections of the study), but the residents have no economic alternative that provides the same job opportunities after the smelters are transferred.

The results indicate that the change in attitudes of the local community is still unsatisfactory. To increase changes in attitude may require intervention such as the appropriate government authorities providing more job opportunities after the closure or transfer of lead smelters.

**Figure 6: impact on knowledge, attitudes, and practices in Shoubra El Kheima comparing survey results before the LIFE-Lead project and near its completion.**

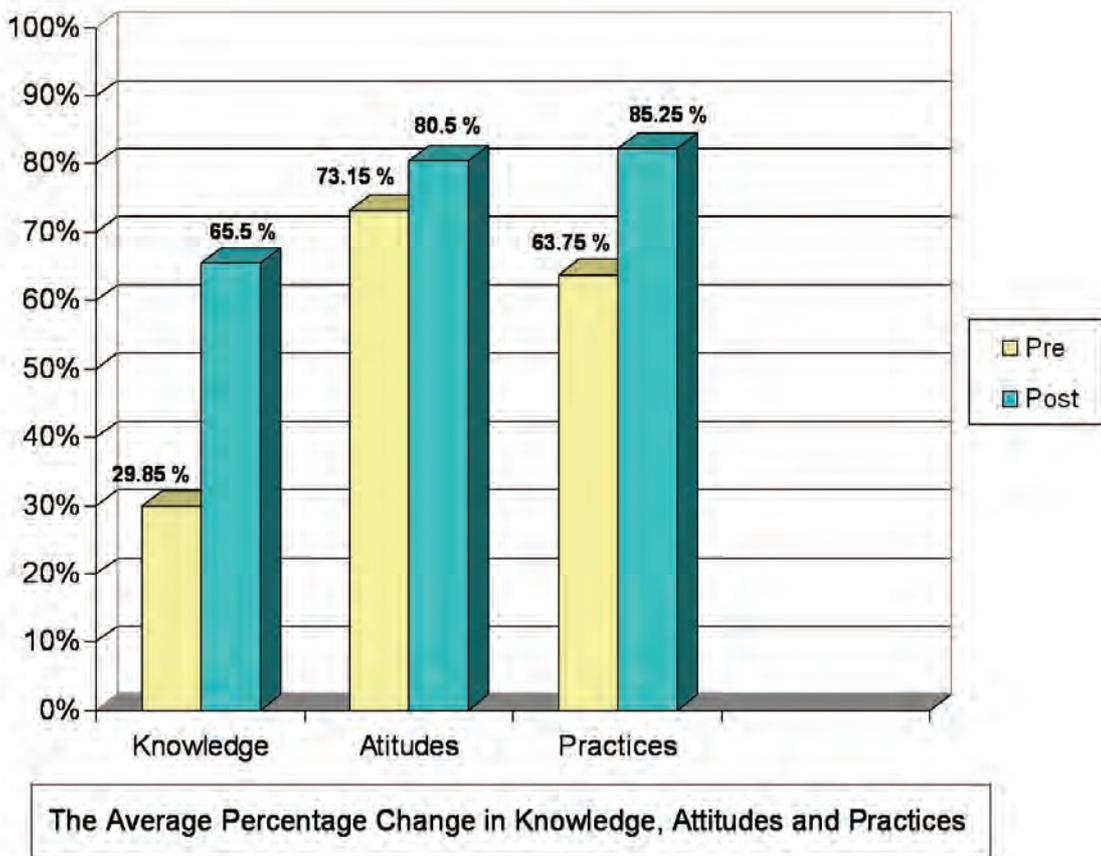


PHOTO: MADIHA AFFIFI/LIFE-LEAD

## CHAPTER FIVE LESSONS LEARNED

What was learned through implementation of the LIFE-Lead project? What will be its lasting legacy?

Perhaps the best way to answer these questions is by considering each of the two main activities of the project: the technical remediation task and the public participation/local governance task.

### *Technical Task Lessons*

1. The remediation sector is a novelty in Egypt. Prior to the LIFE-Lead project, few individuals had more than a superficial understanding of this complex field including the broad number of technical disciplines to complete such tasks as site assessment, risk assessment, remedial design, and health and safety. The concept of “remediation” was not included in current Egyptian environmental laws.

2. Engaging stakeholders in the technical planning, discussions, and execution of site remediation, can lead to a heightened priority of the remediation sector. EEAA and local authorities (i.e., Governorate of Qalyoubia) were involved in the planning and implementation of the technical activities. This has improved their capacity in the subject as well as their understanding of all the individual components and the overall process.

3. Even with the lack of precedence, Egyptian contractors, engineering companies, and consultants have embraced the opportunity to enter this new business market. The LIFE-Lead project provided training to these technical groups at no charge, but each of the participating companies allowed their employees to fully attend and finish the multi-day programs. Seven contractors and engineering companies made the commitment to attend the initial training.

4. Practice makes perfect! The project remediated a total of ten sites. Requests for Proposals to remediate the site were spread out over a three year period. In order to qualify for bidding on the remediation of future sites, firms were required to submit a bid for each opportunity that was presented by the project. Initially, some of the received bids exhibited a lack of understanding pertaining to the technical approach and health and safety. The quality of the bids in terms of thoroughness and meeting all specifications clearly improved as the project progressed.

5. Completing a project in a new (to the country) technical area can foster the participation of other donors. For example, members of a Japanese



**LIFE-Lead remediation training course.**

organization attended some of the LIFE-Lead training. As a result, Japan International Cooperation Agency (JICA) has decided to follow suit, providing funding for site assessment work in Qalyoubia which is focused on poly chlorinated biphenyls (PCBs).

6. Greater Cairo lacks, but desperately needs, a permitted hazardous waste landfill site to support its local industries. Most industries generate at least some hazardous wastes. These wastes are stored or disposed on site or in a solid waste landfill or as was the case of the LIFE-Lead project, hauled to and disposed in the Alexandria Hazardous Waste Landfill. Hazardous wastes must be treated properly or disposed in a specially designed landfill. Hauling wastes to Alexandria adds a trucking cost that could be greatly reduced if a landfill was located in Greater Cairo. This siting, design, and construction of a hazardous waste landfill to serve Greater Cairo needs to be pursued.

7. Health and Safety measures must be enforced by the governmental authorities. Just as remediation is a new word in the Egyptian vernacular, so is health and safety at a hazardous waste site cleanup operation. The project found that contractors did not consistently maintain proper health and safety precautions such as the donning of personal protection equipment (respirators, gloves, etc.). Until there is external pressure applied to contractors in this field with the potential for receiving fines and/or shut down of operations, health and safety measures will be spotty.

8. Egypt would benefit from improvements in environmental enforcement with its attendant benefits. Eventually, economic forces may provide ample incentives for industry to implement sufficient pollution controls; until then, an adequate regulatory framework backed up

by inspection and oversight from a dedicated governmental authority (e.g., EEAA) is needed. A discussion of this concept is presented in Chapter 6.



Photo: LIFE-Lead

**Truck carrying contaminated material from a Shoubra El Kheima secondary lead smelter site crosses the scales at the Alexandria Hazardous Waste Landfill.**

#### *Public Participation/Local Governance Task Lessons*

1. Building a culture of public participation is critical prior to community planning activities. Residents of poor and marginalized communities in Egypt such as Shoubra El Kheima are often unaccustomed to participating in public decision-making processes. This makes it necessary to engage and inform community members before holding important meetings, such as environmental impact assessment scoping sessions, to ensure they understand the nature of the problems facing their community as well as the potential solutions. Convincing people that they can play a role in environmental protection is especially challenging, because many think that environmental cleanup is the government's job and that industrial pollution problems are outside of their control.

2. Practicing consistent and frequent communication and engagement with stakeholder groups is key to gaining trust. The project had to undertake a long-term participatory engagement with the community in order to become a trusted partner. This time-consuming process requires repeated visits and meetings. For example, staff held awareness meetings with local religious figures at the project's outset to try and engage this influential group of community leaders. At first, the priests and sheiks were reluctant to participate, but after project staff consistently asked for their input and engaged them in the planning process, they became crucial partners.



Photo: LIFE-Lead

**A LIFE-Lead team member collects data using the KAP ("Knowledge, Attitudes, and Practices") survey.**

3. To help ensure appropriate community participation, "champion" individuals and organizations must be recruited for the community process. By concentrating on these key people initially, others are more easily mobilized later. For example, the Bahteem Cultural Center was one of the project's earliest and most enthusiastic partners. Once the LIFE-Lead team established a good working relationship with Bahteem, the center's staff helped introduce and promote the project in the community.

4. Promise, then deliver. Many people in Shoubra El Kheima were initially skeptical of the project's ability to deliver what it planned. However, once the community could see tangible results, attitudes changed. Achieving visible technical results can reinforce communication and outreach activities. In the case of the El Shahid Ahmed Shaalan school, remediation of the school was carried out in conjunction with community outreach efforts. Once residents could see that the school had been decontaminated and renovated, they became motivated to participate in such activities as environmental education and community cleanup days.

5. The message may be reinforced by integrating it into different venues. To integrate the project's environmental protection message into the curriculum at Shoubra El Kheima's schools, LIFE-Lead first educated teachers about local environmental problems. Then, through a series of workshops, the teachers were challenged to embed environmental "lessons" into different subjects such as social studies, math, and Arabic. LIFE-Lead followed up on this work by organizing school environmental competitions, which engaged both students and teachers with local government officials helping by judging the competitions and awarding prizes.

The schools are beginning to send classes to the local library on a regular basis. There, students visit the Industrial Pollution Desk, built with project assistance, to watch the environmental videos and plays produced by the project.

6. Take advantage of community resources. Some of the project's best resources were properly trained local residents. The project hired several community members to conduct its initial Knowledge, Attitudes, and Practices (KAP) Survey. The four best surveyors (two men, two women) were retained by the project and trained as part time outreach workers, who engaged in face to face communications work with local residents. As they were already well known by local residents and familiar with the community, they were able to quickly and effectively reach important target audiences.

7. Community resources need to be coordinated. Shoubra El Kheima has a range of local institutions, such as schools, libraries, religious organizations, and NGOs that are not known for their mutual cooperation. One method used by the project to address this problem was the creation of a multisectoral local advisory committee where these various groups met regularly and were able to network. During the community cleanup campaign organized by the project, each member of the advisory committee was asked to participate by nominating 10 youths.

8. Effective strategies can be "win-win". The Shoubra El Kheima Public Library, like many in Egypt, was having trouble attracting new patrons until working with the LIFE-Lead team. Project staff saw an opportunity to use the library as a vehicle for community education and a means of getting new customers in the door. The project held a series of community outreach events at the library, including competitions featuring prizes. Attendees were encouraged to join the library and take advantage of its other resources, including low-cost classes. This effort worked, as the number of daily visitors to the library quadrupled.

9. The message and the medium need to be relevant to the target audience. To garner more attention to the problems with lead pollution, it was necessary to conduct activities which addressed some of the more visible environmental problems, such as trash build up in the streets and other common areas. By incorporating activities such as community and school cleanup days and contests, the industrial pollution outreach and education efforts were greatly enhanced. When it became apparent that the communication materials about lead pollution developed for 5<sup>th</sup> and 6<sup>th</sup> graders were inappropriate for younger children, the project created a puppet show to reach this demographic group. When staff tried to engage women in the community using traditional communication and outreach approaches such as a project newsletter and

promotional brochures, these fell flat. However, filming a video drama in the community using local people and locations was successful.

10. External factors outside a project's control can impact project work and must be acknowledged. While there has been significant progress in cleaning up industrial pollution in Shoubra El Kheima, major pollution problems that are outside of the project's scope still remain. For example, the Delta Solb steel mill is still operating and emitting pollution which falls on the nearby school. It was difficult to convince students at this school to participate in environmental cleanup activities, because their efforts were undone over the space of a weekend. The project acknowledged and then addressed these external problems by coordinating with local government officials and the EEAA, especially around Delta Solb. It is expected that the factory will be outfitted with better pollution control system as part of another donor project.

11. Even severe environmental problems may not be among a community's biggest concerns. Despite the severity of Shoubra El Kheima's lead pollution problems, many residents have more pressing concerns, such as poverty, unemployment and illiteracy. Moreover, many community members, especially men, work in factories or smelters and felt that by participating in project activities, they were working against their personal economic interests. The LIFE-Lead team had to be sensitive to the reality that some residents are more worried about their jobs than pollution.



Photo: LIFE-Lead Team

**Ribbon-cutting ceremony at the opening of the Ahmed Shaalan school in Shoubra El Kheima following remediation.**



Photo: LIFE-Lead Team



## CHAPTER SIX THE FUTURE OF REMEDIATION IN EGYPT

The LIFE-Lead project identified what Egypt will need going forward to further develop a viable remediation program that will be effective in the future.

First, additional environmental legislation and regulations are needed if there is any hope of sustaining a concerted effort to address industrial pollution in Egypt. Texts of Law 4/1994 and its Executive Regulations do not currently reference hazardous waste sites or their remediation. The following provides the language contained in Article 33 of Law 4/1994 and the addition, in bold, proposed by EEAA.

“Those engaged in the production or circulation of hazardous materials, either in gas, liquid or solid form, are held to take all precautions to ensure that no environmental damage shall occur.

The owner of an establishment whose activities produce hazardous waste pursuant to the provisions of this Law, shall be held to keep a register of such waste indicating the method of disposing thereof, and the agencies contracted to receive the hazardous waste. The executive regulations shall determine the data to be recorded in the said register and the EEAA shall be responsible for following up the register to ensure its conformity with the facts.”

**“The owner, or the manager, of such establishment that produces hazardous wastes must cleanup its site and its soil in case of it being transferred or its activities ceased. Remediation should be undertaken according to the criteria and standards clarified by the Executive Regulations of Law 4.”**

The LIFE-Lead project determined that several specific references are needed for inclusion in the Text of Law and its Executive Regulations:

- Standard procedures for sampling and analysis for developing a site characterization for a hazardous waste site.
- Hazardous Waste and Substances Lists of the Ministries of Agriculture, Electricity, Health, Industry, Interior and Petroleum (should be included in the Executive Regulations).
- Health risks limits for the development of cleanup levels.

- Need for having the remediation design for a site reviewed and approved by EEAA.
- Specific reference for the site owner/manager to cleanup groundwater contamination.
- Expansion of the cleanup area to include adjacent areas that are contaminated from the industrial activity and not just the specific site.
- Reference to the competent authority in which the contaminated site is located, including terms for land use planning, land registration, and activity licensing.
- Procedures and standards to be followed for confirmatory sampling and site clearance, once remediation is complete.

Details associated with these legal references would be defined in ministerial decrees to be issued by the Minister of State for Environmental Affairs.

The EEAA would also be responsible for issuing guidelines for the following:

- Human Health Risk Assessments.
- Environmental Impact Assessment for the remediation of a contaminated site.

Tantamount to a successful national remediation program, is the need to establish the responsibilities of the different concerned entities. These primarily entail the site owner and/or operator and the regulatory entities.

The site owner is responsible for all activities of the remediation process (see Figure 3 in Chapter 2) necessary for the site cleanup. Owners could conduct the activities on their own or could contract an engineering/consulting firm to provide the required scientific investigations and engineering designs, remediation design compliance oversight, and regulatory reporting. construction contractors could be hired to provide the actual remediation services as well as site rehabilitation after remediation. The owner/operator is also ultimately responsible for ensuring that confirmatory sampling and laboratory analysis is completed in order to complete a site clearance report.

The LIFE-Lead project has trained a cadre of consultants and contractors that are capable of performing all of the site assessment and remediation activities.

# SUCCESS STORY

## Opening Doors to a New Field

Nagwa El Karawy, executive director of AMA ARAB Environment Company (AAEC), is leading her firm's entry into the environmental remediation field. After seeing a newspaper ad for USAID-funded training, she seized the opportunity to break into a new sector. As a result, five AAEC engineers completed training offered by USAID's LIFE-Lead project. During the free, two-week training course, eight Egyptian firms learned how to set up and implement a full remediation operation. Participants were exposed to best practices in health and safety, remediation, report writing, and record-keeping techniques. Before the training, AAEC's main work consisted of managing solid waste disposal for half of Cairo. Today, however, the company is establishing itself as a player in the remediation market. Through contracts with LIFE-Lead, AAEC remediated two schools polluted with lead and other heavy metals. Applying the skills they learned through the training, AAEC engineers built an on-site decontamination unit, taught workers about health and safety procedures, and worked with the LIFE-Lead team to troubleshoot problems. The five engineers trained by USAID have since trained seven of their colleagues.

Based on this success, AAEC is making efforts to generate new business, especially in the lucrative oil and gas sector. The firm recently won a contract for asbestos abatement.

***"I'm so proud of my team members who have been trained by LIFE-Lead. With the training they received, they are now ready to go work anywhere in the remediation sector."***

**— Dr. Nagwa El Karawy,  
Executive  
Director of  
AMA ARAB  
Environment  
Company  
(AAEC)**



Photo: Kirk Ellis/LIFE-Lead

Capacity building has already taken hold through the project (e.g., see success story). However, additional needs remain for building a sustainable site remediation program in Egypt. For example, EEAA personnel must be equipped to review human health risk assessments, environmental impact assessments, and remediation designs addressing contaminated sites. They must also be able to properly inspect remediation activities and make appropriate decisions on site clearance reports.

Additional seasoning of consultancy service providers is necessary to ensure adequate planning and site characterization, completion of human health risk assessments, determining cleanup levels, selecting the most applicable remediation technologies, producing remediation designs, preparing bidding documents, and conducting other related tasks.

Contractors (even those trained by LIFE-Lead) need additional experience in hazardous waste management, remediation technology construction, and the practice of health and safety standards and procedures on contaminated sites.

In addition to the type of community awareness programs that were initiated during the LIFE-Lead project, other stakeholders will need to be informed about the Egyptian remediation program.

The investment community will be affected by legislative changes. The additional costs (e.g., required insurance for specific activities) and the constraints and requirements these changes would cause on land related transactions need to be communicated.

The insurance and banking communities need to be introduced to environmental liabilities and their potential financial repercussions as well as the business opportunities implied by the legislative modifications.

Legislators need to be made aware of implications of the legislative modifications that will be needed. For example, legislators need to be ready to preempt the expected resistance from the investment community that is presented with the costs of remediation by communicating the economic and social costs that can be avoided through remediation.

Since legislative modifications could entail substantial costs, an adequate transition phase, which may include a grace period, may be required prior to full-scale implementation of the Egyptian remediation program.

The general public needs to be made aware of their rights and the potential impact site contamination could have on their well being.

Property use licensing and real estate transaction control need to be improved to control the transfer of a contaminated property from one owner to the next. In order to improve control, the following items need to be addressed:

- Site clearance must be a requirement for the licensing of a new activity on a site where industrial activities have taken place. New facility licenses should state that site clearance will be required in future changes of land use and/or ownership. For changes in land use, an EIA must be prepared and EEAA must ensure that the site is clear of contamination prior to issuing the approved EIA. However, for new site activities not requiring an EIA (e.g., residential development on a vacated army training field), the site should still conduct a site clearance study prior to receiving use and construction permits.
- For contaminated sites, remediation must be made a prerequisite for obtaining the license of the new activity.
- In order to maintain program transparency, those activities/facilities requiring site clearance should be specified and made public.

The competent authorities will often be the governorates where the site is located. However, according to the specific land arrangements, jurisdiction could be by other authorities including, but not limited to, the Ministries of Housing and New Communities, Agriculture, Transport, Irrigation, Investment, Defense, and Interior.

Fines related to contaminated sites need to be legislated by either the governorates or the EEAA. Payment of fines can present an effective deterrent for causing site contamination or for not acting responsibly in cleaning up a release at a site. Since fines would be set by the courts, there may well be a time delay. However, EEAA can make the threat of fines more realistic by adopting clear and transparent criteria and methodology for the valuation of environmental damage, with corresponding reference for compensation.

Once site remediation is integrated within the standard environmental practices in Egypt, two financial issues need to be addressed including the costs for remediation (including site assessment, etc.) and the regulatory oversight.

According to the “Polluter Pays Principle”, the cost of remediation should be borne by the party responsible for contamination. In order to adequately cover these costs, targeted facilities could be required, in the future, to carry an insurance policy to cover potential costs, when and if required. However, this can only take place after a clearly legislated requirement is in place allowing insurance companies to issue such policies.

For sites where the responsible party cannot be identified or is not able to pay, the Environmental Protection Fund (EPF), based on its mandate, could channel the needed funds. In order to avoid overburdening the current EPF resources, a clear policy related to cases where it would intervene needs to be formulated and issued. This would also raise the need for the investigation of additional and sustainable sources of funds to support EPF interventions.

Alternatively, a fund could be developed to support the EPF funding into which industrial facilities would contribute. The mechanism for such contribution, as well as the levels of contribution would need to be specified in close cooperation with the Industrial Development Agency (IDA) of the Ministry of Industry.

Financing of the oversight expenses of EEAA for this program, could be sourced from the EEAA budget and/or a fee added to the licensing required for industrial facilities. The need for public financing of remediation activities is critical in the early stages of site cleanup. Then as site remediation becomes a standard environmental practice in Egypt the need for public funding should diminish.

A Site Remediation Unit needs to be established within the EEAA. This unit would be responsible for either directing the remediation of a contaminated site or assisting competent authorities during the remediation process. It is crucial that as site remediation becomes a standard environmental practice in Egypt, units would be established at the Regional Branch Offices of EEAA, to work in close coordination with governorate authorities.

## Appendix A: Project Success Stories

# BEFORE & AFTER

## A Clean Slate for Cairo's Kids

**BEFORE** Lead, antimony, and asbestos, produced by local industries, contaminated the school, putting students at risk of serious health problems and making it hard for them to learn.



Fady Nessim/LIFE-Lead

**AFTER** The school is now free of pollution, providing a healthy learning environment for the children and their teachers. After remediation, the school's enrollment increased by 20 percent.



Fady Nessim/LIFE-Lead

### **USAID's environmental cleanup program makes schools healthy places for students.**

The Shahid Ahmed Shaalan Primary School, near Cairo, is one of two schools recently remediated by the LIFE-Lead project as part of USAID's pollution cleanup efforts in the densely populated industrial area of Qalyoubia. A previous USAID project helped shut down a lead smelter operating right next to the school. Before USAID's intervention, the pollution was so severe that, according to teacher Mahmoud Gad, many students had difficulty learning, and some would even pass out in school. "The black dust was so bad," he said, "that it felt like my students worked at the smelter." Aliaa, a fifth grader, recalls that, before, "the school was full of dust and smoke, and I could not breathe. Now the air is clear, and I can concentrate on my studies."

# SUCCESS STORY

## Community Educates Itself About Lead

The Shoubra El Kheima area north of Cairo has suffered for years from severe pollution due to hazardous emissions of heavy metals, especially lead, from nearby industries. While pollution levels were alarming, surveys revealed that many residents were unaware of the significant health threats of lead and simple measures they could take to protect themselves. Now, a local leader is educating his community with assistance from USAID's Livelihood and Income from the Environment (LIFE)-Lead Pollution Clean-up project in Qalyoubia. LIFE-Lead has been working with community leaders in Shoubra El Kheiman to help them deliver the message about the dangers of lead pollution and lead efforts to confront the problem.

Hamid Abdel Aziz, director of the Bahteem Cultural Center in Shoubra El Kheima, has been a pioneer. After learning about the dangers of lead through the project, Aziz decided to raise awareness using homegrown methods. He led a community effort to create and stage a play called *Our Beautiful Life* which uses music and humor to educate children about lead. The play follows the story of a local girl who gets sick from lead, portrayed by a monster called Peebee (after lead's chemical symbol, Pb). She recovers after visiting the local medical center, where her mother learns how to keep her safe from lead. All the roles are played with zeal by local schoolchildren. The play has been a runaway success, seen by thousands, including the Egyptian Minister of Environment and the local governor.

Under Aziz's direction, Bahteem has been a center of community education efforts. The hundreds of children who visit daily learn about lead through environmental competitions, art projects, and a slideshow developed by Aziz's staff, which uses the story of a school field trip to teach children how to protect themselves against lead. Most importantly, these activities are now built into the program at Bahteem and will continue long after LIFE-Lead ends.

**A community leader creates innovative ways to raise awareness about the dangers of lead pollution.**

*"The LIFE-Lead project made us realize how dangerous lead is and our role is to make the community more aware of this." — Hamid Abdel Aziz, Director of the Bahteem Cultural Center in Shoubra El Kheima*

**School children perform a play produced by the Bahteem Cultural Center to raise awareness about the dangers of lead pollution.**



PHOTO: Randy Spiers/MSE

# SUCCESS STORY

## Reduced lead levels brighten futures

Exposure to high levels of lead in early childhood is a serious public health problem. Children who are exposed to unsafe levels of lead have lower IQs, perform below average in school, and may, as a result, have low-paying jobs or remain unemployed as adults. In the densely populated suburb of Shoubra El Kheima in northern Cairo, lead exposure is a serious concern for local residents who have been subjected to years of severe lead pollution generated by lead smelters operating adjacent to their homes, schools, and health centers.

To assist the community in cleaning up their neighborhoods the Governorate of Qalyoubia, the Egyptian Environmental Affairs Agency, and USAID have been working to shut down and remediate the smelters responsible for much of the lead pollution. A previous USAID project assisted with the closure and relocation of several smelters. Despite the closures, significant amounts of lead remained in the soil and buildings on and near the former smelter sites. Since 2004, the USAID Livelihood and Income from the Environment (LIFE)-Lead Pollution Clean-up in Qalyoubia project has been addressing this deadly challenge by remediating contaminated sites and supporting citizen advocacy and awareness groups.

These efforts have been successful. Prior to LIFE-Lead's remediation work, tests were conducted to measure the blood lead levels (BLL) of residents living near the biggest smelters. While no level of lead in the body is considered safe, World Health Organization (WHO) standards deem a BLL of less than 10 micrograms of lead per deciliter of blood to be acceptable. The 2004 BLL surveys in Shoubra El Kheima revealed that nearly 50 percent of the children under age seven surveyed had a BLL significantly higher than the WHO standard of 10 µg/dL. Follow-up studies conducted in 2007 by LIFE-Lead showed that only 20.3 percent of young children had an unacceptably high BLL. The lowered blood lead levels of Shoubra El Kheima children's point to a brighter future for them and their community in the years to come.

**USAID's efforts to clean up lead pollution in the suburbs of Cairo brighten the prospects of local children.**

**These children are less likely to suffer from unsafe exposure to lead thanks to more than 10 years of USAID assistance to remove lead and other harmful substances from their communities.**

*The LIFE-Lead project has combined the remediation of lead smelters, health clinics, and primary schools with increased community awareness and advocacy to reduce the threat of lead exposure for the residents of Shoubra El Kheima. These efforts have led to significant reductions in blood levels of all area residents including the most vulnerable - young children.*



Madiha Afifi LIFE-Lead

# SUCCESS STORY

## Getting the message on protection against lead

Since 2004, the USAID Livelihood and Income from the Environment (LIFE)-Lead Pollution Cleanup in Qalyoubia project has been working to remediate polluted sites in the Shoubra El Kheima area north of Cairo, which suffers from severe lead pollution generated by industries operating in the area. While the pollution levels were truly alarming—before USAID intervention local industries produced more lead emissions than all of North America combined—surveys conducted at the project’s start revealed that many residents were unaware of the problem’s severity and simple actions they could take to protect themselves. In response, LIFE-Lead implemented a communications strategy to educate and enable key groups in the community to spread the word about lead.

The project has reached out to influential community members so that they can be catalysts for action. Women are a key target group, because they can protect their families from lead exposure by adopting a few basic cleaning and nutrition techniques. LIFE-Lead produced a video drama as a means of educating the area’s many illiterate women. The drama features a homemaker named Nabiha (‘smart’ in Arabic) who explains to her neighbor the health problems associated with lead and how she can protect her family. The message has changed the perspective of women in Shoubra El Kheima. One woman said that before watching the video she “did not know that my neighbors and I can have a role in protecting ourselves and our children from pollution.” Another said she was happy to learn that “there are very cheap and available foods that can reduce the risk of pollution for us and our children.” The video has been seen by thousands of local women, many of whom now spread the message to friends and family.

Using a variety of communications approaches, USAID’s messages about lead pollution and health have reached approximately 15,000 people. More importantly, thanks to neighbor telling neighbor, much of this effort is now self-sustaining and will continue long after the project closes.

**USAID works with community leaders to raise awareness about lead, its dangers, and actions residents can take to protect their families.**

**Scene from a video drama funded by USAID, featuring a homemaker who teaches her neighbor how to protect her family from lead exposure through proper nutrition. These video messages have been viewed by thousands of people in the Shoubra El Kheima area of Cairo.**

*“From now on, I will watch my ways in eating and cleaning and I will wash my husband’s clothes separately after he comes from his work at the smelter.” — A homemaker in Shoubra El El Kheima after seeing the video drama produced by LIFE-Lead*



PHOTO: Randy Spiers/MSE

# SUCCESS STORY

## Center Cleanup Boosts Numbers, Morale

Until recently, the Kablat Medical Center in Shoubra El Kheima, north of Cairo, was an unpleasant place for staff and patients. The facility was in disrepair, and staff morale was low. Dr. Gamal Moawad, director of Kablat since 1997, recalled that the situation was so bad that proper urinalysis tests were impossible because of the condition of the toilets. Kablat was also highly contaminated with heavy metals due to hazardous emissions from unregulated factories operating nearby. When experts from USAID's Livelihood and Income from the Environment (LIFE) Lead Pollution Clean-up project in Qalyoubia conducted tests at Kablat they found dangerous levels of arsenic, lead, mercury, and cadmium in the buildings and grounds.

In response, LIFE-Lead spent four months remediating and renovating the facility according to U.S. Environmental Protection Agency (EPA) standards, and USAID's TAKAMOL project provided new furniture and medical equipment. The renovated space, free of heavy metal contamination, provides staff and patients with a functional and pleasant environment. According to Dr. Moawad, "The community noticed the difference immediately," and the number of patients per day nearly tripled as word spread that Kablat had changed. The increased patient numbers also helped Kablat secure more funding and medication from the Ministry of Health and Population.

Medical center staff enjoyed the breath of fresh air too. Morale has improved significantly, and Dr. Moawad said attracting and retaining doctors and nurses has become much easier. Before, staff, including emergency room nurses, did not want to stay at their posts, and the conditions led to short tempers and disagreements. Now, staff happily stay at their posts, and some even come to work on their days off. The staff and patients now see the medical center as a sustainable part of the community and are working together to keep it clean and well maintained.

**A hallway (top) in the polluted and dilapidated Kablat Medical Center before remediation and renovation by the LIFE-Lead project, polluted and in disrepair. The same hallway after (bottom) LIFE-Lead's work shows the difference.**

**The remediation of a community medical center benefits patients and staff.**

*The LIFE-Lead project remediated and renovated the Kablat Medical Center because it was highly contaminated with lead and other heavy metals. The renewed facility has increased patient numbers, staff morale, and community pride.*



Photos: Madiha Afifi (top) and Adel Shafik (bottom) / LIFE-Lead

## FIRST PERSON

### Opening Doors to a New Field

Nagwa El Karawy, executive director of AMA ARAB Environment Company (AAEC), is leading her firm's entry into the environmental remediation field. After seeing a newspaper ad for USAID-funded training, she convinced Managing Director Antonio Canale to seize the opportunity to break into a new sector.

As a result, five AAEC engineers completed training offered by USAID's Livelihood and Income from the Environment (LIFE)-Lead Pollution Clean-Up project. LIFE-Lead works in Qalyoubia, an area north of Cairo, to reduce pollution. The project trains Egyptian companies such as AAEC to clean up hazardous waste at contaminated sites.

During a free, two-week training course, eight Egyptian firms learned how to set up and implement a full remediation operation. Participants were exposed to best practices in health and safety, remediation, report writing, and record-keeping techniques. Before the training, AAEC's main work consisted of managing solid waste disposal for half of Cairo. Today, however, the company is establishing itself as a player in the remediation market. Through contracts with LIFE-Lead, AAEC remediated two schools polluted with lead and other heavy metals. Applying the skills they learned through the training, AAEC engineers built an on-site decontamination unit, taught workers about health and safety procedures, and worked with the LIFE-Lead team to troubleshoot problems.

Based on this success, Dr. El Karawy is now steering efforts to generate new business, especially in the lucrative oil and gas sector. The firm recently won a contract for asbestos abatement and is preparing for certification to international management standards. Building on LIFE-Lead training, AAEC has cut costs by improving its record-keeping systems and established an internal training program in remediation. The five engineers trained by USAID have since trained seven of their colleagues. Dr. El Karawy credits the project for raising their level of professionalism and laying the groundwork for AAEC's entry into the remediation sector.

### **USAID builds the capacity of Egyptian companies to clean up hazardous waste.**

*"I'm so proud of my team members who have been trained by LIFE-Lead. With the training they received, they are now ready to go work anywhere in the remediation sector." —Dr. Nagwa El Karawy, Executive Director of AMA ARAB Environment Company (AAEC)*



Photo: Kirk Ellis/LIFE-Lead

# PHOTO & CAPTION

## Puppets speak kids' language on lead

A puppet show in a Cairo suburb is teaching children how to avoid exposure to lead, a powerful neurotoxin that can cause permanent damage in early childhood. Performed at local schools, the show has reached thousands of kids in Shoubra El Kheima, where residents have long suffered from lead pollution generated by unregulated smelters.

Children are especially vulnerable to lead pollution because they can easily ingest the harmful substance while playing in polluted streets. To make matters worse, their underdeveloped digestive systems tend to absorb lead more readily than in adults. Prolonged exposure to high levels of lead can impair cognitive function, causing lower IQs — a largely irreversible effect that often results in a lifetime of academic underachievement and lost income.

Through stories told by the puppets, children between the ages of 5 and 9 learn about simple ways to protect themselves, such as washing their hands and eating foods that strengthen the immune system. The puppet show is part of a multifaceted approach used by the USAID-funded LIFE-Lead project to educate local residents about the health dangers of lead.

LIFE stands for Livelihood and Income from the Environment. Under this umbrella contract, one project — Lead Pollution Cleanup in Qalyoubia, also known as LIFE-Lead — has been remediating polluted sites and raising awareness of protective measures since 2004. Because teaching kids about this complex subject is difficult, the project adopted a novel approach by letting puppets do the talking.

**A puppet show created by the LIFE-Lead project educates children about ways to keep themselves safe from lead pollution.**



Photo: Madiha Afifi / LIFE-Lead project

# CASE STUDY

## Religious Leaders Raise Awareness

**CHALLENGE** The Shoubra El Kheima area north of Cairo is severely polluted due to hazardous emissions from metal smelters and foundries, including lead, arsenic, and mercury. Before USAID's intervention, these industries produced more lead emissions than all of North America combined, threatening the health of the local population. Yet surveys showed that most residents were unaware of the dangers, especially from lead, a powerful neurotoxin that is particularly harmful to children.

**INITIATIVE** Since 2004, the USAID Livelihood and Income from the Environment (LIFE)-Lead project has been cleaning up polluted sites in the heavily populated industrial area of Qalyoubia. As surveys revealed that religious leaders were highly trusted by the community, the project enlisted their support to raise awareness about environmental issues. Through a series of four workshops, 41 Muslim and Christian leaders learned about the severity of the problem and worked together to craft and disseminate messages to their followers. The leaders developed community outreach plans and created brochures that address environmental concerns from a religious perspective.

**RESULTS** Since their participation in the workshops, leaders of both faiths regularly discuss local environmental issues during religious services and community meetings. By incorporating awareness messages into their weekly sermons, the priests and sheikhs have taught thousands of people about the effects of pollution and how they can protect their families. This approach complements the project's clean-up work, including the remediation of seven lead smelters, two schools, and a medical center. Thanks to these efforts, Shoubra El Kheima residents now live in cleaner surroundings and are more aware of their environment.

**Priests and sheikhs work together to design a strategy for raising environmental awareness in the Shoubra El Kheima community**

### Muslim and Christian leaders work together to raise community awareness about pollution.

*USAID's LIFE-Lead project is working with religious leaders to help them design and disseminate environmental awareness messages for a community deeply affected by pollution. Muslim and Christian clerics are working together to educate their followers.*



Photo: Dina Alaa/LIFE-Lead

# SUCCESS STORY

## Environment wins in school competitions

Educating schoolchildren about environmental issues is challenging but essential work in Shoubra El Kheima, a densely populated suburb of Cairo. The area has long suffered from severe pollution due to nearby industries, including metal smelters which emit hazardous materials such as lead, which threaten residents' health. To teach the children of Shoubra El Kheima about the environmental challenges facing their community, USAID's LIFE (Livelihood and Income from the Environment)-Lead Pollution Cleanup in Qalyoubia project has helped the area's schools integrate environmental education into their curriculum and activities.

As part of this effort, LIFE-Lead organized environmental competitions between five primary and secondary schools in Shoubra El Kheima as a fun way for students to apply what they have been learning. A quiz-bowl style tournament held at the local library provided a forum for children to show off their environmental knowledge. Winning teams earned savings bonds, as well as bragging rights. Another competition asked students to come up with creative ideas for improving environmental conditions at their school. Students at one school started a recycling program, while others fashioned decorations from old potato chip bags.

Mahmoud Gad, a teacher at Ahmed Shaalan Primary School in Shoubra El Kheima, says the competitions have had a big impact on his class, which won an award during the competition. He notes proudly that now "the students are dedicated to keeping the school clean and have set aside a day every month for this." More importantly, Mr. Gad sees USAID's work with the schools contributing to other positive changes in the community. "Students naturally tell their parents about what they did at school and this is starting to affect the whole area. There is a sense of change in the community. Even the government is moving towards solving problems. Streets which used to be full of garbage are now clean."

**USAID project uses competitions to teach schoolchildren about environmental action.**

*"Now, my students are not only interested in environmental problems, they are leading activities by themselves." — Mahmoud Gad, teacher at the Ahmed Shaalan Primary School*

**Students read a question during an environmental competition sponsored by the LIFE-Lead project.**



Photo: Adel Shafik/LIFE-Lead

# CASE STUDY

## Community Finds Common Ground in Cleanup

**CHALLENGE** As part of its efforts to encourage community participation in the Shoubra El Kheima neighborhood north of Cairo, the USAID Livelihood and Income from the Environment (LIFE)-Lead Pollution Clean-up project in Qalyoubia helped the community tackle some of its biggest pollution problems by raising awareness about environmental issues and convincing residents that they can have an active role in keeping their environment clean. This heavily populated industrial area, which was suffering from hazardous emissions generated by local industries and tons of trash that had piled up in streets and common spaces, lacked a tradition of community involvement in environmental issues.

**INITIATIVE** Since 2004, LIFE-Lead has been working to clean up polluted sites by shutting down and remediating seven lead smelters, two schools, and a local medical center that had been highly contaminated by heavy metals. To raise awareness about its efforts and promote community initiatives, LIFE-Lead's local advisory committee in Shoubra El Kheima organized the "Do Your Part Cleanup Campaign." Committee members recruited volunteers from the area's schools, community centers, mosques, and churches to involve residents, especially youth, in a massive campaign to remove trash and debris. LIFE-Lead provided volunteers with shirts, hats, tools, and safety equipment, while the local sanitation department provided the trucks and heavy equipment necessary to transport the trash to proper disposal areas.

**RESULTS** The results showed residents how they can have a positive impact on their community by working closely with each other and the local government. In September 2006, more than 70 volunteers worked over two weekends to remove nearly 160 tons of solid waste that had blighted the community. Shoubra El Kheima and LIFE-Lead celebrated the successful collaboration by inviting the volunteers to a celebration at the local cultural center. More importantly, inspired by this example of community involvement, residents are now paying more attention to where they toss their trash, and local officials are promising to hold more cleanup days.

### **USAID helps Shoubra El Kheima work together to cleanup pollution in its common spaces.**

*The LIFE-Lead project has been remediating sites contaminated by lead and other heavy metals in the Shoubra El Kheima area north of Cairo. To involve the public in its efforts and provide an example of community participation, the project worked with local leaders to organize a cleanup day.*

**Students, teachers, and residents work together to clean up the streets of Shoubra El Kheima.**



Photo: Adel Shafik/LIFE-Lead

# SUCCESS STORY

## An Agreement for Change

The Shoubra El Kheima suburb of Cairo used to be well outside city limits. But because of Egypt's explosive population growth over the past 30 years, it is now a densely populated part of Cairo — and one of the most polluted industrial areas in Egypt. Inefficient and unregulated industries operate next to apartment buildings, schools, and health clinics. Many of the local metal smelters, lacking modern pollution controls, emit large amounts of hazardous materials, including lead, mercury, and arsenic, which threaten the health of local residents, especially children.

USAID has been working in the Qalyoubia governorate, where Shoubra El Kheima is located, for nearly a decade to close the worst smelters and clean up their toxic legacy. The effort is paying off. Several smelters have already been shut down and relocated, leading to a 75 percent decrease in lead emissions in Shoubra El Kheima. Previous USAID projects planned and designed the modern Al Safa Industrial Zone outside the city to house smelters relocated from the area.

USAID's Livelihood and Income from the Environment (LIFE)-Lead Pollution Cleanup in Qalyoubia project has facilitated a dialogue among representatives of the governorate, smelter owners, and the Egyptian Environmental Affairs Agency to decide how to further reduce pollution. After two years of difficult discussions, all sides recently signed a landmark agreement to work together on relocating approximately 90 remaining smelters. Many of the smelter operations will be moved to Al Safa, where they will be modernized and equipped with pollution controls and health and safety equipment, providing the added benefit of improving their competitiveness. The agreement also demonstrates how the compromises needed to safeguard Egypt's environment while promoting economic growth can be reached through dialogue. And Shoubra El Kheima's residents will finally be able to get a breath of clean, fresh air.

**After two years of negotiations facilitated by the LIFE-Lead project, representatives of government and industry sign a landmark agreement to relocate approximately 90 polluting smelters from a residential area to a modern industrial park.**

**USAID leads multiyear effort to relocate and modernize polluting industries.**

*The LIFE-Lead project has been continuing USAID/Egypt's efforts to reduce lead emissions in Shoubra El Kheima by working with government and industry on an agreement to relocate smelter operations outside the area.*



Madiha Afifi/LIFE-Lead

# SUCCESS STORY

## New Tool Tests Hazardous Waste

Cleaning up hazardous waste at contaminated sites can be a dangerous business, requiring the best scientific tools available. During cleanup operations in the United States, the Environmental Protection Agency (EPA) requires samples of hazardous waste to be tested to determine their exact chemical characteristics using a procedure called the toxicity characteristics leaching process (TCLP). TCLP results determine whether it is safe to dispose of waste in certain landfills or whether toxic chemicals are at risk of leaching (leaking) out of the landfill and contaminating groundwater. If contaminant levels in leachate are too high, waste must be stabilized before disposal. Until recently, Egypt lacked the equipment and trained personnel necessary to conduct accurate TCLP tests, despite having hundreds of hazardous waste sites in need of cleanup.

Since 2004, USAID's LIFE (Livelihood and Income from the Environment)-Lead Pollution Cleanup in Qalyoubia has been remediating polluted sites near Cairo. These sites — heavily contaminated with lead and other heavy metals — include seven former lead smelters, two schools, and a medical center. To determine safe locations to dispose of hazardous waste removed from cleanup sites, the project's experts had been sending samples to the United States for TCLP testing.

To build local capacity in environmental remediation — an emerging field in Egypt — the project equipped the Egyptian Environmental Affairs Agency (EEAA) to conduct TCLP tests. LIFE-Lead purchased the necessary lab equipment and brought in a U.S. expert to lead a two-week training session that taught 14 local technicians how to perform the test and explain its importance to local industries. According to Dr. Hanaa Sheltawi, supervisor of EEAA's Soil and Water Department and one of the trainees, this has been a valuable addition to EEAA's central lab in Cairo because it will assist the agency in carrying on LIFE-Lead's remediation work after the project ends.

**Technology and expertise from the United States helps improve the safety of hazardous waste disposal in Egypt.**

*“Before, the TCLP procedure was unknown to us, but now it is clear. It is very useful because it helps us ensure that waste is safe for disposal.” — Dr. Hanaa Sheltawi, supervisor of EEAA's Soil and Water Department*

**Chemists from the EEAA learn how to conduct TCLP tests, which determine where hazardous waste can be disposed.**



Madiha Afifi/LIFE-Lead

# SUCCESS STORY

## New Opportunities, a Cleaner Egypt

Eager to expand his family business, Ahmed Ismail answered a newspaper ad from a USAID project looking for local environmental contractors. Ismail's firm, Al Eman Engineering Company, had no experience with remediation work, but he sensed a good business opportunity. Though Egypt has hundreds of polluted sites, many caused by unregulated and inefficient industries, new government regulations and stepped up enforcement are starting to push firms to clean up hazardous waste.

Al Eman and seven other Egyptian companies attended a free two-week training course on how to set up and run a complete remediation operation. Training was provided by USAID's Livelihood and Income from the Environment (LIFE) Lead Pollution Clean-up project, which has been remediating polluted sites in the industrial area of Qalyoubia since 2004.

Ismail immediately saw the value of the training but was initially skeptical about the focus on health and safety. Real-world experience quickly changed his mind. Al Eman won contracts with LIFE-Lead to remediate three former lead smelters in Shoubra El Kheima, a crowded industrial zone north of Cairo. The sites were severely contaminated with heavy metals, especially lead, a powerful neurotoxin that can cause infertility and learning disabilities. Ismail realized the importance of keeping his employees safe while working in these dangerous conditions.

With the training, Al Eman was able to implement the necessary safety measures at each site and to complete the work ahead of schedule. LIFE-Lead provided expert guidance along the way, but Ismail knows that his firm will soon be on its own. Still, he is positive about the future. With the training and remediation experience gained through LIFE-Lead, Al Eman is now ready to compete in a new marketplace.

**USAID builds the capacity of local companies in the hazardous waste cleanup business.**

**Ahmed Ismail tests the safety equipment for his workers before they enter the job site at a former lead smelter.**

*"The LIFE-Lead training taught us how to do remediation the right way, making it possible to do the job correctly and win new contracts." — Ahmed Ismail, owner of Al Eman Engineering Company, an environmental services contractor.*



PHOTO: Randy Spiers/MSE

**Appendix B: List of Project Deliverables**

Project Monitoring Plan	Request for Bid - El Shahid Ahmed Shalaan School
Environmental Assessment for Lead Pollution Clean-up in Qalyoubia	Request for Bid - Delta Solb School
Environmental Assessment - El Kablat Medical Center and Two Closed Secondary Lead Smelters	Request for Bid - El Kablat Medical Center
Environmental Assessment - Delta Solb Preparatory School	Request for Bid - Osama Zakaria Secondary Lead Smelter
Environmental Assessment - Sayed Hussein Copper Smelter	Request for Bid - Khaled Saad Secondary Lead Smelter
Environmental Impact Assessment for Awadallah Secondary Lead Smelters	Request for Bid - Sayed Hussein Copper Smelter
Environmental Impact Assessment for El Mahy Secondary Lead Smelter	Remediation Guidelines
Environmental Impact Assessment for Seoudi Secondary Lead Smelter	Communication Strategy for Community Participation
Environmental Impact Assessment for El Shahid Ahmed Shalaan School	Public Meetings Summary (Documentation)
Environmental Impact Assessment for Delta Solb School	Knowledge, Attitudes, and Practices Report
Environmental Impact Assessment for El Kablat Medical Center	Post-Remediation Blood Lead Level Study in Shoubra El Kheima, Qalyoubia
Environmental Impact Assessment for Osama Zakaria Secondary Lead Smelter	The Future of Remediation in Egypt
Environmental Impact Assessment for Khaled Saad Secondary Lead Smelter	Socio-economic Study of Industry Relocation
Environmental Impact Assessment for Arab Contractors' Battery Assembly Facility	Lessons Learned from Scoping Meetings
Cost-benefit Analysis of Remediation	Street and Common Area Characterization Report
Request for Bid - Awadallah Secondary Lead Smelter Nos. 1, 2, and 3	Greater Cairo Smelter Update
Request for Bid - El Mahy Secondary Lead Smelter	EEAA Remediation Unit Framework
Request for Bid - Seoudi Secondary Lead Smelter	Environmental Management Plan for Al Safa
	Lead Pollution Cleanup in Qalyoubia Work Plan
	Year 2 Work Plan
	Extension Work Plan
	Extension II Work Plan
	Extension III Work Plan
	Quarterly Progress Report Oct. - Dec. 2004
	Quarterly Progress Report Jan. - Mar. 2005
	Quarterly Progress Report Apr. - June 2005

Quarterly Progress Report July - Sept. 2005  
Quarterly Progress Report Oct. - Dec. 2005  
Quarterly Progress Report Jan. - Mar. 2006  
Quarterly Progress Report Apr. - June 2006  
Quarterly Progress Report July - Sept. 2006  
Quarterly Progress Report Oct - Dec. 2006  
Quarterly Progress Report Jan. - Mar. 2007  
Quarterly Progress Report Apr. - June 2007  
Quarterly Progress Report July - Sept. 2007  
Quarterly Progress Report Oct. - Dec. 2007  
Final Report



## Project Deliverables – Electronic Format (DVD)

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