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PUBLICATIONS

EVENTS

CAREERS

LIBRARY

CONTACT US

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Latest News

Newsletter Archives

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You're here: Home » Publications » Latest News » ZAMFARA LEAD POISONING CRISIS - THE STORY

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- [Latest News](#)
- [Newsletter Archives](#)

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## ZAMFARA LEAD POISONING CRISIS - THE STORY

### PREAMBLE

A deadly lead poisoning outbreak that began two years ago in northern Nigeria continues to claim young victims even today, due to the lack of total commitment on the part of Nigerian government to tackle the epidemic from the roots.

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Medecins Sans Frontieres's (MSF), Head of mission in Nigeria, Ivan Gayton had criticized the government of oil-rich Nigeria for not taking the threat seriously, despite over 4,000 children already being sickened by the outbreak linked to gold mining.

"One thousand five hundred children are currently lead-poisoned but are not receiving treatment because it is impossible to deliver effective treatment while they still live in contaminated homes," Ivan Gayton, said.

In 2009 it became clear that hundreds of children in the northern state of Zamfara had died from exposure to lead.

In 2010, a Nigerian health ministry official reported that lead poisoning caused by illegal gold mining had killed 163 Nigerians, most of them children, in remote villages, in the space of just a few months.

In November, 2011 the Nigerian government said it would spend more than \$5m (£3m) cleaning up Zamfara, and in some areas this work has already begun.

Since then, the mining has continued and some 4,000 children of the miners, often from desperately poor backgrounds where other sources of income are meager, have been contaminated.

The villages affected, such as Dareta and Giadanbuzu, are in the poor, arid Sahel region on the southern fringe of the Sahara, where many people work as miners and



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subsistence farmers. No action has been taken to help them.

#### ROOT CAUSES OF LEAD POISONING OUTBREAK

The existence of gold deposits in Zamfara along the border of Niger had been long known. But it wasn't until gold prices soared in recent years that villagers began heading into the bush to search for it.

Soon the poor herdsmen and farmers could sell gold for more than \$23 (N 3,680) a gram - a huge sum in Nigeria where most people live on less than \$2 (N320) a day.

However, the ore brought back to the villages in Zamfara contained extremely high levels of lead.

Miners return from work dusted with lead, which then pollutes their homes. Fathers carried the precious rocks home to store inside their mud-walled compounds, sometimes leaving them on sleeping mats. Wives often broke the rocks and ground them, sending dust and flakes into the villages' communal areas.

#### HEALTH EFFECTS OF LEAD POISONING

High levels of lead exposure can damage the brain and nervous system, resulting in behavior and learning problems such as hyperactivity, or cause slow growth. Lead also can cause reproductive problems, high blood pressure, nervous disorders and memory problems in adults. In severe cases, it can lead to seizures, coma and death.

Because the body struggles to rid itself of metal, it accumulates in the blood over time. Children are particularly vulnerable because their developing nervous systems can be permanently damaged.

It wasn't until 160 children died and others went blind and deaf that authorities in 2010 realized the region faced a lead poisoning outbreak, which the US Centers for Disease Control and Prevention called "unprecedented".

#### SYMPTOMS

Children suffer most because their size makes them more vulnerable to the effects.

Symptoms include lethargy, abdominal pain, vomiting, constipation and headaches. Children in particular may develop encephalopathy - seizures, delirium and coma. For mild poisoning it may be sufficient to remove the patient from the source. More severe poisoning will need medical treatment, but may prove fatal.

## MITIGATIONS

Foreign aid groups have done much of the work to clean the villages affected in rural Zamfara state and provide care to the children, who likely will suffer long-term brain damage from their exposure to the lead. Meanwhile, tests show that lead is returning to areas that have been cleaned.

An international team of doctors and hazardous waste experts arrived in Zamfara in mid-May 2010 to clean the region, but seasonal rains halted their work.

In the time since, the cleanup work and the medical care for those affected has come almost entirely from foreign aid groups. While the government ordered the halt of mining by local villages, the practice continued.

In January 2011, it was reported that some villages already cleaned by foreign experts showed traces of lead and mercury again because residents had begun mining again without taking any precautions.

Gayton called on Nigeria's government to release \$5.3 million for the cleanup effort. He also said the government needed to educate those living there that precautions could make mining safe. "It's possible to do the environmental remediation and it is possible to do safer mining," Gayton said. "We need not die in search of livelihood. It can be done safely."

On Friday May 11, 2012, an International Conference to find solutions to the Zamfara lead poisoning crisis, of which Médecins Sans Frontières (MSF) was the lead organizer, concluded its brainstorming session. The conference delegates endorsed a clear action plan calling for Nigerian government commitment to resolve the crisis.

"There has been plenty of talk, but now is the time for action" said Ivan Gayton, MSF Country Representative in Nigeria. "MSF said at the conference that it would only consider the conference to be a success when all of the poisoned children are living in a safe environment and

receiving treatment."

At the May, 2012 Conference, delegates including Zamfara State officials, HRH the Emir of Anka, Nigerian government representatives as well as national and international aid workers, scientists, health, environmental and mining experts expressed disappointment that the decision-makers from the Nigerian government; the Ministers of Mines, Environment, and Health, were not present - and that no concrete action by the Nigerian federal government was announced.

Then, the Conference called for the promised funds of N 850 million (US\$ 5.4 million) for environmental remediation and safer mining that have been languishing for months, while thousands of children continue to suffer from acute lead poisoning, must be urgently released without further delay to the people of Zamfara.

Also, the Conference agreed an Action Plan to set the path to achieving the **three key pillars** necessary to solve the Zamfara crisis - **medical care; environmental remediation and safer mining**. To succeed, the Nigerian government, in particular the ministries of Mines, Environment, and Health at both federal and state level must commit significant resources and coordination.

Release of the promised funds was a key priority of the Action Plan, as is the immediate remediation of the village of Bagega where an estimated 1500 children have been suffering from lead poisoning since 2010, and continue to wait for their village to be made safe. MSF cannot provide effective treatment in locations such as Bagega, which have not been remediated. MSF treats the sickest children at its inpatient facility in Anka hospital.

"The people of Bagega are desperate for help." said Zakaria Mwatia, a nurse and project coordinator for MSF in Zamfara. "Some of the villagers are attempting to remediate their own compounds in hopes that MSF will be able to provide treatment."

"To effectively cut the pathways of lead contamination requires specialized expertise and equipment" said Simba Tirima scientist with environmental engineering experts Terragraphics. The people of Bagega need the urgently required assistance to provide a safe environment for their children."

The charity group Medecins Sans Frontieres (MSF) is concerned that the situation in Zamfara is deteriorating as the water supply becomes polluted. MSF also called on the Nigerian government to do more to deal with the deadly outbreak of lead poisoning.

## CONCLUSION

It is also our believe that it is possible to do environmental remediation as well as carry out safer mining.

The Nigerian government needs to act now to help thousands of children in Zamfara exposed to lead who are at risk of death or long-

term disability.

More than 2,500 children with high-lead blood levels have been treated. However, thousands more cannot be treated because they continue to be exposed to lead. For those children, treatment would be ineffective or could lead to even more serious medical problems.

It has been more than two years since this epidemic began and the government needs to end the inaction and delay. If Nigeria's federal government steps forward, Zamfara could become a model of how lead poisoning can be effectively addressed, instead of an example of how hundreds of children's lives were needlessly lost. It is a known fact that since the problem first came to light about three years ago the price of gold has almost doubled.

More and more people have turned to mining despite the health risks to their families.

Although the authorities have told people to stop mining, Experts including professional Chemists at the Institute of Chartered Chemists of Nigeria (ICCON) want to see better education in place to teach people of the health risk of mining gold ore containing lead and also alternative safer process of mining.

### **DEVELOPMENT**

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#### **Boy Gets Lead Poisoning from 'Tiro' Eye Pencil**

A 6-month-old boy was treated for lead poisoning due to the use of the cosmetic known as "tiro," which is used as a folk remedy for promoting visual development, according to a report of the boy's case released today.

The baby was brought to Boston Children's Hospital with elevated levels of lead in his blood in June 2011, according to the report from researchers at the Centers for Disease Control and Prevention (CDC). The boy was born in the U.S. to Nigerian parents.

An investigation revealed the source of lead to be tiro, a powdery Nigerian cosmetic that had been applied to the infant's eyelids. Investigators had examined the family's home and found it was "in excellent condition, without lead hazards," according to the report. The baby was exclusively breast-fed, and was not given spices or supplements.

The powder was 82.6 percent lead, the report said.

The main source of lead poisoning in the U.S. is lead-based paint; however, other sources are increasingly being identified, the CDC said. Imported products such as spices, candy, cosmetics, health remedies, pottery and jewelry have all been implicated.

The case began when the baby's parents brought him to a pediatrician for a well-child visit. The doctor noted the cosmetic on the child's eyelids, and tested his blood for lead. The baby was treated with iron supplements, and referred for further testing at the hospital. The baby was growing well and developing normally, according to the report.

The parents stopped using the product, and follow-up blood tests showed the boy's lead levels were dropping.

Tiro is also called "tozali" and "kwalli," and similar products called "surma" and "kajal" in Asia, and "kohl" in the Middle East, may also contain lead.

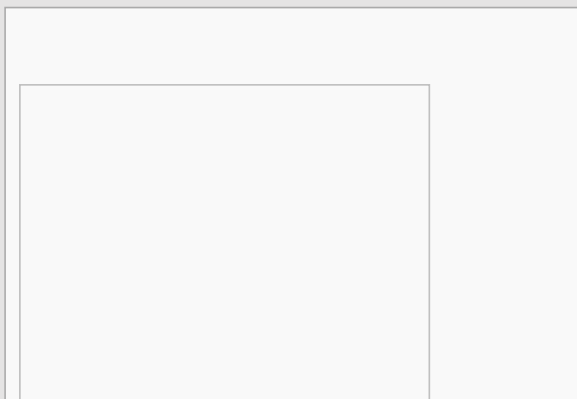
The powder has many uses as a folk remedy, the report said, including relieving eyestrain or pain, and preventing infections in a baby's umbilical cord stump or circumcision wound.

The case shows that certain groups of immigrants may be at higher risk of lead poisoning, the report said. "Educational efforts are needed to inform immigrants from Africa, Asia, and the Middle East that 'tiro' and similar products can cause lead poisoning in children," the researchers wrote in their report. When children with elevated lead levels are brought for medical attention, health care workers should ask about eye cosmetics and folk remedies as a possible source, they said.

Lead is highly toxic and can damage body organs including the brain, kidneys and bone marrow. Young children are especially susceptible to lead because they tend to put things they find on floor in their mouths, and because of differences in their body functions, such as greater absorption in their guts, and still-developing central nervous systems.

### **Zamfara Lead Poisoning Epidemic-The Need to Prevent its Resurgence**

A **series of lead poisonings** in Zamfara State, led to the deaths of at least 163 people between March and June 2010, including 111 children. Health ministry figures recorded the discovery of 355 cases, with 46 percent proving fatal.





**Date** March - June 2010

**Location** Zamfara State, Nigeria

### Casualties

at least 163 dead

355 cases discovered

### Findings

An annual immunization programme in Northern Nigeria led to the discovery of a high number of child deaths in the area. An investigation showed that they had been digging for gold at the times of their deaths, in an area where lead is prevalent. It was thought by the villagers that all the children had contracted malaria but Médecins Sans Frontières found unusually high levels of lead in the blood during tests. Analysts suggested the contamination of water may have contributed to the high mortality rate. Blacksmith Institute was called in by the Nigerian authorities to assist in the removal of toxic lead.

It is thought that the poisonings were caused by the illegal extraction of ore by villagers, who take crushed rock home with them to extract. This results in the soil being contaminated from lead which then poisons people through hand-to-mouth contamination. Others have been contaminated by contact with contaminated tools and water.

### Actions

In an effort to halt the epidemic the authorities had clamped down on illegal mining and embarked on a clean-up of the area. The number of cases had fallen since when illegal mining in the area was halted and some of the residents were evacuated. Education on health and the dangers of lead mining is also being given to local people. It was hoped that the clean-up can be completed prior to the start of the impending rainy season, which would spread contaminants, though it is being hampered by the remoteness of the villages and Muslim restrictions preventing men from entering some compounds.

Those who died came from several villages. Five villages in the Local Government Areas of Anka and Bungudu were affected. All five villages were evacuated by the Nigerian health authorities.

### Treatment

Two treatment camps were established by health authorities to deal with the crisis. The World Health Organization, Médecins Sans Frontières and Blacksmith Institute assisted with the epidemic. Federal

health ministry epidemiologist Henry Akpan said: "We are working with the state ministry of health to give health education and create enlightenment on the dangers of illegal mining". Nigeria's chief epidemiologist Dr. Henry Akpan had announced the discovery of the epidemic on June 4, 2010. Blacksmith has been removing toxic lead from houses and compounds in the villages so that surviving children returning from treatment will not be re-exposed to toxic lead in their homes.

Africa's most populous country has a poor record on environmental protection, evidenced by the huge amounts of crude oil that it spills each year in the swamps of the Niger Delta.

Experts say not less than 800 million naira (\$5.08 million) funding proposal from the environment ministry is intended to finance safe mining programmes.

Many victims died after coming into contact with tools, soil and water contaminated with large concentrations of lead.

Analytical results indicated the levels of lead exposure in affected areas were 100 times above internationally accepted safe norms.

### **Remediation of Poisoned Site**

WHO and multiple partners have been assisting state and federal authorities to manage the situation, which cannot be resolved without sustained changes to mining practices to prevent further environmental contamination with lead. These include relocation of ore processing activities and storage of ore materials away from villages, the adoption of new processing methods that produce less dust, as well as hygiene measures such as removing contaminated clothes and washing before returning home.

WHO is continuing to advocate with the Government in Nigeria for their attention to this problem and to gain their commitment to further sustained action to prevent the serious and life-long consequences of lead poisoning in a generation of children in Zamfara.

The response to the mass lead poisoning in Zamfara State has involved multiple agencies, including WHO, United Nations Children's Fund (UNICEF), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP) - Office for the Coordination of Humanitarian Affairs (OCHA) Joint Environment Unit, Médecins Sans Frontières (MSF), the US CDC, the Blacksmith Institute, TerraGraphics Environmental Engineering Inc, and the Artisanal Gold Council, working with authorities and leaders at community, state and federal level.

With funding of US\$ 1.9 million provided by the UN Central Emergency Response Fund (CERF) to WHO and UNICEF, the following activities have been carried out:



- remediation of five villages (Abare, Tungar Guru, Tungar Daji, Sunke and Duza);
- social mobilization and community awareness activities directed at informing local communities about the hazards of lead and how to prevent lead exposure, including safer mining and gold extraction processes;
- advocacy activities with state and federal authorities, and community leaders;
- establishment of a surveillance system for the early detection of lead poisoning in Zamfara State;
- provision of three hand-held x-ray fluorescence devices for the rapid measurement of lead concentrations in soil;
- provision of four point-of-care analyzers and their kits for the rapid measurement of blood lead concentrations;
- provision of a graphite furnace atomic absorption spectrometer, ancillary equipment and reagents, as well as technical advice, for the establishment of a reference laboratory for the measurement of lead;
- training for doctors, nursing and laboratory staff at the planned lead treatment centre in Gusau on the diagnosis and management of lead poisoning;
- provision of antidotal agents for the treatment of lead poisoning;
- co-ordination of partners involved in the response activities.

The remediation work has been organized by the Blacksmith Institute and TerraGraphics Environmental Engineering Inc, working with the Zamfara State authorities and local contractors. Remediation has involved the identification of contaminated areas in the villages, removal of all contaminated soil, its disposal in secure landfill sites and its replacement with clean soil. In addition walls and other surfaces in family compounds have been cleaned. A total of seven villages have now been remediated, two having been completed before the CERF funding was available. Terra Graphics has provided training in assessment and remediation procedures so that they can be continued by local agencies.

MSF has continued to provide chelation therapy for lead-poisoned children in the decontaminated villages and now has over 2 000 children under five years of age on its treatment programme.

### **Ongoing challenges**

This serious environmental emergency cannot be resolved quickly. Remediation is a challenging and time-consuming task. Children have to wait for their family compounds to be cleaned before they can start treatment, and some children will require chelation for many months. Persuading people to adopt new practices and behaviours requires continuing effort. In addition, capacities within Nigeria for the diagnosis and management of lead poisoning need further strengthening and support. A further challenge is the purchase of sufficient chelating agents: these are expensive drugs that are not available as generics.

There is therefore a need for long-term engagement on the part of leaders and authorities at community, state and federal levels in Nigeria, as well as health and environment professionals, technical partners and donors.

Of particular concern is the town of Bagega in Anka Local Government Area, which is a regional hub for ore processing and the informal gold trade. Many family compounds and communal areas in the town have soil lead concentrations above 1 000 ppm (400 ppm is the limit in the USA for areas where there are children), and it is estimated that 1 500 young children may be poisoned with lead. Before these children can be treated they must have a clean environment to live in. There is therefore an urgent need to decontaminate Bagega and the other villages and to provide chelation and other therapy

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