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African Gold Rush Kills Children as Miners Discover Lead Dust

By Alan Katz - Dec 20, 2010

Gold brought death to Umoru Musa's nine-family compound in Sunke, a mud-brick village in northern Nigeria.

Five of the 25 children, including Musa's 1-year-old daughter Nafisa, lost their lives in May after villagers ground ore from nearby hills they didn't know were also loaded with lead. Rising prices for gold promised a windfall. Instead, they helped unleash the deadliest lead-poisoning crisis in modern medical history.

As the adults pulverized rocks with their grain grinder, they spewed lead dust across the ground where their children played and poultry grazed. They spread more of the material, lethal to children in high doses, around the communal well where they washed the ore to sift out the gold.

"This gold cost us a lot," Musa, 40, said in the open-air courtyard of his home last month as a clean-up team in white respirator masks cleared away lead-laden dirt. "There is nothing God can give that is better than a human being."

At least 284 children under the age of five have died from lead poisoning in eight villages in Nigeria's Zamfara state as a result of small-scale gold mining, according to government officials. An additional 742 are being treated for high levels of lead in their blood, a number which may rise to 3,000 by the end of next year, according to [Medecins Sans Frontieres](#), also known as Doctors Without Borders.

Brain Damage

Health effects from lead poisoning, including brain damage and miscarriages, will plague the area for years, said Joseph [Graziano](#), professor of environmental health sciences at Columbia University's Mailman School of Public Health in New York.

The deaths are an unintended consequence of a 21st century gold rush. Villagers turned en masse

to mining over the past two years, spurred on by more frequent visits from gold-buying middlemen. During that time, investors drove bullion prices up 58 percent in London as they sought a haven from the aftermath of the financial crisis. Gold reached a record \$1,431.25 an ounce in London on Dec. 7.

In Nigeria, soil from 29 villages has shown unsafe lead levels for children, according to preliminary tests by the U.S. Centers for Disease Control and Prevention. The crisis is “unprecedented” for the number of deaths and the amount of lead found in the children, according to Atlanta-based CDC, which has helped set up testing and treatment in the area. Some cases were measured at about 15 times the level that calls for immediate treatment, said Medecins Sans Frontieres, an international humanitarian organization often referred to as MSF.

‘Morbid Novelty’

“I’m stunned to learn of an epidemic of this severity and magnitude at a time when lead poisoning in the developed world is truly [diminishing](#),” said Graziano, who with two colleagues [discovered](#) the lead-treatment drug now being used in Nigeria. “This has a morbid novelty of poor people trying to find a source of income only to encounter this massive exposure.”

In June, Nigeria’s federal government [banned](#) all mining in Zamfara state, which is in the country’s northern Muslim area. Yet lead levels found in a few compounds in October show that some families were grinding the ore in their homes again, according to aid workers and local officials.

Blacksmith Institute, a New York-based charity working on the cleanup effort, has a total budget for the project of about \$950,000, most from the United Nations Children’s Fund, known as [Unicef](#), said John Keith, Blacksmith’s head of operations in Nigeria.

Costly Cleanup

Blacksmith is seeking an additional \$2 million to extend the efforts to more contaminated villages and provide long-term training to help Nigerian agencies deal with the problems.

“It would be a lovely and appropriate response to find that people who have profited very much so from this run-up looked to give back a little,” said [Richard Fuller](#), [Blacksmith](#)’s president. Nigeria’s small-scale miners “are just trying to pull themselves from the very bottom of the poverty rung and artisanal mining is one of the best ways of increasing local economic development, all over the world,” he said.

In Sunke, the mud-brick village where the 1-year-old girl died, her father, Musa, says he got the

idea of grinding ore for gold from the nearby village of Daretu. Residents there made enough income to roof 36 structures with corrugated metal, replacing the traditional thatch or earth and keeping the rainy season from eroding layers of their mud-brick walls each year.

\$100 a Day

Soon Musa was in business, buying 50-kilogram (110-pound) bags of ore to process in the compound. The family could earn the equivalent of \$100 on a good day by grinding and processing five bags.

Musa would make the three-hour trip by motorcycle to Zamfara's capital, [Gusau](#), to sell the gold mix to dealers. The compound earned enough to buy a metal roof of its own, a motorbike and breeding cows.

A few months later, Musa said he realized that the chicks and ducklings that pecked about the grounds were disappearing. Then nine-month-old Nazifi became gravely ill, convulsing violently. He died a few days later. Four other children rapidly showed similar [symptoms](#), and were dead within about a week, he said.

With the cause of the deaths a mystery, he said he kept processing gold though he was overcome by grief at times.

"It was very silent, very emotional," Musa said in his native Hausa. "When I was grinding the rock, sometimes my heart would begin to ache so much that my head would start to pound and I would have to stop."

Shutting Down

Once doctors linked the deaths to the gold operation, Musa said he shut it down. The cleanup team found the ground around the compound's well contained more than 100 times the lead limit in the U.S. for public areas such as playgrounds.

"We only grind grain now," Musa said, pointing to the blue grinder hooked up to a generator just outside his compound door.

Small-scale gold mining creates work for 10 million people [worldwide](#), according to [Kevin Telmer](#), an associate professor at the University of Victoria in Canada and executive director of the Artisanal Gold Council.

For most of them, "this is the best opportunity they have of escaping poverty," he said.

Small-scale miners [start](#) by beating rocks into gravel with a mortar and pestle or an iron bar, then grinding it. The resulting sand is washed over a ridged board to remove the lighter particles. Villagers who do the processing themselves, such as Musa in Sunke, then use mercury to extract the gold.

‘Desperate Situations’

The health risks come more often from the mercury, which can damage the central nervous system, according to the findings of the United Nation’s [Global Mercury Project](#).

Telmer described the Zamfara crisis as a “perfect storm”: poor miners working with toxic ore in the home, and using a dry grinding process that spreads the toxic dust.

When prices rise, no matter the commodity, people start pushing into places that otherwise wouldn’t be economical, said Ian von Lindern, the chief executive officer of [TerraGraphics Environmental Engineering Inc.](#), a Moscow, Idaho-based consulting company that is providing the technical direction for the cleanup.

“A lot of those are desperate situations,” he said.

The state government in Zamfara has called for the mining ban to be lifted. It’s impossible to stop people from mining who have gotten used to a new way of life, according to Alhaji Sadiq Abubakar, special assistant to Zamfara’s governor. It’s better to educate them on how to mine safely, he said.

Helping Miners

If the ban is lifted, the state plans to set up processing areas near mines and provide water to the miners in the area, said Zubairu Mohammed, the district head of Anka, the local government area that encompasses Sunke. Officials would also supply registered miners with tools, training and micro loans, he said.

Nigeria, Africa’s most populous country, is best known for its oil resources in the Niger Delta. The country exported tin, coal and [gold](#) in the 1930s and 1940s, when it was under British rule. It gradually turned away from mining, and in the late 1950s began to focus on oil, which [accounted](#) for 85 percent of exports in 2009.

In 2007, the western African nation passed a new mining [law](#) and encouraged foreign companies to invest there. Zamfara State invited teams of surveyors from China, the U.S., Australia and elsewhere in May and August 2009 to assess levels of gold, copper and other minerals, said

Abubaker Maru, the state environment commissioner.

Mining in Earnest

In Daretu, villagers began gold mining in earnest after the arrival of a group of Chinese miners, according to village chief Mohammed Bello. They dug neat square holes in a dry riverbed two kilometers (1.2 miles) out of town. Neither Bello nor other local officials were able to say who employed the Chinese workers.

Mining picked up after the discovery last year of a rich vein of gold a few kilometers from Sunke in an area contaminated with lead, Maru said.

Many families established ore grinding operations in or near their homes for the first time. The lead spread far from its original sources as couriers on motorcycles took the rocks to villages across the region for processing.

Besides metal roofs, the gold profits afforded people motorcycles and other luxuries. In rural Zamfara, 85 percent of the population lives on less than \$1 a day, a higher proportion than for the country as a whole, according to the most recent survey funded by the World Bank. Nationally, 37 percent of Nigerians living in rural areas have access to safe water, according to Nigeria's National Bureau of Statistics' [Social Statistics Report, 2009](#).

'A Good Thing'

Kabiru Sani, 25, a former cow-herder with no income, shifted to gold about two years ago when he saw people wearing new clothes paid for by mining proceeds.

"My instinct was that it was a good thing to try," says Sani, who wore green khakis and a t-shirt with SKELETON written across the back. He dug ore from mines around Sunke and ferried bags of it to a nearby processing area on his Honda motorcycle that's adorned with a pink seat cover and a decal of crossed AK-47s on the headlight.

He says he was able to earn as much as 50,000 naira a week, or \$323, at the height of the gold rush this year.

The motorcycles villagers bought helped get the gold to traders in Gusau. From there, gold was further refined and driven to Benin, on Nigeria's western border, to be turned over to dealers working with wholesale buyers from Europe and Dubai, according to interviews with several traders.

“We have very big wholesalers coming here to buy gold and they always want more,” Jibril, a dealer in Cotonou, the main port city of Benin, said by phone. He declined to provide his last name because he said he operates in the black market.

Kulu’s Son

Kulu Rabiou watched as other women earned cash from crushing ore in her village of Tungar Daji before asking for her own bags in February. Pounding rocks into gravel with a mortar and pestle netted her 500 naira, or about \$3.23, for three days work --more money than she had ever had, she said.

Now her 2-year-old son Imrana shows signs of permanent brain damage: crying, biting his mother and hitting her, according to Medecins Sans Frontieres doctors treating him at a hospital in Anka.

He became sick in May, crying inconsolably at night. By July, when the symptoms worsened, the rainy season had filled local riverbeds cutting off the roads to the hospital.

Observing Symptoms

“He was a boy who moved so much, so active, now he just lies here,” Rabiou, 30, said, her hand on Imrana’s head as he slept next to her on a hospital mattress. “What will he do even if he lives? He can’t walk or think right.” Rabiou recently was released and is being treated at home, according to MSF.

Doctors from Medecins Sans Frontieres on a tour to encourage meningitis vaccines in the region were dismayed when they started seeing the heavy metal-poisoning symptoms in March. Nigeria has a high child mortality rate from illnesses such as malaria, meningitis and measles. About 186 children in 1,000 [die](#) in Nigeria before the age of five, compared with 8 in the [U.S.](#), according to Unicef figures from 2008.

Dr. Anyaji Prince Chinedu said five families brought in small children who were convulsing and vomiting on his first day at the Yargalma town dispensary. He and the lone nurse could treat only one at a time. Some lost consciousness while waiting to be examined and one child died, he said.

Chinedu, just two years out of medical school, returned to the MSF base in Gusau that night feeling helpless and broke down crying to his coordinator, he said.

‘Scenario is Horrible’

“Please don’t send me there again,” he recalls saying. “The scenario is horrible. They were all little,

little kids.”

He did go back and he’s now treating children in the lead work of a hospital in Anka.

Nearly half the children who visited clinics with symptoms of lead poisoning died in the first months until the lead- treatment drug succimer was approved by the Nigerian government and reached Zamfara in June, according to Antonio Neri, medical epidemiologist at the CDC.

Danish drugmaker [H. Lundbeck A/S](#) is providing succimer to MSF free through its U.S. unit. A 19-day course for a young child normally costs \$308, the company said. Some children in Nigeria are on their sixth course of the drug.

Succimer, which binds to the lead and then is expelled from the body with urine, has lowered lead levels in the children who have taken it, said Ellen van der Velden, who served as MSF’s emergency coordinator for Nigeria from July through November. However, the level shoots higher when they stop taking the drug, indicating they either have large amounts of the metal stored in their bones or are being re-contaminated, she said.

“We have no idea how long it will take for these children to be cured,” she said.

Cleanup Progress

To eradicate the lead, cleanup teams scrape off about 5 centimeters of topsoil, bag it, and deposit it in landfills with a high proportion of clay. The scraped areas in the village are topped by new soil. The landfill is marked off so villagers won’t dig or plant crops there.

By the end of January, seven villages will have been completed, said Blacksmith’s Keith. The charity also has enough money to cover about a quarter of the cleanup required in Bagega village.

The mining ban has reduced the amount of gold coming from the region to traders in Gusau by about 80 percent, according to Abdul Wahid Halidi, a dealer who has been in the business for a quarter century.

At a lake by Bagega, as many as 200 people used to gather to wash their ground ore and separate gold.

Lead-Filled Bricks

It was mostly quiet on a Sunday in November. Four boys ran leftover ore across a washboard looking for specks of gold missed in prior washings. A dozen blue Viking-brand grinders sat unused

on the land above the lake. One was being cleaned by Mohammed Sani, who said he planned to take it to Niger to process gold there. Ore deliveries had slumped to almost nothing from a peak of as much as 30 bags day, he said.

That doesn't mean the crisis is over. In Bagega, hundreds of mud bricks made from the lead-tainted, red-brown sand left over from processing ore lay drying in the area between the grinders and the lake. Built into houses, they will poison residents for years, as pieces flake off to be inhaled or eaten by children, Keith said.

"Welcome to lead poisoning in action," he said.

'Hopeless Case'

In Daretu, the first village to be decontaminated, soil samples in three family compounds revealed high lead levels again in October, indicating they'd gone back to grinding ore there, Keith said.

With the price of gold being what it is, it seems inevitable that some mining will continue, said Columbia University's Graziano.

"If they can't stop the exposure, it's a hopeless case," he said.

Even if all lead could be removed, health problems will plague the communities for years to come, he said.

As girls now aged 6 to 15 marry and become pregnant, their bodies will release lead stored like calcium in their bones, causing miscarriages, and children exposed to such high lead levels will have reduced brain function of some form, Graziano said.

"We do know they will be left permanently impaired," Graziano said.

Bitter Moments

Musa said that while he still has bitter moments, the pain is fading and the village has come to life again. Children are singing again and they dance around.

He sent one of his brothers to fetch Naziru Haruna, a 1-year-old who has been to Anka hospital three times for lead treatment. Sitting tall in his fathers' arm, Naziru smiled, laughed and grabbed at a hand as it came up to pat him on the back. "Now we have hope," Musa said.

A week later, the lead poisoning had appeared again. Musa's six-month-old son Ibrahim started

vomiting and losing his hair. Musa took him to the lead ward at the Anka hospital where doctors asked that Ibrahim and his mother stay for treatment. MSF said Ibrahim's condition improved, he recently was released, and is now under treatment at home.

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