Scheme village, Kenya: Susan Atieno Onyango was interviewed about her use of Sprinkles. She is pictured with four of her children (from left to right): Evans, 3; Vera, 12; Amos, 11 months; and Euphemia, 4. Several weeks later Amos, who was suffering from severe anemia, died. The exact cause of his death is not known.

By Samuel Loewenberg

REPORT FROM THE FIELD

Fighting Child Malnutrition In Africa Through The Use Of Micronutrient Supplements

On a flat landscape of corn and tall grasses sit groups of small square huts, each constructed of mud and dung and topped with either thatched roofs or slabs of corrugated metal. This is the village of Ahero, in the Nyando district of southwestern Kenya, on the shores of Lake Victoria.

In one of those huts, Peninah Achieng, a slim woman in a loose blue and yellow plaid dress, perches on the edge of a cushionless couch frame. She looks to be about thirty, but she doesn’t know her exact age.

Her year-old son, Willis, nurses at her breast, while her youngest daughter, two-and-a-half-year-old Liliane, sleeps on a chair. The girl does not stir, even with four strangers in the room. Chickens occasionally wander in and out of the entrance. An antimalaria public service announcement plays on the radio.

The four strangers are three survey takers for an international health organization and a journalist who is accompanying them. At the moment, Ms. Achieng is telling them that her son
has been eating dirt—four times in the last week alone.

Eating dirt is a compulsion common in the children in this impoverished region of Kenya. Pregnant women do the same thing; they actually buy special cakes of chalky earth in the market. The syndrome is known as geophagia, or pica, and is associated with deficiencies of iron and other micronutrients—commonly known as vitamins and minerals.

That eating dirt is common in Nyando, a district in Nyanza Province, is no surprise to the visiting survey takers. They recognize it as a sign of anemia, which affects two-thirds of children in the area and an estimated four out of ten preschool children in developing countries, according to the World Health Organization (WHO). Anemia and other ailments common to malnutrition are the underlying cause of about one-third of all children’s deaths, says the WHO. Improving child nutrition is a main thrust of the United Nations’ Millennium Development Goal of reducing by two-thirds the mortality rate of children under age five between 1990 and 2015.

As with other deficiencies associated with malnutrition, anemia’s initial symptoms are rarely dramatic—small children who are anemic mostly lie listlessly about. In poor, remote areas like the villages of Nyando, the condition is usually ignored for the simple reason that without access to medical care, and with better-quality food out of reach for many of the world’s poor, there’s usually nothing to be done.

But the consequences of this neglect are grave because of childhood anemia’s unsparing, long-term effects: impaired mental and physical development, and sometimes death.

Overcoming malnutrition once seemed unsurmountable in impoverished places like Nyando. The region’s largely uneducated population lives on less than a dollar a day per person. The area has little in the way of infrastructure for such basics as clean water, electricity, and sewage, and its poorly functioning health care system can do little to correct the damage that such poverty inflicts.

**Progress In A Packet**

Sometimes, though, progress comes in unusual guises. In this case, it took the form of a sandy-colored powder that comes in packets like those containing sugar in American diners. The powder is sprinkled onto food—hence its name, “Sprinkles.”

Sprinkles contains micronutrients—vitamins and minerals such as iron, zinc, folic acid, and vitamins A and C—that the body needs, even if in minuscule amounts. Micronutrients play a central role in numerous essential body functions, including metabolism, blood clotting, bone development, the production of enzymes and hormones, and nerve transmissions. They are essential to healthy growth and development.

Sprinkles was created in 1997 by Stanley Zlotkin, a University of Toronto scientist and pediatrician at the forefront of efforts to curb childhood iron-deficiency anemia. At that time, anemia was considered the developing world’s “most common preventable nutritional problem despite continued global goals for its control,” according to an article that Zlotkin and his colleagues published in 2005.1 It still is. Childhood anemia in resource-poor settings has multiple causes, including infestation with parasitic worms, but one important cause is an iron-deficient diet.

From the beginning, global nutrition experts believed that Sprinkles had the potential of sparing millions of undernourished children from anemia, provided that they ingested the product regularly. A 1999 study of 557 anemic children ages 6–18 months in rural Ghana showed that a daily dose of Sprinkles was effective in treating anemia without side effects.2

Today, almost fifteen years after its development, Sprinkles is manufactured in six facilities worldwide and benefits more than four million children in eighteen countries. It has been demonstrated to be effective in reducing childhood anemia in countries ranging from Bolivia to Bangladesh.

The great innovation of Sprinkles, says Bruce Cogill, a consultant and the former chief of nutrition at the US Agency for International Development (USAID), is that it doesn’t require recipients to eat unfamiliar food or take a pill. They merely need to shake the product onto the food they already eat, the way Westerners do with salt and pepper.

In 2007, Nyando, with its sixty villages and total population of 80,000 people, seemed a place very much in need of the benefits that Sprinkles could bring. The level of childhood anemia was 67 percent, and that of vitamin A deficiency—the leading cause of preventable childhood blindness and an underlying cause of disease and death—was 18 percent. Dirt eating was rampant.

“‘The mind [of people with anemia] says, ‘Hey I need iron,’ so they eat dirt,” says Parmi Suchdev, a nutrition expert at the US Centers for Disease Control and Prevention (CDC) and the chief investigator in the Sprinkles project in Nyando.

Suchdev, who is also a professor of pediatrics at Emory University, believed in Sprinkles, but he knew that having an effective product and getting it to where it can do good are not the
same thing. As is often the case with new health initiatives in the developing world, the challenge would be figuring out how to distribute the nutritional powder in Kenya in an effective and economical way.

But even that wouldn’t be the end of it. There was also the need to persuade parents to incorporate Sprinkles into the diets of their children. As many veteran aid workers knew from experience, doing so would present a major challenge in its own right. Efforts over the past decade to broaden distribution of insecticide-treated bed nets to combat malaria had amply demonstrated that the simple availability of life-sustaining products wasn’t necessarily enough to guarantee their successful use. Over the years, many insecticide-treated nets had ended up being used as fishing nets or dresses, or were used by the male head of the family rather than by children and pregnant women, who arguably needed them more.

Suchdev was determined to find a way to avoid a similar fate for Sprinkles. That’s when he heard about the “Avon ladies” of Nyando.

**Avon Ladies In The Bush**

Most Americans are familiar with Avon ladies—women who sell products, sometimes door to door, for the US cosmetic company Avon. Nyando has an equivalent: a group of women organized by a Kenyan nongovernmental organization known as SWAP (the Safe Water and AIDS Project). Instead of peddling facial creams and nail polish, these women sell low-cost public health products, including water purifiers, condoms, and antimalarial bed nets.

SWAP was started in 2005 through support from Rotary Atlanta and has since received funding from the USAID, the World Bank, and others. The organization has branched out from its original focus on HIV/AIDS and clean water, and it now has a solid track record of reaching isolated communities and mobilizing people to become engaged in their own health care. The group has a well-developed network in Nyanza Province, with more than 878 chapters in local communities and roughly 6,000 vendors.

The strength of SWAP’s sales force is that the vendors aren’t outsiders, but rather residents of villages in areas like Nyando who have credibility within their communities. The women not only sell health products, but they also receive basic training on how the products work, the causes of diseases, and how to prevent them. They become respected health advisers in their villages, who preach the importance of such basic but essential health practices as hand washing, sleeping under bed nets, and drinking and cooking with clean water.

When nutrition experts at the CDC learned of the existence of the SWAP ladies, they immediately realized that they might have found the solution to the problem of distributing Sprinkles. “You have this ‘Avon lady’ with bed nets and soap and so on,” Suchdev says, “and now you’re just adding a new product to her line.”

Suchdev worked with a veteran micronutrient field specialist, Laird Ruth, to devise a protocol to study the distribution of Sprinkles through SWAP. Two qualitative researchers and a behavioral scientist at the CDC created messages that vendors would use to explain the product and educate mothers about anemia.

The CDC also crafted promotional material that vendors could hand out. A pricing structure was devised so that the vendors would have an incentive to sell Sprinkles. The cost to produce a packet of Sprinkles was three Kenyan shillings (about three American pennies), which was subsidized by the CDC. Packets are sold to SWAP vendors wholesale for one shilling each; the vendors then sell each packet for two shillings apiece and pocket one shilling per packet.

When Sprinkles was finally introduced, it was backed up with a carefully designed marketing campaign, which included skits performed in local villages, testimonials from parents whose children had used Sprinkles, and demonstrations by vendors on how to use the product. (Relying on reading material alone would not have been effective because much of the region’s population is illiterate.) Marketing teams offered incentives to both consumers and vendors, such as T-shirts, stickers, calendars, and cups.

Even so, there were glitches. Initially, the nutritional powder was met with skepticism or puzzlement by residents of Nyando. Some people tried to use it for soap.

The packets’ red color also caused some consternation. Aid workers quickly realized that many villagers associated the color red with disease. The color of the packets was switched to blue. On the other hand, the fact that the packaging looked foreign proved advantageous, says Suchdev, because people didn’t trust products made in Kenya.

“I’m a doctor, not a marketing person,” he says, but he admits that he learned a powerful lesson about selling techniques. When popular marketing incentives such as “buy one, get one free” and promotional cups were later dropped, sales of Sprinkles fell by more than half. “You have to promote it like they promote Coca-Cola and beer,” he says. “Expecting people to just take it because it works isn’t good enough.”

Suchdev also discovered how effective it was to have vendors who lived in the communities
where they sold Sprinkles. An anecdote from Nancy Auma Omolo, a thirty-two-year-old vendor in the village of Kacholo, shows why.

Omolo says that some people in her village asked her why the powder was only to be given to children, not adults. “Do you want to get rid of our children, or what?” they asked her.

A mother of six, Omolo says she would explain that she had given the powder to her two smallest children. Sure enough, she told them, those two were soon much healthier and got sick less often than her older children had. Once the village parents began to see the effects of Sprinkles on their own children, Omolo says, the supplements became a big seller.

On market day in her village, Omolo hauls bags of health items—antimalarial soap, water filters, insecticide-treated bed nets, and Sprinkles—to a large outdoor fair. She ambles among the kiosks, chatting with the vendors, some of whom have called to her by name.

She asks them about the health of their children, and at their request hands over new packets of the micronutrients or one of her other items. She makes about 500 shillings ($5.75) a week as a SWAP vendor.

Another vendor, Selina Achungu, a forty-two-year-old mother of three, has been selling SWAP merchandise in the village of Kamahwa Kasambula for nearly seven years. Like many of the SWAP vendors, Achungu says she likes her work because she feels she is helping her community. And, of course, the money helps.

Selling SWAP merchandise, she says, supplements her income from teaching preschool by about 20 percent, or 200 shillings ($2.30) a week.

Sprinkles, Achungu says, is one of her best sellers, particularly after customers see its effect on small children. She tells the story of a listless two-year-old who was totally transformed after only a few weeks of taking Sprinkles. “The child could play [and] became active,” she says.

**Studying The Impact Of Sprinkles**

Built into the Sprinkles project was a forty-three-month, $1 million impact study, which provided crucial information on what worked and what did not, and how much of an impact the micronutrient powder was having in the community. The evaluation included a detailed survey conducted once a year for three years, plus monitoring of the vendor training sessions, biweekly monitoring of households receiving the nutrients, and a continuing follow-up on how the use of Sprinkles was affecting children’s health.

The first year of the survey found that one out of three families in Nyando used Sprinkles regularly—higher than the one in five target that Suchdev’s team had hoped to reach. Levels of iron-deficiency anemia fell by fourteen percentage points and vitamin A deficiency by ten percentage points. Approximately 53 percent of children were cured of anemia.

More than a quarter-million packets were sold in the study area between 2007 and 2009. And dirt eating diminished.

In fact, the only complaint from mothers was that the product may have worked too well, Suchdev told an audience in August 2010 at the Kenyan Medical Research Institute in Kisumu, which is a coinvestigator on the project. The mothers reported that Sprinkles not only revived the health of the children, but that it also made them hungry—a mixed blessing for poor families, he noted. During the lean season in between harvests, a hungry child is a burden. That raised the dispiriting possibility that perhaps Sprinkles should be distributed when food is going to be available, after the harvest.

At any rate, now that Sprinkles has found a market in Kenya, the next step is to convince a Kenyan entrepreneur to manufacture the powder, perhaps in partnership with a nongovernmental organization. The Global Alliance for Improved Nutrition (GAIN)—a Geneva-based organization that is one of the funders of the Sprinkles study—is working to do just that. At present, the packets are produced and shipped in from the Sprinkles Global Health Initiative–approved factory in India.

The Sprinkles study had an unanticipated finding, which appears to contradict a WHO recommendation to cease using iron supplements in areas with a high incidence of malaria. A 2006 study in Zanzibar found that for unknown reasons, iron supplements appeared to increase the severity of malaria infection in children, as measured by an increase in hospitalizations. The result of the WHO recommendation was that millions of children stopped receiving iron supplements.

In contrast, in the Nyando study, the incidence of hospitalization for malaria actually declined. Suchdev postulates that the difference stems from the fact that Sprinkles produces a slower rate of absorption of iron, and at lower levels than traditional iron supplements. The reason is that Sprinkles is taken with food, as opposed to the drops given out in the Zanzibar study, often to children with empty stomachs. But the Sprinkles study was not designed to test the issue of any linkage between Sprinkles and the severity of malaria infection. Suchdev says that a larger-scale, more focused study would need to be done to fully understand the effects.

Independent of such issues, one conclusion
that several nutrition experts draw from the Nyando experiment is that the market-based nature of SWAP largely explains its success as a distribution program. The lesson is critical, because undertaking a successful health intervention is more than simply handing out drugs, food, or mosquito nets. The goal is to have a long-term impact, so distribution itself has to be durable and sustainable.

Dominic Schofield, a senior analyst at GAIN, says that the approach is more sustainable than would be the case if a governmental entity distributed Sprinkles for free. It is also more likely to help struggling working families in poor countries whom government food or nutritional programs often miss—because they are either too poor to pay market prices for foods fortified with nutrients or too “well off” to receive direct food distributions from the government.

Sprinkles has served “the forgotten majority,” says Schofield. So far, Suchdev and colleagues have published four papers from the study,1–4 and a fifth, an overall analysis of the program, was going through the CDC’s approval process at the time this article was published.

UNICEF, the WHO, GAIN, and the government of Kenya have taken notice of the findings of the Sprinkles/SWAP study and would like to replicate it in a larger population, in either Kenya or other countries, according to Suchdev. “We now need government and the private sector to take ownership of the program and its formal implementation,” he says.

The exceptional amount of time and resources—an estimated $1 million—that went into evaluating and honing Sprinkles and the SWAP community-based distribution program offer an important lesson for public health. Even a seemingly straightforward form of aid requires intense scrutiny and oversight to get it right.

The distribution of micronutrients, rated by the Copenhagen Consensus group of economists as the single most effective public health intervention, would seem far simpler than the complex behavior change required for something as complicated as controlling HIV/AIDS. Yet as the Sprinkles study demonstrates, a straightforward public health intervention such as giving out micronutrients can be a complex undertaking. What’s more, such interventions can’t overcome all of the privations menacing impoverished children.

The Case Of Amos

Amos was one of five children of Susan Atieno Onyango, who with her husband, a maize farmer, lives in a mud and dung hut in the village of Scheme. The family income is about 25 shillings (29 cents) a day.

In 2010 Amos, then eleven months old, fell ill with what his mother believed was malaria. Test results showed that the child’s blood had extremely low hemoglobin, a sign of severe anemia. The cause of the anemia was unknown; given the region, it could have been due to infection with malaria-causing or other parasites, iron deficiency, malnutrition, an inherited blood disorder, or a mix of several of these factors.

After suffering for several weeks, Amos died, leaving behind his parents and siblings, including Evans, an active three-year-old boy; Euphemia, his four-year-old sister; and Vera, another sister, age twelve. The youngest children, including Amos, had been using Sprinkles. Mercifully, all of the other children appeared to be healthy.

“Immediately after [starting on] the Sprinkles, the kids had more blood in their bodies,” says Atieno Onyango, showing her understanding of the product’s effects. “They became more lively.”

All except for Amos. His death is a sobering reminder that, as powerful and important as interventions like Sprinkles are in addressing poor nutrition, they are but one ingredient in the complex efforts that will be needed to improve children’s health in the world’s poorest regions.

NOTES