Aflatoxins in Egypt
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Aflatoxins in Egypt
Haqikah’s Story

I look out at the field where Father and my brothers Okpara, Bankole, and Ottah are working. Though he will say nothing, I can tell by the hunch in his back that Father is worried. We have had another drought and the corn is poor. It seems as if we have two or three months every year with no rain at all. Though the new calf is small we will not be able to afford to feed her. I look out into the pasture to see the little brown animal. I named her Miw-Sher and have been raising her myself. A knot forms in my throat as I realize that we will have to sell her, leaving us with only two cows.

We have managed to gather about 1,000 kg (39.3 bushels) of corn from our land this season. We own almost one half of a hectare (1.20 acres) here in Upper Egypt. I can hear Father as he tells Okpara to take some of the corn inside. Mother and I will prepare it for dinner tonight and store the rest for a time when it is needed, which won’t be long in this horrible heat. It seems like it has been a very long time since we have had enough corn to make all the money we need for our family. I finish making the cornbread and set to work cleaning. It’s what I do every day since I stopped going to school a year ago at age seven. Mother is sitting on the rug tending to the twins. Atsu and Kakra were born three months ago but their health has been bad. Mother constantly watches over them, and her features have become hardened as if she is wearing a mask so that I will not see how scared she is. She walks over to me a few moments later. There are large purple bags under her eyes; and her hair, that used to shine like a raven’s wing, has become dull and ratted.

As time passes, the twins get weaker and weaker, so Father sells one of our two water buffalos at the souk. He can’t sell the other because he needs it to pull the plow in the field. Father uses the money from the water buffalo and Miw-Sher to get Atsu and Kakra some medicine from the doctors, but it seems to have no effect. Two weeks later as I am picking weeds from the lettuce, marrow, spinach, and tomatoes, I can hear Father working on something. I can see him pounding a hammer against a piece of wood, but suddenly he stops. He drops his head to the table and lets out a sob. I have never seen Father cry; so I move closer that I might see what has upset him and as I do, the outlines of two little coffins come into view.

I don’t understand. I had seen the twins only hours earlier and they had been sleeping peacefully. I run to the house hoping that nothing is wrong, yet the fear creeps into my mind like a thick ooze. I walk into our tiny house. An air of sadness hangs in the room and I can see Mother’s body shaking with sorrow, but the twins are nowhere in sight.

Whether from sickness or sadness I do not know, but a week later, I became the only woman of the household.
Haqikah’s story is what happens when a crop is contaminated with aflatoxins. Aflatoxin has taken its toll on many families all over the world mainly through causing Hepatocellular Carcinoma (liver cancer). In the World Journal of Gastroenterology it states that liver cancer is the fifth most common malignancy in men and the eighth in women. The incidence rates have increased between 3% and 9% annually. Hepatocellular Carcinoma accounts for 4.7% of chronic liver disease patients in Egypt. In fact, according to the U.S. National Library of Medicine and the National Institutes of Health, the incident rate of Hepatocellular Carcinoma has doubled in Egypt in the last ten years.

Aflatoxins are formed on crops that have been stored in moist conditions or on crops grown in stressful conditions such as drought. For the purpose of this paper, only drought-related aflatoxins will be discussed. Aflatoxins are a large factor in the development of Hepatocellular Carcinoma according to the World Journal of Gastroenterology because they damage the DNA in liver cells and cause mutation in the p53 tumor suppressor gene. Aflatoxins are produced by two types of fungus: Aspergillus Flavus and Aspergillus Parasitics. Aspergillus Flavus forms as a yellow-green powdery growth on crops that have been raised in stressful conditions such as Haqikah’s crops, which were grown during a drought. When Haqikah’s father, Ako, fed the aflatoxin infected crops to his livestock they became infected with Aflatoxosis. The family then ate the crop as well. Naeemah, Haqikah’s mother, took in a steady amount of aflatoxins; and by breast feeding, gave the aflatoxins M (aflatoxins transferred through breast milk) to Atsu and Kakrah. The aflatoxin M affected the twins’ immune system. Aflatoxin M leads to high mortality rates in African infants (most not living past the age of one) and impaired health for the rest of the surviving children’s lives. Naeemah had Hepatitis C which combined with the aflatoxins and greatly increased her possibility of contracting Hepatocellular Carcinoma, which was the cause of her death. The cancer is generally quickly fatal with most cases having only one year survival past diagnosis. According to IPS (Inter Press Service) Hepatitis C is “a health crisis of alarming proportions. Up to nine million Egyptians have been exposed to Hepatitis C and tens of thousands will die each year unless they receive a liver transplant.”

Basically, aflatoxins are powerful animal hepatocarcinogens and carcinogenic in humans. They are especially dangerous in humans who already have Hepatitis B and C as does one in every seven Egyptians according to Dr. Gamal Esmat who is a professor of hepatology at Cairo University and the elected president of the International Association for the Study of Liver Disease.

The Chart below shows the number and proportion of patients who had Hepatocellular Carcinoma that attended the Cairo Liver Center from 1993 to 2002.

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<tr>
<th>Total registered</th>
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<td>Patients at CLC</td>
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Egypt is especially at risk for Aflatoxins because Aspergillus Flavus forms on crops grown in drought, which is common in their desert region. They have a seasonal drought meaning that there is a certain season every year in which they have no rain.

**Average Rainfall in Egypt According to worldclimate.com**

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The International Crop Research Institute for the Semi-Arid Tropics stated that, “Most people have no idea of the dangers of aflatoxins. As with tobacco, you usually don’t see the effects till many years later. It is well documented in medical literature, but the problem is hugely underestimated. Aflatoxin delays development and it’s a silent killer.” There are several different types of aflatoxins produced in nature, aflatoxin B1 being considered the most toxic. In 2004 the U.S. National Library of Medicine and the National Institutes of Health did an examination using high performance liquid chromatography technique in six urban and eleven rural areas in Egypt. They found levels of aflatoxin B1 contamination as follows: corn – 64.7%, wheat – 53%, peanut – 53%, lupine “termis” – 47%, white rice – 47%, cowpea “lobiya” – 41%, fava bean – 29.4%, and brown rice – 29.4% respectively.

No animal is resistant to the effects of aflatoxins. It is a very potent carcinogen in many species such as nonhuman primates, birds, fish, and rodents. In these species, aflatoxins produce necrosis, cirrhosis, and carcinoma of the liver. The first discovery of aflatoxins was in 1960 when more than 100,000 young turkeys died in poultry farms in England over the course of a few months. They named this disease “Turkey X disease.” It soon spread to ducklings and young pheasants. After a careful examination they discovered that the cause was associated with feed, Brazilian peanut meal. They soon found that the feed was highly toxic from a fungal origin, Aspergillus Flavus. They named this toxin aflatoxin.

In recent decades, aflatoxin-related deaths in India and Kenya also caught the world’s attention. In the fall of 1974, in over 170 villages in the connected districts of two neighboring states in Northwest India, 397 people were affected with aflatoxins and 108 people died. In this particular situation, corn was the major problem with aflatoxin levels of 0.25 to 15 mg/kg. The people’s daily intake of aflatoxins had been an estimated 55 microgram/kg body weight for an unknown number of days. The symptoms were high fever, rapid progressive jaundice, edema of the limbs, pain, vomiting, and swollen livers.
Histopathological examinations of the people showed they had extensive bile duct periportal fibrosis of
the liver as well as gastrointestinal hemorrhages. In 1982 Kenya had only 20 hospital admissions but there
was a 60% mortality rate and they estimated their daily aflatoxin intake to be at least 38 microgram/kg
body weight. Cairo, Egypt is only 2,182 miles from Nairobi, Kenya. India’s and Kenya’s aflatoxin
problems are occurring in Egypt as well.

Because Egypt’s aflatoxin problem is caused by drought, their lack of water is a large issue. Some
steps are being taken to help with the limited water supply. The Ministry of Agriculture and Land
Reclamation is looking at 1.4 million hectares (3.125 million acres) in the Sahara that they intend to
reclaim by 2017. They have made progress on this plan and it is well on its way. They also have
intentions to further expand the Nile Delta, the Southern Valley, East Owaynat, and the Suez Canal
region. With this the government is pushing for better irrigation practices to conserve the limited water
supply. Even once these projects have been finished, though, there will not be enough water to maintain
all of the production necessary in Egypt. Helm Abouleish, the chairman of the Industrial Modernization
Center stated that, “Self-sufficiency is not an option. It’s all about prioritizing the resources you have in
order to achieve a better situation for farmers.” These water projects may help ease the burden of
aflatoxin poisoning caused by drought stressed crops, but they will not prevent it from occurring.

To combat the problem of aflatoxin poisoning the farmers must be educated. Around 80% of girls are
taken out of school to do farm work before they turn ten, so they would not have the proper education to
know that the food they are cooking is poison. There is as of yet no medical cure for aflatoxin poisoning;
so it stands to reason that to stop it, it must be prevented from occurring.

One way to educate the farmers would be to get
permission from frequently visited small community
stores to place radios there. Over the last decade the
number of radios in Africa has skyrocketed. According to
Farm Radio International, radio is the most cost-effective,
accessible communication technology for developing
countries, reaching more people than any other mass
medium – people who are isolated by illiteracy, distance,
conflict, and poverty. Using these radios Egyptians could
broadcast Farm Radio International which is “a
Canadian-based, not-for-profit organization working in
direct partnership with approximately 300 radio
broadcasters in 39 African countries to fight poverty and food insecurity.” Their goals are “To provide
and exchange practical, relevant and timely information for use by partner-broadcasters. To enhance the
ability of partner-broadcasters to serve the interest of small-scale farmers and their communities and to
ensure food security.” There are two branches to Farm Radio International. The first researches and writes
radio scripts on topics such as crop production, environmental management, farm and household
management, aflatoxins, food safety, nutrition, HIV/AIDS and agriculture, children on farms, farm safety,
youth in rural areas, farm income, women farmers, and more. The second branch assists the broadcasters
in developing the skills to help the farmers, which includes the promotion of training resources and
opportunities offered by other organizations, and the publication of guidelines, tips, and information about
African farming issues. They provide scripts to actors who will read them over the radio so that the
farmers can listen to the information in a language they are familiar with. They talk about little tips that
other farmers have discovered which helped with the health of their own crops. Many farmers have never
even heard of aflatoxins or don’t believe they exist so the station helps provide awareness. Since around
30% of Egypt is illiterate, listening over the radio will be a way for everyone to learn about aflatoxins
regardless of their education. Farm Radio International is also working as The African Farm Radio
Research Initiative (AFRRI). This initiative started in 2007 and is a 42-month action research project.
supported by The Bill & Melinda Gates Foundation. Farm Radio International is also in partnership with the World University Services of Canada (WUSC). Their aim is “To assess the effectiveness of farm radio on meeting the food and security objectives of rural farming households in Africa.”

Farm Radio International could also educate farmers about aflatoxin testing kits. There are many aflatoxin testing kits available which could be financed through the International Fund for Agricultural Development (IFAD), the World Health Organization (WHO), or the Food and Agricultural Organization of the United Nations (FAO). All three have provided assistance to Egypt in the past and the last two having done at least some research on aflatoxins already. Another way to get aflatoxin testing kits to Egypt would be to apply for grants through the Bill & Melinda Gates Foundation. MycoChek Aflatoxin Test Strip Kits have been USDA GIPSA certified. It is easy to use lateral flow test strips that show results in 5 minutes. A test strip can detect aflatoxin content to 20 ppb (parts per bushel) and is easy to understand. Two lines mean less than 20 ppb and one line means greater than 20 ppb. If the government could provide the farmers with testing kits it would significantly decrease the mortality rates of livestock infected with aflatoxins. To help the farmers in using the MycoChek kits one suggestion would be the domino effect. By having people such as Ministry of Agriculture field workers, Egyptian University Agricultural students, or Peace Corps volunteers teach farmers how to use the kits, small scale farmers could then teach others.

Aflatoxins must be combated. As of now, aflatoxins are seriously underestimated. According to an estimate by the World Health Organization, less than one percent of food borne diseases episodes are reported. People need to know what is happening and that there are ways to make aflatoxin poisoning less common. Working with organizations such as Farm Radio International will help. According to them, “The goal that inspires us is poverty reduction and food security for smallholder farms in low-income countries.” Farmers must be informed for this goal to be achieved. In North America and Europe people make decisions all the time based on information from newspapers, internet, market services, and commercial or government extension services; but low-income Egyptian farmers do not have access to such sources. Subsistence Egyptian farmers simply cannot fix something if they don’t know what the problem is. Mothers, fathers, and children are dying. Families are broken and people’s livelihoods as well as their lives are being threatened. It’s time for food security in the world. Haqikah’s story could have been different. Her mother and siblings could still be alive had they been properly educated about the dangers of aflatoxins. We can help her with that. The world is in our hands and it doesn’t have to end like this.
Works Cited


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