

Andrea C. Pinga
Phillips Academy
Andover, MA
Malawi, Factor 11: Malnutrition

The Hidden Threat of Aflatoxin in Malawi

Since its establishment as an independent nation in 1964, Malawi has faced challenges that have continuously plagued similar developing African nations. Malawi suffers from the “cycle of poverty,” where poverty is both a cause and consequence of malnutrition (Unite for Sight). More than half (52.4%) of the Malawian population lives below the poverty line and 22.4% are “barely surviving” (UNIDO Evaluation Group 35). These statistics are significant indicators of extreme hunger and malnutrition, which in turn, further worsens poverty. More than a third of the Malawian population are undernourished (FAO). Undernutrition, a type of malnutrition, is the lack of eating enough food with sufficient nutrients. A major indicator of long term undernutrition is growth stunting, where a person’s full potential for growth is impeded by inadequate absorption of essential vitamins and micronutrients due to poor diets and/or poor health. Stunting in Malawi affects 42.4% of the population, the twelfth highest prevalence in the world (International Food Policy Research Institute 120), while 61% of infants ages 18-23 months are stunted (Malawi National Statistical Office and ICF Macro 11). These extremely high figures demonstrate the severity of the nutritional situation and the immediate action required in order to achieve the 2030 Millennium Sustainable Development Goals (SDG).

Other factors supplementing this food insecurity include inadequate infrastructure, economic instability, policy inconsistency, insufficient responses to disasters, and poor health and education that limit labor productivity (The World Factbook). All these factors are basic and underlying drivers for malnutrition. Addressing malnutrition, specifically undernutrition, is key in solving the poverty cycle.

Aflatoxin Links to Food Security

Aflatoxin is a naturally-occurring, colorless, odorless mycotoxin. Therefore, it is difficult to detect. Major crops of the daily Malawian diet, such as maize and groundnuts, are highly susceptible to this toxic substance. It thrives in Malawi’s hot and humid climate. Acute exposure to aflatoxin is lethal, and chronic exposure is widely associated with growth stunting and immunosuppression. A 2004 study conducted in Kenyan rural homes found strong correlations between higher aflatoxin levels in flour and stunting (Okoth and Ohingo 43-54). Recent research proposes that aflatoxin reduces nutrient absorption by changing metabolism (Jones, Kelly, and Hoffman). Aflatoxins’ strong links to the development of liver cancer has also been studied, and the mycotoxin is a Class I human carcinogen according to the International Agency for Research on Cancer. Further research is presently ongoing as the exact mechanism by which aflatoxin impacts stunting and cognitive impairment is still not fully understood (World Food Programme, United Nations Economic Commission for Africa, and African Union Commission). However, there is strong enough evidence from animal and human studies that we need to take action urgently (Kablan). Aflatoxin contamination is potentially a major reason for undernutrition (PACA Secretariat). Furthermore, multiple food crises due to severe dry spells have led Malawi to declare a state of national disaster. Widespread aflatoxin contamination renders major crops unusable, further decreasing the dwindling food supply contributing to food insecurity (Oneko).

The overwhelming presence of aflatoxin in major crops, such as in maize and groundnuts, is a serious setback in Malawi’s fight against malnutrition. By establishing commitment, increasing awareness and training against aflatoxins, and strengthening standards and policies of aflatoxin screening, Malawi can potentially gain major strides. These steps, in addition to steps regarding the other drivers of malnutrition can help protect the nations’ people and food security (Rios 28).

Typical Subsistence Farm Family in Malawi

Malawi is predominantly agricultural. The sector accounts for 80% of the labor force, one third of the nation's GDP, and 90% of export revenues (National Statistical Office and ICF Macro 1). Most of the population lives in rural farming areas with their extended families in patriarchal and matriarchal systems. Male-headed households are four times more common, and almost half of the household is under the age of 15 signifying an extreme age imbalance in the rapidly growing population (National Statistical Office and ICF Macro 10). Malawi has the second highest population growth rate in the world and an unsustainable population density. Smallholder farmers own on average only 1 hectare of land, mostly focused on producing the foods that they consume. These foods include maize, groundnuts, rice and chili. Farming practices still rely on hand hoes and family labor. Seventy percent (70%) of the land is solely devoted to maize, but only 15% is used in the market while the rest is used to meet subsistence needs. Most major crops grown are kept for household consumption, including maize and groundnuts (Chirwa and Matita 3)

Malawi is the second highest maize consuming country per capita in the world (Ranum, Peña-Rosas, and Garcia-Casal 110). This maize-centered diet is demonstrated in Malawi's staple food, *nsima*. *Nsima* is made of a thick paste of ground maize flour and water, complemented by starchy fruits and vegetables, and a protein source such as groundnuts or beans. Due to the lack of diversity in nutrients, the dietary energy supply is barely sufficient to meet population energy requirements (FAO). Undernutrition is also linked to poor educational performance, demonstrated by the low numbers of school attendance by Malawian children. Only 16.3% males and 9.6% females complete secondary school (National Statistical Office and ICF Macro 13), with half of the children dropping out before fourth grade (UNICEF). Health care access is low with only one physician per 50,000 people (The World Factbook). Only one out of every three children with undernutrition receives proper health attention (World Food Programme, United Nations Economic Commission for Africa, and African Union Commission). Disease continues to plague the country; 10.6% of the population suffers from HIV/AIDS. Plans to help elevate the level of healthcare are hindered by inadequate finances, infrastructure and equipment (World Health Organization).

Impact of Aflatoxin on Malnutrition and Food Insecurity

Malawi faces many obstacles to improving its nutrition situation. Of the many potential solutions, aflatoxin control should be a top priority as it plays a major role in Malawi's life and economy. Over 60% of the daily calorie intake of the average Malawian includes maize, groundnuts and cassava, all of which are highly susceptible to aflatoxin contamination. Furthermore, less than 5% of groundnuts produced are subject to aflatoxin end-market testing and up to 25% of all market samples are contaminated well above the international CODEX safety levels. Aflatoxin is repeatedly cited for the collapse of the groundnut trade, and the loss in Malawian groundnut export revenue is estimated to reach nearly US \$11 million in the year 2017 (Rios 9). Although the naturally-occurring mycotoxin does not degrade the environment, it does degrade the value of the contaminated crop. More importantly, every single day that Malawians are exposed to this toxic substance, aflatoxin continues to bar their access to adequate nutrition. As a recently recognized problem, programs have only just begun to control aflatoxin contamination. However, many programs have been showing early signs of success and are working to improve their methods. Ongoing research provides new data to the promising start (UNIDO Evaluation Group).

Though all genders and ages are impacted by aflatoxins, "children are especially affected to aflatoxin exposure" due to the effects of stunted growth and delayed development (Abbas). Malnutrition as a whole provides a greater disadvantage to young children and women. Today, malnutrition is the cause for half of children's deaths in Malawi due to insufficient nutrition in the first 1,000 days of a child's life. This time window is critical for later development and health. In addition, micronutrient deficiencies in iron and vitamin A are common. About 60% of children under five have subclinical vitamin A deficiency. The high maternal death rate, 807 deaths per 100,000, is due to maternal nutritional deficiencies, low socio-economic standing, and their limited access to health services during critical periods of pregnancies.

These deficiencies could also be a possible consequence of the severe aflatoxin contamination in people's diets (UNICEF).

Recent actions and revived commitment to general malnutrition in the Malawian government are revealing positive trends. The Hunger and Nutrition Commitment Index (HANCI) is an annual index created by the Institute of Development Studies (IDS) who ranks countries on their level of political commitment to addressing hunger and undernutrition. Malawi ranked among the top countries in 2013, since the country established many policies and prioritized nutrition education at the community level. For example, the Malawi Growth Developmental Strategy emphasizes agriculture and food security and supports investments in related areas, such as transportation and irrigation development (Rios 15). In a 2012 document published by the United Nations Development Program, researchers used three indicators for nutritional status – stunting, wasting, underweight – and graphed Malawi's progress using their prevalence from 1991 to 2010. In the 1990s and early 2000s, there were no substantial improvements, but data since 2004 has shown decreased rates for all three indicators. Also, though rural children tend to be more exposed to malnutrition due to their lower socio-economic status, they have benefited most from the improvements. This has significantly reduced the deficit between rural and urban families (Viridiana 33).

Relevance to Other Significant Sectors that Require Improvement

Solving malnutrition in Malawi would enable the country to make greater strides in other aspects of daily living. While receiving his Nobel Peace Prize for his work in agriculture and food security, Dr. Norman Borlaug stated, "Almost certainly, however, the first essential component of social justice is adequate food for mankind." Dr. Borlaug highlighted the importance of nutrition to escape the cycle of poverty (Borlaug). Undernutrition during the "window of opportunity" of the first two years of life (or the first 1,000 days) leads to health disadvantages in later adult years – not only stunting, but impaired cognitive development and intellectual capacity, and reduced lean body mass. Poor educational performance and attendance in the future leads to restricted income-earning potential. Especially in a heavy farming-dependent economy, manual labor is extensive and a less healthy body limits work productivity (Unite for Sight). Child mortality associated with undernutrition has reduced Malawi's workforce by 10.7%. Additionally, since 66% of the adult population engaged in manual activities were stunted as children, US \$67 million is annually lost (World Food Programme, United Nations Economic Commission for Africa, and African Union Commission). Nutritional intervention is critical.

In the Nutrition Profile released by the Food and Agriculture Sector of United Nations, Malawi is said to be "among the most food insecure countries in the world" (Mtimuni 19). In addition to low education rates, low productivity, poor infrastructure and functioning of markets, the country is devastated by population growth, disease, and erratic weather. Presently, agricultural production levels do not keep up with Malawi's population growth (Mtimuni 20). This food scarcity could contribute to reluctance to screen for aflatoxins, since contaminated crops must be disposed and declared unfit for human consumption. Furthermore, crops are ravaged by unpredictable weather patterns and frequent flood and cyclones (Christian Aid). Disease continues to spread across the heavily dense population. Due to the high prevalence and mortality rates among adults, about 500,000 children are orphaned because of HIV/AIDS. Without parental protection, these children have a higher chance of exposure to neglect, abuse, exploitation, and lack of basic necessities such as food. Infection can also spread to children through mother-to-child transmissions. It is estimated that 89,000 children are living with HIV/AIDS, with 30,000 newborns infected each year (UNICEF). Aflatoxin's effect in the body is augmented by HIV/AIDS, further demonstrating how Malawi's problems are closely intertwined (Rios 10).

A Multi-Sectorial Approach with a Focus on Aflatoxin Control

Aflatoxin's role in stunting is large given the significant amount of maize and groundnuts consumed in local diets. However, addressing the other factors causing undernutrition is also important. Therefore, a multi-sectorial approach to addressing undernutrition is necessary. This paper emphasizes aflatoxin control that requires the collaboration at all levels. For this, the following actions are necessary:

- (1) Establish ownership and commitment at the top levels. Steps to address aflatoxins begin with firm commitment at the top. A recent United Nations Industrial Development Organization (UNIDO) project in Malawi focusing on aflatoxin management and control in groundnuts concluded that government departments and coordinating agencies demonstrated “weak ownership of the project, despite high-level buy-in from the heads of these organizations” (UNIDO Evaluation Group 5). Though there was good involvement and ownership of the program at its inception, responsibilities were not honored and commitment quickly waned as the project progressed. The Malawian government has already demonstrated commitment by recently implementing new strategies and policies, such as the Malawian Growth Development Strategy. However, implementation needs to be frequently monitored and prioritized. Stronger relationships need to be built with the people and organizations. These actions will also lead to higher efficiencies within the program, and create a more productive effort to address aflatoxin control (UNIDO Evaluation Group). International organizations such as USAID and UNIDO can partner with local organizations such as the National Association of Smallholder Farmers (NASFAM) and Malawi Programme for Aflatoxin Control (MAPAC) to establish this.
- (2) Strengthen standards and policy framework for aflatoxin screening. According to MAPAC, “Undoubtedly, effective management of aflatoxin risks in Malawi will come from combined investments to address production and market constraints along with the implementation of aflatoxin risk-reduction measures” (Rios 14). Quality standards and clear systematic processes aren't strongly embedded into aflatoxin regulations in Malawi, leading to weak enforcement. The Malawian Bureau of Standards has the responsibility by law to provide testing of locally manufactured and imported commodities. However, lack in confidence and commitment in its services led to deficiencies in several assessed groundnut and maize labs (Rios 25). More research can also build confidence and strengthen policies. Strict guidelines, formal processes, and regulatory oversight need to go hand-in-hand with strong commitment to provide the foundation for further initiatives.
- (3) Increase awareness and provide training to local farmers on appropriate pre- and post-harvest agricultural practices and storage methods. In a survey conducted by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the National Smallholder Farmers' Association of Malawi, only 65% of farmers are aware of aflatoxin and most respondents only identified aflatoxin contamination in rotten nuts (Monyo 22). A national media campaign, pitched by UNIDO, will highlight the importance of combating aflatoxin contamination as a communal effort (UNIDO Evaluation Group). MAPAC also states that “contamination can occur at pre-harvest and postharvest stages, and can be managed through a combination of measures including: adoption of technologies (e.g. biological control and resistant varieties) and good management practices applied along the chain” (Rios 13). Poor agricultural practices and limited access to irrigation also translates to low productivity. Training for farmers, supplied by local NGOs and programs, will be able to implement efficient methods and policies. A rewards system could also be established to incentivize farmers to adopt and learn practices that help deliver safe and quality products (Rios 33). This type of aflatoxin control would enhance productivity and reduce postharvest losses, benefiting farmers and their markets.

Local aflatoxin training has been sporadically implemented in larger Malawian districts. One such program that can be scaled up to a national level is from the South Africa Trade Hub and the INVC (Integrating Nutrition in Value Chains), a USAID/Malawi Feed the Future flagship activity to sustainably reduce poverty and hunger. They conducted a field-based training of over 200 farmers in aflatoxin management in the central Dedza District. The training helped farmers and traders “improve the safety and nutritional value of the food they consume at home and the groundnuts they bring to the market” (USAID SA Trade Hub). The trained farmers are now able to pass on their skills and knowledge to other smallholders in Dedza. These types of training programs can become more frequent in other parts of Malawi, especially in more rural and remote areas. This program increases local ownership with relationships between farmers and expresses a communal effort in addressing aflatoxin.

These actions for strong aflatoxin control fall under SDG 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture. However, because of the multi-sector nature of nutrition, most if not all SDG targets potentially contribute to reducing overall malnutrition in Malawi (United Nations). Although aflatoxin control can constitute a major step forward in stabilizing food and nutrition security, all underlying and basic factors driving malnutrition need to be considered in order to create lasting prosperity.

In regard to other sectors contributing to reducing malnutrition in Malawi:

- (4) Empower women; improve health services, water, sanitation and hygiene, education, and infrastructure; and create a more stable and productive system to produce and consume food. Empowering women is especially important as they play a major role in the critical 1,000-day window for nutrition and the rest of the child’s life. Giving agency to a pregnant woman enables her to take better care of herself and her child. It allows her to seek health services and practice proper caregiving and feeding. Help in other sectors such as water and sanitation reduce exposure to disease and infection. Improvements in Malawian’s standard of living can further help efficient food production and safe consumption. Growth in other sectors helps to grow a healthy nation. Similar to the poverty cycle, a well-nourished nation allows potential for growth in other sectors (USAID).

Addressing the multiple factors driving malnutrition requires cooperation at the local, national and international levels. Processes need to be standard and efficient, and communication at all levels needs to be clear. In order to reach the 2030 SDGs, Malawi requires massive steps forward in all sectors, especially in addressing malnutrition. Ensuring that local food commodities are safe is an essential step in combating malnutrition. Reducing aflatoxin contamination in maize and groundnuts will be an important step, for those commodities define the average Malawian diet. Doing so will be a significant contribution to improving overall food security in Malawi.

Works Cited

- Abbas, Hamed K. *Aflatoxin and Food Safety*. Boca Raton: CRC Taylor & Francis, 2005. Print.
- Borlaug, Norman. "Nobel Lecture." *Nobel Prize*. The Nobel Foundation, 2016. Web. 19 July 2016.
- Chirwa, Ephraim W., and Mirriam Matita. *From Subsistence to Smallholder Commercial Farming in Malawi: A Case of NASFAM Commercialisation Initiatives*. Working paper. Futures Agriculture, Jan. 2012. Web. 19 July 2016.
- Christian Aid. "The Impact of Climate Change in Malawi." *Christian Aid*. Christian Aid, 2016. Web. 19 July 2016.
- FAO. "Malawi." *Nutrition and Consumer Protection*. FAO, 2010. Web. 19 July 2016.
- International Food Policy Research Institute. *From Promise to Impact: Ending Malnutrition by 2030*. Rep.
- Washington DC: International Food Policy Research Institute, 2016. Print.
- Jones, Kelly, and Vivian Hoffman. "Does Aflatoxin Exposure Cause Child Stunting?" *IFPRI*. IFPRI, 19 May 2015. Web. 19 July 2016.
- Kablan, Ahmed. *Aflatoxin Impacts on Child Growth*. Rep. Feed the Future, Jan. 2016. Web. 31 July 2016.
- Malawi National Statistical Office, and ICF Macro. *2010 Malawi Demographic and Health Survey: Key Findings*. Rep. NSO and ICF Macro, 2011. Web. 19 July 2016.
- Monyo, Emmanuel S. *Assessing Occurrence and Distribution of Aflatoxins in Malawi*. Rep. The McNight Foundation, USA, Jan. 2010. Web. 29 July 2016.
- Mtimuni, Beatrice. *Nutrition Country Profile: Republic of Malawi*. Rep. FAO, 2008. Web. 19 July 2016.
- National Statistical Office, and ICF Macro. *Malawi Demographic and Health Survey 2010*. Rep. NSO and ICF Macro, 2011. Web. 19 July 2016.
- Okoth, SA, and M. Ohingo. "Dietary Aflatoxin Exposure and Impaired Growth in Young Children from Kisumu District, Kenya: Cross Sectional Study." *African Journal of Health Sciences* (2004): 43-54. *NCBI*. Web. 31 July 2016.
- Oneko, Sella. "Malawi Declares National Disaster over Food Crisis." *Deutsche Welle*. Deutsche Welle, 13 Apr. 2016. Web. 29 July 2016.
- PACA Secretariat. *The Relationship Between Aflatoxins and Stunting: A Summary of Current Research*. Rep. Partnership for Aflatoxin Control in Africa {PACA}, 2016. Web. 19 July 2016.
- Ranum, P., JP Peña-Rosas, and MN Garcia-Casal. "Global Maize Production, Utilization, and Consumption." *Annals of the New York Academy of Sciences* (2014): 105-12. Print.
- Rios, Luz Diaz. *Malawi Programme for Aflatoxin Control (MAPAC)*. Rep. MAPAC, Sept. 2013. Web. 19 July 2016.

- UNICEF. "The Situation of Women and Children." *UNICEF Malawi*. UNICEF, 2016. Web. 19 July 2016.
- UNIDO Evaluation Group. *Malawi: Capacity Building for Aflatoxin Management and Control in Groundnuts*. Rep. United Nations Industrial Development Organization (UNIDO), May 2012. Web. 19 July 2016.
- Unite for Sight. "Social Determinants of Malnutrition." *Unite for Sight*. Unite for Sight, 2015. Web. 19 July 2016.
- United Nations. "Sustainable Development Goals: Sustainable Development Knowledge Platform." *Sustainable Development Knowledge Platform*. United Nations, 2015. Web. 19 July 2016.
- USAID. *The 1,000-Day Window of Opportunity: Technical Guidance Brief*. Rep. USAID, 8 Feb. 2016. Web. 19 July 2016.
- USAID SA Trade Hub. "Two Hundred Farm Leaders Trained in Aflatoxin Management in Rural Malawi." *SA Trade Hub*. USAID SA Trade Hub, n.d. Web. 19 July 2016.
- Viridiana, Garcia. *Children Malnutrition and Horizontal Inequalities in Sub-Saharan Africa: A Focus on Contrasting Domestic Trajectories*. Rep. African Human Development Report, Mar. 2012. Web. 19 July 2016.
- The World Factbook. "Malawi." *The World Factbook*. Central Intelligence Agency, 11 July 2016. Web. 19 July 2016.
- World Food Programme, United Nations Economic Commission for Africa, and African Union Commission. *The Cost of Hunger in Malawi*. Rep. ECA and WFP, n.d. Web. 19 July 2016.
- World Health Organization (WHO). *Malawi: Country Cooperation Strategy at a Glance*. Rep. WHO, May 2014. Web. 19 July 2016.

