Grappling with ~~Malnutrition And Food Insecurity~~

During the global Covid-19 pandemic, 2020 and 2021, economic fallout built the stage for world hunger and malnutrition to grow at a rapid rate. This is reflective upon the years challenged to sustain global health and hunger after natural disasters, conflicts, and harsh weather. History has proven that such conditions amongst babies and young children can become life threatening. It caused emaciated biologically results of weight loss, stunted growth, and vitamin and mineral deficiency's. Humanitarian assistance could do nothing more than rise in association with the alarming indices of continued G7 recognized states of famine.

Current research has shown that one in nine people suffer from hunger or malnutrition. Of this 820 million number, 13.6 million are children under five years of age who suffer with severe acute malnutrition. Malnutrition stems from a lack of the essential nutrients in diet which we receive from our dietary intake. We protect our healthy against sickness and diseases such as diabetes, low weight, high cholesterol counts and spurn biological development through maintaining a healthy diet (food intake) which provide the essential nutritive elements. The ability to eat a variety of foods, fresh fruits and vegetables, and other needed vitamins and mineral is the primary consideration in building global food systems. History has shown the world the negative impact a lack of access to quality foods has on many country's.

Food is life beyond the natural thirst for water our bodies have. As stated, the quality of our health is driven through our nutritional status. Around the world, there remains a need for improvement of dietary intake and because of the economic status of varied countries, there is an urgency for humanitarian aid. This sense of aid in global care is both a financial and food availability driven matter that seems to find no finish line to cross as it is a continuous faction in global healthcare and the fight against malnutrition.

This lack of food and the mal-nutritive state a country's populace or cultures are found in is treated through food supplementing, yet it's success depends upon many factors such as:

a. Severity of malnutrition
b. Underlying cause of the malnutrition
c. Ability to feed oneself
d. Ability to eat and digest food normally
e. Age
f. Mental Health status
g. Place of living

Treatment for those compounded with this healthcare condition requires a diet planner and the provisions to improve nutrient intake. The use of supplemental food products are often recommended along with assessing progress of the patients BMI (Body Mass Index) regularly. In instances where the person can not prepare meals for themselves, pose with mental disorders, dementia, or long-term illness, Occupational Therapist are suggested. The inability to chew, swallow or necessitate soft foods is a medical consideration for the use of medical team who treat malnourished patients. This counsel includes a gastroenterologist, nutrition nurse, psychologist, and social worker. At times also the use of such interventions as the Nasogastric tube feeding [PEG] which can either be by mouth, esophageal, or

implanted directly into the stomach (percutaneous endoscopic gastrostomy) and additional vitamin injections, infused into the veins of the arms.

Children & Malnutrition

Those children found in a vulnerable condition of severe malnutrition requires a health practitioner's (pediatrician) prescription and regular medical check-ups. This healthcare state can lead to growth retardation [physical & mental] and the possibility of repeated infections. These children may suffer low weight for their height, muscle wasting, swollen feet, face and limbs. Deficiencies of macronutrients zinc, iron, vitamin A, and vitamin B-12 are often widespread. As low levels of vitamin D is often detected as well, high-doses as supplement have been shown through research to improve weight gain and help continued language and motor skill development. Vitamin D is important to muscle growth, bone health, and impacts the immune system.

Children who are less than an acute status require an adapted diet which enables them to regain a normal nutritional state. They are treated as outpatients who mind their own progress through the use of supplemental dietary aids provided such as therapeutic milk and RUTF's. Their recovery rates have improved with the use of such items and hence, have the approval of WHO, UNICEF, WFP and the UN Standing Committee on Nutrition in the Joint Declaration on Community-based Management of Severe Acute Malnutrition.

In countries plagued with food shortages and weather driven hunger issues, the use of immediate breastfeeding during the first six to twenty-four months of after birth is recommended. Where access to food or food supplies is limited due to emergency or seasonal conditions the use of short-term food supplements is required for the prevention of wasting. There must be a consistent increase in caloric intake to improve a child's health status. Each day a malnourished child goes without food or appropriate treatment puts him or her at greater risk and is attributable to the country's child mortality rate.

Humanitarian Aid

Availability of the necessary food products, such as therapeutic milks or ready-to-use foods, strengthens the ability for humanitarian, institutional, or social gatekeepers to manage malnourished populations.

The malnourished treatment food supplements gaining momentum with global researchers are:

1. Nutriset Distribution Network
2. Plumpy'Nut
3. Lumpy'SupTm (RUSF)
4. Therapeutic milks F-75 and F-100.

There exist many organization who maintain worldwide storage facilities designed in response to relief and development needs of a countries localized aid agencies and governmental bodies. They've assumed partnerships with those providing food relief and those offering as 'food' resource corporations. These "distribution centers" are organized networks with purposed stock of nutrition products aligned for the local representatives use toward fulfilling their objectives in nutrition, hunger, and in respects to mortality

rates. It is a service to these communities whose undernourished numbers were steadily falling up until Covid-19.

Measurements (Body Mass Index)

MUAC tape (mid-upper arm circumference tape) is a red color coded tape and easy tool for health practitioners, mothers, etc…to quickly detect malnutrition in children. It is readily wrapped around the subjects arms as the color aligns by mass and suggest the child's nutritive status. There is no delay in treatment of those found to be in a malnourished state. As a highlight in maintenance and care during Covid-19, one company *Nutriset*, inserted these tape measures inside all of its cartons produced December 2020.

Severe Acute Malnutrition Treatment

In severe acute malnutrition (treatment) the use of Ready-to-Use Therapeutic Food(*RUTF's*) are the current trend.

During a 6 to 8 week period, each person is provided 2 to 3 sachets per day of the chosen supplement. *Plumpy'Nut* is an RUTF for children after 6 months of age and adults suffering from severe acute malnutrition. It is destined for those with an appetite and without medical complications. There is Caution as Plumpy'Nut isn't for people prone to allergic reactions to peanuts or dairy products.

Positive outcomes are only measured in accordance with weight gain and removal of sickness and disease. As patients and treatment participants are found to have improved nutrient values, body mass index measurements, and access their ability to consume a normal food diet, they are believed to be on track toward healthy.

Problems In Treatment & Care Products

Product formulation for the supplements is not finalized and still going through development in use. Cost reduction in use of less expensive ingredients is a consideration weighted against the effectiveness barriers it may plausibly result in.

RUTF Development and Problems (Ready to Use Therapeutic Food)

Plumby'Nut is recognized as the first RUTF designed to eliminate the uptake of bacteria through use of F-100 formula and peanut paste. F-100 is the preliminary therapeutic milk used to treat severe acute malnutrition of those with an appetite and minor medical condition status; enables patient to gain weight. In the supplemental versions of this milk product such as, Plumby'Nut and Nutriset, the milk (dried skim milk) is replaced with Whey powder and maltodextrins.

These products are used for those suffering a severe level of malnutrition whereas these supplements are the only food item consumed under intense biological uptake rehabilitation efforts. A slight dependency

exists regardless that they (Plumby'Nut & Nutriset) remain in the testing stage and researchers carefully evaluate the outcomes of patients having deficiencies impacting growth requirements. It is also relative to product taste, weight-gain, and applicability in reducing or changing macro and micro nutrient levels. Body mass is a particular focus as it is relative to the RUTF's short-term and long-term biological impact.

These products can be continually utilized as those patients under mal-nutritive treatment use RUTF as a dietary aid along with the ingestion of foods within their local diet.

The most expensive ingredient, dried skim milk, is a challenge to food chemical researchers seeking an alternative which meets nutritive standards (protein, phosphorus & Vitamin D) and adheres to cost effective efficiency desires. The chemical make-up in use of food alternates chick peas, soy, maize or sesame had non-desirable outcomes biologically as it's incompetence caused sickness. Scientist have also asserted the suggested use of milk proteins for the hormonal effect and production of insulin-like growth factor 1 (IGF-1) development. But, there is no existing product nor testing for their use. Thus, this process requires the careful combination which upon ingestion taste good and adheres to the uptake and mass building requirements medical professionals seek toward improvement of nutritional quality of RUTF's.

INTESTINAL CHIPS

Intestinal chips which are deprived of niacin amide and tryptophan show structural problems characteristic of environmental enteric dysfunction. It will provide data to researchers for understanding the biological mechanisms of the disease in children in association with malnutrition. Environmental enteric dysfunction (EED) is a chronic intestinal disease that affects millions of children in low- and – middle- income countries. Some cases are curable with dietary change, but this does not aid all children still suffering inadequate nutrient uptake and contaminated food and water supply. This 'microfluidic organ-on-a-chip' technology, however, has given them the ability to simulate key genetic and structural features of EED. Chips are destined for research & laboratory use in mimicking the features of EED in the lab for clarity in showing gene expression patterns of the disease (malnutrition) in deprivation of niacinamide (vitamin) and tryptophan (essential amino acid).

Data Charts of Aspects of Global Food Insecurity

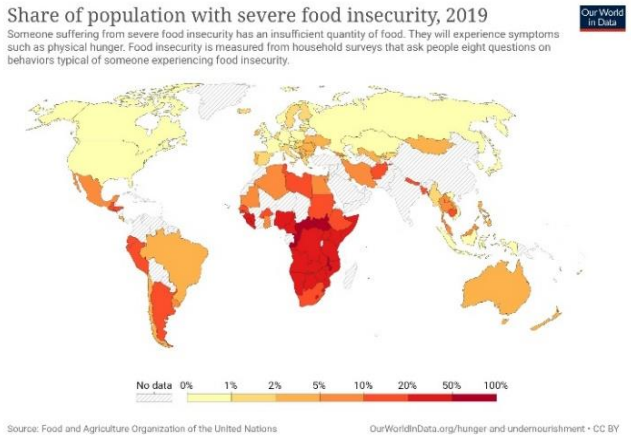

Chart 1: African and South American Severe Food Insecurity

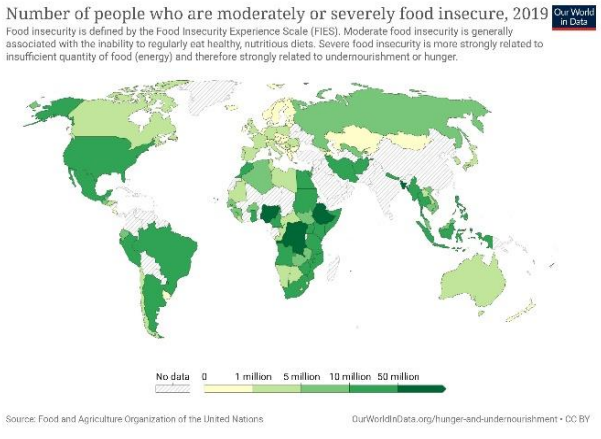

Chart 2: Populations Severely Food Insecure

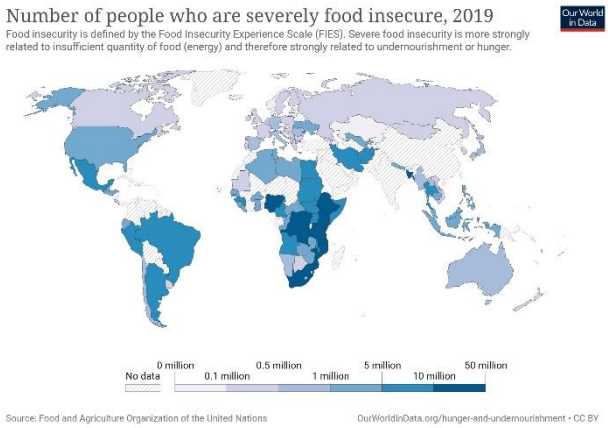

Chart 3: Global Millions Who Are Food Insecure

Food Security Within the United States

In 2021 it was reported that approximately 33 million Americans lived in a sense of food-insecure households. "Food deserts" are the outcome of our global Covid-19 experience and regardless of the government fight resilient in use of economic sustainment through established pandemic relief programs. This is inclusive of the monetary disbursements by government and private industry as well as the use of our social systems for food purchases which exceeded it's volume and financial offering. The expanse of Child Tax Credit, SNAP programs, PPP grants/loan system, Stimulus Checks, and the other historical happenings, placed most households in the best standing and posture for our future. However, the use of SNAP and financial payment was in an effort to steer clear of the imposed risk of food insecurity the pandemic created which overlap a pre-existing statement of the United States economic standing in regard to labor statistics, our agricultural mishaps, and lack of available social service long-term support for our community homeless, children, and elderly populace.

Connecting others to public food programs educated some, supported others, and sustained our biological total health. Corporations have also been challenged with extending themselves in food donations and supplies to empower our farmers. Offering provisions for seeding, fertilizer and supporting innovative agricultural technology is the in-action plan to counter the global upset the Ukraine, Russia War created in limiting the global supply of wheat, fertilizer, fuel and other products these countries distributed.

To further our view onto malnutrition we must grasp the understanding of living with a lack of food resources. Hence, *Food Insecurity* is when people lack secure access to sufficient amounts of safe nutritious food for normal biological growth and development enabling a active healthy life. This is the result of unavailable, unaffordable, or unequal distribution of food between community or household members. This is the cause of poor nutrition and can result in malnutrition.

As the concept of 'Food Insecurity' has arisen as a global concern, we must first recognize the stages for this growing communal dynamic. There are two:

1. Low food security: reduced quality, variety, or desirability of intake without notable change
2. Very low food security: multiple indicators of eating pattern change and reduced food intake resulting in malnutrition or hunger

Though these conditions can be long-term or temporary, as they exist inside a number of factors which include, income , affordability, employment, race and ethnicity, disability, health conditions, location and population influence. As we well know, the variance of income dictates ones ability to purchase food items. Income along with availability suggest access to goods, quality items and suitable quantity of what is purchased. Those in urban zones can have limited access to good types (variety), but haggle with pricing dilemmas such as higher prices and less quality. There may be local convenience stores versus supermarkets and limited fresh fruits and vegetable providers. A different prospective exist for those trapped outside of the city and confined to rural neighborhoods which have limited transportation options and fewer grocery or market places to buy from.

We must then consider the health status of the community in regards to disability, the elderly, or chronic disease sufferers within or outside of the city limits. Each relative factor impacts food access and purchase ability. This in-turn affects the individual healthy status and mortality rates.

Race can also indirectly impose upon 'food insecurity' as it is suggested that Black households are more likely to suffer compared to their Hispanic counterparts. It is relative to income levels, types of food(s) purchased, and community. Black Americans still tend to suffer with a higher unemployment rate.

It was predicted at some point during the Pandemic, that billions of people would suffer in having less access to food. We've already seen the outcome citing how Food Banks were overly used, burdened with supplementing societal lack as time raged forward and donations dwindled. Many food distributors were forced to close their doors despite the ongoing pandemic. This stress along with the continual food cost rising, spent household available doors and forced others to rely most heavily upon the SNAP/EBT funding under the Covid-19 Public Health Emergency initiative of Congress. Low income households held a sense of comfort until their recent release from programs providing extra food income aid for some and lower monthly benefits for others this past winter 2023. Here is where to concern of the procuring food insecurity began again.

For our homeless population the use of EBT benefits maintains their ability to feed themselves outside of the food provided through community kitchens, children nutrition programs and shelter meal(s) served. Their ability depends upon access to donations which impacts the quantity and quality of food served. This has its influence upon each persons health and nutritive standing which is supposed to be protected through use of SNAP programs as alternative means of feeding ones self and family. As this social system financial resource was heavily taxed during this two year time frame, the reductions in benefits is assumed to be severely reduced without indication of any near future increase. The reemergence of any external food resources is slim as we understand the plight of the farmer(s), corporate financial sloth, businesses are closing, global food insecurity rising, and that the economic standing of our country is in a chaotic state of flux despite the sense of normality media has created.

Thus, the health and well-being of our population is at risk due to inadequate household resources. This brings about poor nutrition especially for those economically compounded. Low-income extends from the middle class on down to our most newly received immigrants/refuges. Due to this reality, malnutrition will then become the focus as disease and pre-existing medical conditions for heart disease, skin disorders, onto dementia, or simple depression, weakened immune systems and body mass reductions, all run their course of biological maintenance.

The risk of hospitalization increases just as our hospitals are decidedly closing doors and eliminating forms of medical practice and community health maintenance under financial restructuring and the inability to afford the total expense of servicing our people effective and efficiently.

We are faced with a chance and opportunity to control our deepening condition of food insecurity through self action. This country has the ability to create it's own sustainable food system that is able to feed our population in total as individuals and communities. In our immediate past, we've maintained through an influx of food distribution chains, food store brands, community farming, organics, education in food income, variations, and gardening. Upgrading our efforts with supporting farmers, sustaining trade relations, realigning at state level commodity transportation (distribution) systems and redirecting our access ability through refined economics, are steps toward closing the existing gaps within our food systems.

Therefore, as we watch the news and read about the government and other private sector bodies struggle to outsource our income to help aid and feed the global community, we are faced with the reality of our reduced state of living. The questions then become grounded in our choosing to face the impoverishment of our country versus sending financial and alternative forms of global aid to reduce food insecurity of other nations in the constant fight to alleviate poverty, improve their nutritive health and lower mortality rates, while education them and developing their land(s) for survival. This is our double edged sword, which is beginning to deepen the wound in both directions

Global Food Supply Chain Issue's Impacting the United States

China

In China, there are varied quote unquote 'Economic Zones' in which products and food are manufactured for the country, but mostly for exportation. Despite there having been a strong financial hold on the in-house Chinese economics, economist predicted in 2011 that the solidity of the country's bounty was headed toward the *perfect storm.* Outside of the goods manufactured such as smartphone production, China held interest in rice, tea, and technology. These industry's, pre-Covid-19, could have sustained their standing, but as with most other countries and cultures, the pandemic carved out problem zones which shut down most of the constant conditions under which currency exchange traditionally taken place. Business as usual was heavily scrutinized.

China Fishery

The diet of this Asian culture in highly inclusive of fishery. The interest in fish farming had taken hold of some in China as they began investing time and researching the methods most effective for producing fresh fish to sustain their diet outside against pollution and other waterway issues. As populations have grown, citing income potential, and using seafood as a healthy food resource, there was a projected 50% increase in demand for fish and shellfish.

The plausibility of contamination of fishery foods became real between 2006 and 2007 as seafood items shrimp, crab, salmon and other types from major exporting countries such as China, Thailand, Taiwan, Chile and Vietnam was heavily banned by the FDA for containing irregular substances. Farmed Fish effort too was thwarted once the Fish Flu wiped out more than two-thirds of the farmed fish between 2007 and 2010. It was inclusive of the dangers in oyster and shrimp farming for Asia, South American and African fisheries.

Chinese Meat

Different from other cultures who fear cardio disease, high blood pressure or high cholesterol, the Chinese have relied upon the production of pigs for their mostly pork diets. Pork gained momentum as their number one meat resource since prior to the 1980's. They've grown to rely on the Durocs (USA), Yorkshire(English), and the Landrace (Danish) pig types. In 2005 this farmed animal grew subject to PRRS Disease. This is a disease liken to AIDS and it's destruction of humans and life. And, it forced China to import from other country's just as the 2011 grain drought infused by Wall Street and biofuel corporations investment frenzy.

The onset of PRRS brought into question once again, the value in use of CAFO's. Concentrated Animal Feeding Operations (CAFO) have been the typical structure, since the 1950's, and means by which to house and farms animals. This controversial method had an positive impact upon market shares but since is too a notable means for spread during disease outbreaks. The EPA denotes large animal farms as the cause for bad air quality and the contamination of waterways and the animals themselves. Animals are problematic inside CAFO's as their waste equates to gas production and odor among other issues.

By the year 2008, Wall Street held hundreds of millions invested in commodity futures market which was to known as a precursor to inflating food and energy prices. This would cause a global spiraling down of the world's poor and lead onto starvation mode a plausible outcome the Obama administration fought to deter with the Dodd Frank Wall Street Reform and Consumer Protection Act amendments. The Wu Wei, *do nothing* pause was not in their interest.

Though pricing increases went fairly unnoticed in America and Europe, it caused a rip for developing countries who spent 50 to 70% of their income on food alone. This was also a pivotal point against global rioting of more than 20 nations and the onset of Arab Spring.

African Country's

SAM (Severe Acute Malnutrition), is indicated from the WHO, for the nations of Ethiopia, South Sudan, Uganda and Somalia. These war torn lands are major sufferers as food insecure zones the result of climate change, war, and poverty. This and other organizations have committed to food, water, medical care and assigning each human, man, woman, or child into programs designed to meet their needs. Children are found to be undernourished for which SAM is in use to build, maintain, and improve health conditions through food and nutrient access and supplementation.

Food Farming 2011 to Present Day

The rainforest around the world had become subject to destruction for the construction of farmland to grow oil palms, soybeans, sugar cane, hold cattle and supply timber amongst many other interest. The purchase or land leasing scheme took hold yielding income for governments despite the eviction of families, protection of land, and environmental considerations. Major bank players were contributing income to country's inclusive of Ukraine who we find burdened and buried in War with Russia. This idea was not necessarily a success story for all as it contributed to debt and lost investments into the millions unheard of, yet lost in the futures market. Here too we see the spike in the cost of corn as the competition for grain intensified.

Then, the mysterious *UG99 Virus* strikes again. Discovered in Uganda 1998, the Puccinia Graminis or wheat stem rust, takes over fields and turns healthy crops into a black diseased shrivel of grains. The possibility of this particular infection and climate change issues presents in at least 14 countries around the world.

To date, our food supply is influenced more and more by climate change as we've seen droughts, heatwaves and major flooding which changed to dynamics of farm cropping. Rice paddy's, strawberry's, and lettuce have suffered added onto the list of 2023 shortages. The cattle farmers have been forced to sale livestock unlike the chicken farmers seeking egg laying chicks to meet he demand for eggs. Inside both industry's is disease, flooded land, land sales, and rumors of a spreading bird flu. A global lack of fertilizer for the fields is fear born inside a war. And, without meat and other foods to prepare, the shortage and cost of cooking oil may too be overlooked.

References

Barbu, Brianna. Cen.acs.org: ACS MEETING NEWS, Modeling malnutrition with microfluidics. August 26, 2022. Accessed March 2023

Bourne, Joel K. Jr., June 15, 2015. The End of Plenty: The Race To Feed a Crowded World, W.W. Norton and Company

Collins, Steve. Henry, Jeya. FEX: Alternative RUTF formulations (Special Supplement 2), Developing CTC programmes that Ready to Use Therapeutic Food (RUTF) made locally, from available produce, and used to treat….. en-net: Plumby nut Vis-a-vis Supplementary plumby. Accessed March 2023

www.departmentofhealthandhumanservices.gov, Office of Disease Prevention and Health Promotion. Food Insecurity. Accessed April 24, 2023

Dewey, Kathryn G; Arnold, Charles D.; Prado, Elizabeth L.; Stewart, Christine P; Wessells, K Ryan. ASN, Small-quantity lipid-based nutrient supplements for the prevention of child malnutrition and promotion of healthy development: overview of individual participant data meta-analysis and programmatic implications. 2021 accessed January 11, 2023

Djibo, Ali; Isanaka, Sheila; Nombela, Nohelly; et al. Jama.ama-assn.org, Effect of Preventive Supplementation With Ready-to-Use Therapeutic Food on the Nutritional Status, Mortality, and Morbidity of Children Aged 6 to 60 Months in Niger: A Cluster Randomized Trial. JAMA. 2009, 301 (3): 277-285 January 20, 2009 accessed 3/11/2023

Elliot, David. Coalition On Human Needs: FOOD INSECURITY IS ALREADY A HUGH PROBLEM FOR THE U.S. IN 2023, IT MAY GET WORSE. December 23, 2022 www.chn.org accessed April 18, 2023

Emergency Situational Updates. 24 April 2023, Situational Report: Greater Horn of Africa Food Insecurity and Health- Grade 3 Emergency – 1 January 2023 – 1 February 2023. www.WHO.int. accessed 3/2023

Focusforhealth.org, Focus For Health Foundation, Malnutrition In America. Accessed April 18, 2023 @ 5:23pm

International Food Policy Research Institute (IFPRI) accessed 3/2023

Martineau, Adrian. THE CONVERSATION, High-dose vitamin D could be a game changer in treating severe malnutrition. May 10, 2018 10:24amEDT accessed 3/2/2023 @ 3pm

Learner, Michele. Bread.org. Bread For The World: In 2022, global hunger emergencies are still on the rise. JAN 17, 2022. Accessed March 2023

Roser, Max. Ritchie, Hannah. www.ourworldindata.org/hunger-and-undernourishment. (2019). Hunger and Undernourishment, accessed April 2023

Mandal, Ananya M.D., Mar 13, 2023. www.news-medical.net/halth/Treatment-of-malnutrition. accessed 3/2/2023