

Including Indigenous Knowledge of Local Foods, in our Primary School Curriculum as a Support Food System and a Coping Strategy in Adverse Nutrition Emergencies. Lessons from the Amazon Plane Crash Survivors. (The Amazon Miracle Children)

Nkereuwem Sunday Etukudoh¹

Department of Hematology Federal College of Medical Laboratory Science and Technology,
Jos University Teaching Hospital JUTH, Jos Plateau State

Joyce Ene Ocheola Oki^{2*}

Department of Academics Federal College of Medical Laboratory Science and Technology,
Jos University Teaching Hospital JUTH, Jos Plateau State

Orinya Agbaji Orinya³

College of Agriculture and Veterinary Medicine,
University of Rwanda

Matthew Joshua Akpan⁴

Department of Environmental Health Science,
Faculty of Health Sciences
National Open University of Nigeria Abuja-FCT

Tobias Agada Ikoyi⁵

Department of Academics Federal College of Medical Laboratory Science and Technology,
Jos University Teaching Hospital JUTH, Jos Plateau State

Azuh Ejimola Eberechukwu⁶

Department of Academics Federal College of Medical Laboratory Science and Technology,
Jos University Teaching Hospital JUTH, Jos Plateau State

Blessing Edogbo⁷

Department of Environmental Health Science,
Faculty of Health Sciences
National Open University of Nigeria Abuja-FCT

Dim Chioma Callista⁸

Department of Academics, Federal College of Medical Laboratory Science and Technology,
Jos University Teaching Hospital JUTH, Jos Plateau State

Masok Nandi Felix⁹

Department of Academics, Federal College of Medical Laboratory Science and Technology,
Jos University Teaching Hospital JUTH, Jos Plateau State

Emmanuel Tete Nakanda¹⁰

Department of Academics, Federal College of Medical Laboratory Science and Technology,
Jos University Teaching Hospital JUTH, Jos Plateau State

Iyanam Deborah Akpan¹¹

Department of Library, Federal College of Medical Laboratory Science and Technology,
Jos University Teaching Hospital JUTH, Jos Plateau State

Corresponding Author:- Joyce Ene Ocheola Oki^{2*}

Abstract:- The knowledge of indigenous foods is very important for sustainable transformation of global food system, but it remains continually under emphasized in policies and practice. Improved comprehension of local indigenous food system alongside an all-inclusive repetition of its conservation as well as political enunciation of indigenous representation is key to ensuring the passage of this knowledge the between

generations. Secondary data collection was used for this review which was exhaustive. Research has it that Indigenous people conserve about 80% of the world's biodiversity especially in food and their knowledge systems have advanced side by side the ecosystems, guiding most agricultural and other livelihood practices. The survival of children after a plane crash in the amazon rainforest, called for a probe on how these

children survived the forest for forty days. The aim of this study is to review briefly and show the need to include indigenous knowledge of local foods in our primary school curriculum, as a support food system and a coping strategy in adverse nutrition emergencies. Lessons from the Amazon plane crash survivors (the Amazon miracle children). Using the review method of study, the research on this study found out that, the children aged between 1-9 years, survived on high energy flour called yuca and farine which was left on the crashed plane, they also did eat fruits from the forest to get their micronutrients, they ensured that they had drinking water to avoid organ damage, and also protected themselves from infections. The children's indigenous knowledge of local foods, helped them to know what foods to eat and which not to so as to avoid poisoning. This knowledge if included in primary curriculum could help boost children's nutritional status, reduce malnutrition, and intervene in dire nutrition emergency situations.

Keywords:- Farine, Yuca, Curriculum, Amazon.

I. INTRODUCTION

Bumping into the pitch of supporting traditional foods for indigenous people, is not only to guarantee the availability of the foods for their day to day consumption, but also to renew the awareness and knowledge of indigenous people about the environmental benefits, health benefits, and the sense of identity and belonging of their own traditional food sources (Sadiq *et al.*, 2020). It is well documented that Local wild foods help to enhance dietary diversity as well as the resilience of the ecosystem (Gewa *et al.*, 2019; Padha *et al.*, 2018; Chyne *et al.*, 2017; Meldnum *et al.*, 2018).

Indigenous knowledge is particularly crucial for sustainable transformations of food systems but often remains marginalized in policies and practice. Controversies surrounding the 2021 UN Food Systems Summit have highlighted this issue, as a broad alliance of academics and activists boycotted the event by arguing that it disempowered indigenous people and constituted an effort by “multinational corporations, philanthropies, and export-oriented countries to [...] capture the global narrative of food systems transformation (Cornfeild *et al.*, 2021)”. The controversy of the 2021 Summit reflects a deeper tension between increasing emphasis on the importance of indigenous knowledge in academic research and its continued marginalization in institutions and decision-making processes of the global food system. As participants and organizers of the 2021 Summit's side event Bridging scientific and indigenous peoples' knowledge for sustainable and inclusive food systems, also identified seven key entry points for the inclusion of indigenous knowledge in the negotiation of food systems transformations.

The need for an improved understanding of indigenous food knowledge systems, a more inclusive practice of conservation and negotiation, as well as political

articulations of indigenous representation and self-determination is key to ensuring the passage of this knowledge between generations. (FAO, 2020).

Research has it that Indigenous people conserve about 80% of the world's biodiversity (Albuquerque *et al.*, 2019) especially in food and their knowledge systems have co-evolved with ecosystems, guiding most agricultural and other livelihood practices. Despite growing academic interest in the co-evolution of ecosystems and knowledge of food systems, agricultural development often fails to recognize the adaptive character of indigenous peoples knowledge and practices especially in the aspect of food.

Food security and the acquisition of food resources represent a significant concern for many indigenous peoples. Recent data suggest that indigenous peoples account for 15 per cent of the poorest people globally [9] despite their rich knowledge of indigenous foods and diets; this also contravenes their conserving 80% of the world's biodiversity which can be translated into billions of dollars if appropriate steps and policies are put in place. If 15% of indigenous people are poor, could this also mean that they are also food insecure?

Food insecurity is broadly understood as a state where people do not have continuous physical or economic access to nutritious and safe food, as the distance to food access grows to the extent that communities would be placed in food poverty. The lack of food, particularly quality food, not only contributes to malnutrition of the population, but on a wider scale is also the main slowing element of rural territories, leading to hunger, poverty, and unemployment. According to the available data, the number of people suffering from hunger has grown during the last 3 years, returning to the levels of a decade ago. It is currently estimated that the absolute number of people worldwide affected by food insecurity has increased from around 804 million in 2016 to almost 821 million in 2017. The situation is worsening in South America and most regions in Africa and Asia (FAO, 2018).

The unanswered question is, “is government at global levels concerned about the situation?”, if the superintending answer is yes, what solutions has been put in place to mitigate the current situation?. The facts are not hidden that government has begun to implement mechanisms to address the problem; one of the major actions is the 2030 Agenda for Sustainable Development, the efforts of foundations such as the Bill & Melinda Gates Foundation through their Striking Challenges Explorations, financing program, and other equally important efforts, such as that by FAO learning and promotion of indigenous food systems.

As a whole, these efforts are important, but very insufficient. If we truly want to end hunger and ensure food access by 2030, it is necessary to rethink the strategies of action. The promotion of indigenous food systems proposed is a major mile stone, but this requires an institutional resilience approach, that is, to help alleviate the problem by standing out as a bridge between local informal

institutions and formal institutions; this translates into learning local actions to have a global impact (Lugo-Morin & Doisey 2020) is why there is a need to include indigenous knowledge of local foods in our primary school curriculum.

II. METHODOLOGY

This study will critically look at making indigenous peoples food knowledge, a support food system, and a coping strategy in adverse emergencies, with lessons from “the amazon plane crash survivors”. (THE AMAZON MIRACLE CHILDREN). Secondary data will be collected from reviews and analysis of documents and relevant literature, peer reviewed articles if any, social media reports newspapers and blogs.

This studies in its analysis will be extensive and exhaustive in its review, on ways the indigenous peoples knowledge on food system can serve as a support system as well as a coping strategy/ or mechanism in dare nutrition emergencies, drawing facts from the survivors of the recent plane crash in the amazon rain forest and their coping strategy which kept them for forty days considering their ages, what informed their knowledge, and how the formal institutions can input this wealth of knowledge into the formal food system for global impacts.

III. RESULTS AND DISCUSSION

Success of the search for four children, the ages of the children were 13,9,4, and 1 yrs respectively with two of them celebrating their birthdays in the forest. Found after 40 days in the jungle, these four children now popularly known as “the miracle children of the amazon forest”, the entire situation was named a miracle in the amazon.

The rescue operation that found these children was referred to as “operation miracle” by some, while the indigenous people called it operation *milagro* and the military called it operation hope. This rescue operation comprised of 350 people and 30 organizations 11 aircrafts, 113 commandoes, 92 indigenous trackers most of which fished and hunted within this region armed basically with ancestral wisdom.

The mystery happened in south Colombia, according to the reports gathered the father who is the biological father of the two younger kids and step father to the two older ones was a farmer who was threatened by insurgency and decided to fly his family away. The children with their mother and another adult left on the 4th of May 2023, but their plane crashed in the amazon rain forest, while others on the plane died, the children survived along with their mother who was badly injured but later died four days after the crash. The husband who belong to the huitoto tribe or indigenous people, found mostly in the south eastern Colombia and part of Northern Peru. According to reports the four children survived in the amazon rain forest for forty days while rescuers searched for them.

A. How and on what did they Survive?

The older siblings took care of the younger ones, they fed on the remains of supplies they found in the plane such as *yuca flour* which was similar to sweet potatoes, and also *farina* which is a type cassava flour, they also moved with water bottle and found one aid kits dropped for them by rescuers, of all the approximately 100 aid kit which comprised water and food. According the vanguard news, the children consumed about 3kg, (6pounds) of *farina*. The children also lived off some roots and seeds since they were raised in indigenous jungle communities according to survival experts.

For these four children, survival was most imperative as they exhibited resilience to survive. Also as indigenous children they are trained and raised to know indigenous plants, which to eat and which not to eat, because eating what you don't know can cause harm such as poisoning, they are also taught survival traits or qualities such as hiding in tree trunks when it rains or hide away from dangerous animals. Noticeably the children were instructed by their mother before she passed to move away from the crash site and this they obeyed. According to rescuers, about 10,000 flyers were dropped, instructing the children in Spanish and their indigenous language on survival tips.

On the 16 of May 2023, the plane wreckage was found without the children which gave hopes the children were active, and with intensified search the children were found on the 9th of June. The children when found were dehydrated, malnourished, with insect and mosquito bites, but managed not to be infected.

This story is a testament to the resilience and adaptability of indigenous cultures, but beyond this, it shows that the rich heritage and knowledge of fruits and indigenous jungle survival skills, learned from them helped to navigate the dense forest. Developing this skill allowed them to thrive in such challenging situation. The ability also of the indigenous trackers to maintain positivity in the situation they found the children gave them a better survival stand mentally.

This could be seen in the notation Ordines and Edwin Manchola, when the boy first spoke to them by saying mama “*San Morio*” meaning my mum is dead. Nicholas quickly changed the discussion to a sweet one by telling them that their grandfather and grandmother are looking for them, this can be said to be a mental therapy towards positivity.

B. Nutritional and Health Impact of this Challenge on their Bodies:

There was evidence that the children were very mentally alert they also showed signs of having more natural immunity. Even though they were dehydrated they made water a priority and this helped them stay away from organ failure. The two major foods they ate included cassava *farine*, and *yuca* flour. These two food are one and the same since there major source is cassava. The question at this point is, are these two foods similar to *tapioca*? While

tapioca is another name for yuca and cassava, there is a slight difference between the two items. Tapioca flour comes from the pulp of the yuca plant while cassava flour is made from the entire root. More specifically, tapioca comes from the bitter variety of yuca that is believed to have arrived in South East Asian and Taiwan through Japanese occupation in the late-1800s (via Eater). The starch must be extracted from the pulp of the yuca plant, treated to rid it of the natural cyanide, and then dried into a flour form that we can find at all of our local stores (www.tastingtable.com).

Again looking at Cassava flour vs. tapioca flour one will notice that Cassava flour and tapioca flour both come from the cassava root. However, there are some key differences between the two:

➤ *The Part of the Plant they come from:*

Cassava flour contains the whole root, while tapioca flour is made up only of the starchy part of the root.

➤ *Fiber Content:*

Cassava flour contains more dietary fiber than tapioca flour.

➤ *Calories:*

Cassava flour has fewer calories per serving than tapioca flour.

➤ *Their use in Recipes:*

Both flours work similarly in recipes. However, due to the higher fiber content of cassava flour, it can be more effective as a thickener.

➤ *Their Taste:*

Cassava flour has a more noticeable taste, it has a nuttier flavor in comparison to more plain-tasting tapioca flour. (www.medicalnewstoday.com).

It has also been scientifically proven that Cassava flour can serve as a gluten-free substitute for wheat flour in bread, pasta, and other foods. It comes from the root vegetable cassava. Cassava contains important nutrients that may manage digestive health and maintain insulin sensitivity, among other benefits. (woodlandfoods.com/products/cassava).

Research has shown that Yuca has many nutrients that are beneficial for your body. To begin with, yuca is very high in Vitamin C, with 20% of your daily value coming from only 100 grams of cooked yuca (www.Healthline.com). Vitamin C is great for your immune system and also acts as an antioxidant in your body.

Yuca also has a significant amount of potassium and copper, which are good for muscle function and health (www.WebMD.com). Lastly, WebMD also explains that yuca is a great source of resistant starch for digestion and is also a good way to stabilize blood sugar.

C. *Most Likely Seeds they Consumed could Include:*

➤ *Myrciaria Dubia, Commonly Known as Camu Camu*

Rumberry, another name for Camu camu, which grows in the Peruvian and Brazilian Amazon on the riversides that busy. Despite the fact that the fruit itself is sour, the fruit can be used in many ways, apart from being served as ice cream or juice form. The fruit is harvested during the wet season and usually collected using canoes. The vitamin C, content of the fruit is between 2 – 3% of its fresh weight, and is extremely prevalent among the Iquitos and the Amazonas. This fruit is becoming increasingly well-known as a health supplement because of its antioxidant and anti-viral properties. Camu Camu is also used medicinally to combat cold sores, herpes, and common cold. Also recognized as a super fruit camu camu can also be used to combat inflammation due to its high content of an amino acid called valine, it also prevents muscle collapse and is unlimited in enhancing nervous system's cognitive function. (www.rainforestcruises.com/guides/amazon-rainforest-fruits).

➤ *Maracuya (Passion Fruit).*

Maracuya is popularly known to us as passion fruit and popularly consumed in South America. The fruit grows on vines, and is yellowish to dark brown having a juicy seed-filled inside. Passion fruit contains beta carotene, pro-vitamin A, vitamin C, dietary fiber, and iron. Just one cup of passion fruit gives about 25% of daily recommended amount of carotenoids. Passion fruit juice is a well-known source a source of potassium, suggesting it has good properties for blood pressure lowering and naturally reduces stress and anxiety. Even though there is need for more research on this fruit, earliest research has also showed that eating the fruit peel may assuage asthma symptoms. (www.rainforestcruises.com/guides/amazon-rainforest-fruits)

➤ *Acai Berries*

Acai berries are famous natives of Central and South America, these grapelike fruits are popularly found on trees that grow as tall as 25 meters for example palm trees. Per year, they produce 40-50pounds of acai berries. In recent times the acai berries has become tremendously famous internationally due to its extraordinary fiber, antioxidant, and unsaturated fat properties (omega fatty acids). Apart from supporting healthy hair, skin, and nails, the berries enhance the digestive apparatus for optimal function. Their great vitamin C property protect the body from coronary heart diseases and raises the bodies total energy. Research among some traditional Cibolo inhabitants in the Brazilian Amazon, has shown that acai palm is their most important and most frequently used plant species because the fruit constitutes about 42% of their total food intake by weight, (www.rainforestcruises.com/guides/amazon-rainforest-fruits)

➤ *Aguaje (Aguaje, Fruits of the Peruvian Amazon with High Nutritional Value)*

Other famous fruit in the amazon region is the Aguaje, or the Moriche palm fruit. The fruits vitamin A level is three times more than that of carrot. It also has other vitamins, oils as well as proteins, frequently used in the preparation of food products such as ice cream, fruit wine, jam, and even juice. It is popularly found in tropical wet zone of South America. Due to its excessive concentration of vitamin A and also E, carotenoids, tocopherol and oleic acid, the fruit was renamed a “miracle fruit” because it can also be used to manage skin conditions such as psoriasis, burns and eczema, since it has natural soothing and anti-inflammatory components which help to tame skin redness and also calms the skin. The pro-vitamin A components also protect the skin from photo damage. The above combinations of the fruits characteristics as well as its possession of phyto-estrogen (plant based -estrogen) properties has earned it another popular name “the curvy fruit” because the phyto-estrogen properties help to enhance female curves as well as balance hormonal levels in females during menstruation, relieves hot flushes during menopause and also helps restore fertility.

D. Lessons Learnt

Obviously these children’s knowledge of indigenous foods served both as a survival tool and a coping strategy for them in such adverse situation, three notable things they did include, ensuring they had calories, micronutrient especially vitamin C, making sure they had water to prevent organ damage, and trying their best to avoid infection. These survival tips kept them moving and alive until they were found. As a result, there is need for an improved awareness of the knowledge of indigenous foods at an early age among children as well as include these knowledge in the schools (primary schools) curriculum. It is well documented that this knowledge can help improve children’s nutritional status. But while the students in the rural areas will have the potentials to practice these knowledge due to their environment, urban schools will need to provide supportive space for experiential learning.

IV. CONCLUSION

Community based indigenous knowledge of local foods requires the co-operation of a wide range of stakeholders including the students or pupils as the case may be, for it to be successful. With an all-inclusive approach and government full support, this can go a long way in improving children’s nutritional status and reducing the level of non-communicable diseases in the community.

RECOMMENDATIONS

- Each community should have a “mantra” of its indigenous local foods.
- A curriculum should be made to teach children in primary schools community-based indigenous knowledge of local foods.

REFERENCES

- [1]. Sidiq, Fathir & Coles, David & Hubbard, Carmen & Clark, Beth & Frewer, Lynn. (2022). The Role of Traditional Diets in Promoting Food Security for Indigenous Peoples in Low- and Middle-Income Countries: A Systematic Review. IOP Conference Series: Earth and Environmental Science. 978. 012001. 10.1088/1755-1315/978/1/012001.
- [2]. Gewa, C. A., Onyango, A. C., Angano, F. O., Stabile, B., Komwa, M., Thomas, P., & Krall, J. 2019 Mothers' beliefs about indigenous and traditional food affordability, availability and taste are significant predictors of indigenous and traditional food consumption among mothers and young children in rural Kenya Public Health Nutrition 22(16) pp 2950-2961.
- [3]. Padhan, B., Biswas, M., Dhal, N. K., & Panda, D. 2018 Evaluation of mineral bioavailability and heavy metal content in indigenous food plant wild yams (*Dioscorea* spp.) from Koraput, India Journal of Food Science and Technology 55(11) pp4681-4686 10.1007/s13197-018-3388-3.
- [4]. Chyne, D. A. L., Meshram, I. I., Rajendran, A., Kodali, V., Getti, N., Roy, P., . . . Longvah, T 2017 Nutritional status, food insecurity, and biodiversity among the Khasi in Meghalaya, North-East India. Maternal and Child Nutrition 13 e12557-e12557, 10.1111/mcn.12557
- [5]. Meldrum, G., Mijatović, D., Rojas, W., Flores, J., Pinto, M., Mamani, G., . . . Padulosi, S. 2018 Climate change and crop diversity: farmers’ perceptions and adaptation on the Bolivian Altiplano. Environment, Development and Sustainability 20(2) pp 703-730 10.1007/s10668-016-9906-4
- [6]. Canfield, M., Anderson, M. D. & McMichael, P. UN Food Systems Summit 2021: Dismantling Democracy and Resetting Corporate Control of Food Systems. Front. Sustain. Food Syst. 5, 66512 (2021).
- [7]. FAO. Food Loss and Food Waste (2020)
- [8]. Albuquerque, U. P. et al. Social-Ecological Theory of Maximization: Basic Concepts and Two Initial Models. Biol. Theory 14, 73 –85 (2019).
- [9]. United Nations Development Programme 2019 10 things to know about
- [10]. Indigenous peoples. Available at: <https://stories.undp.org/10-things-we-all-should-know-about-indigenous-people> (Accessed: 22 July 2023).
- [11]. FAO, FIDA, UNICEF, PMA, and OMS. El estado de la seguridad alimentaria y la nutrición en el mundo. Fomentando la resiliencia climática en Aras de la seguridad alimentaria y la nutrición. Rome: Food and Agriculture Organization of the United Nations; 2018.
- [12]. Lugo-Morin, Diosey. (2020). Indigenous communities and their food systems: a contribution to the current debate. Journal of Ethnic Foods. 7. 10.1186/s42779-019-0043-1.
- [13]. www.rainforestcruises.com/guides/amazon-rainforest-fruits