

Nutrition and Medical Geology: The Hidden Truth on Healthy Dietary Food Consumption that Never was - An Example from Ghana

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Introduction

Operating within a single bubble in a dynamic world with changing climate makes therapies of yesteryears questionable and challenging. It is understood that nutrition is the intake of food, considered in the relation to the body's dietary needs ([1,2], Figure 1).



Figure 1: Fruits and Vegetables-the nutritionist choice for healthy food.

To a nutritionists, adequate, well balanced diets form part of the cornerstone of good health. This is the third goal of the United Nations (UN) internationally agreed goal popularly branded as sustainable development goal 3 (SDG 3). The attainment of this important goal is not only in the hands of the healers (Medical Doctors) but require multi-disciplinary collaboration that requires contributions from Nutritionists and Geoscientists. However and most importantly the wish of the nutritionist was valid 50 -100 years ago where body's dietary need were from food intake for human development. Conversely the balance diet from these same foods when consumed might not provide the same results as the world is undergoing industrial revolution (Figure 2).

It thus become apparent that the connection between the earth, nutrition and human health need to be tackled involving many disciplines. From Kaplan [3] 'we are what we eat and drink'. It thus becomes imperative that ignorance to the elements in the earth (i.e. in soils) that plants grow to give us food (fruits and vegetables-the nutritionist choice) can scale up public health problems. Everything connects as shown in figure 3. For this reason, that make a concerted approach in providing good health should consider trans-disciplinary inputs.

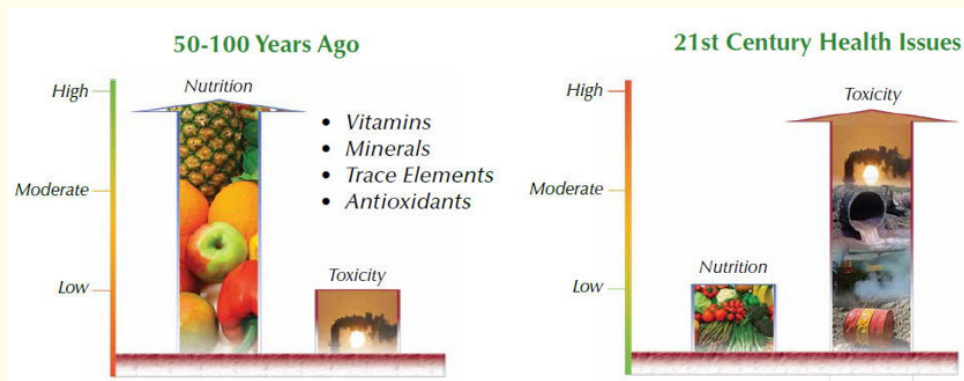


Figure 2: Contributions from fruits and vegetables in nutrition equation with time.

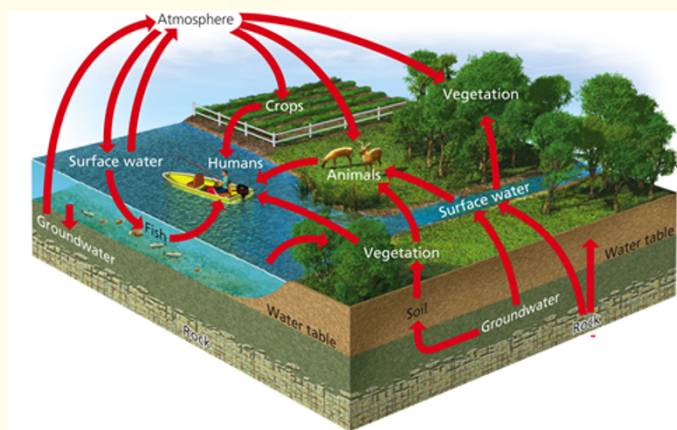


Figure 3: Schematic diagram illustrating what goes around comes around to haunt us.

It is no doubt that poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development and reduced productivity. It is on the basis of this that medical geological information is vital because what goes around comes around to haunt our well-being. This short communication looks at some common staple foods in northern Ghana with respect to the selenium (Se) concentration inconsistencies. The result outcome suggests many consumers are at health risk if the source of dietary nutrients is only from the locally cultivated foods in this case millet, guinea corn and maize.

What is medical geology?

It is an emerging interdisciplinary scientific field studying the relationship between geological materials and geological processes impacting on human and animal health at a place (Figure 4).

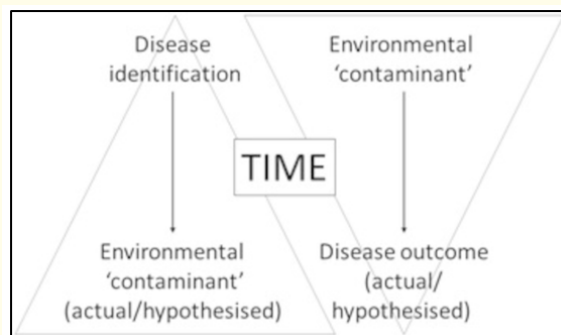


Figure 4: Main goal of Medical Geology to identify locations of disease-causing elements in the environment.

It makes use of the geochemistry in the environment to determine the health of any entity being investigated. To a nutritionist it will be the food crops. As recounted by Paracelsus his famous dictum “What is there that is not poison? All things are poison and nothing is without poison. Solely the dose determines that a thing is not a poison” [4,5]. This paved the way for the modern threshold concept and the no-adverse effect level. This is relevant as the changes in climate resulting in landscape modifications instantaneously affect the distributions and concentrations of essential elements for human health development as well as the potentially harmful elements that have damaging health consequences in humans. It is just too difficult for a nutritionist to look at a fruit or vegetable to know the elements deficient or toxicity levels. Nonetheless, the obvious thing is that fruits and vegetables rich in particular elements example iron (Fe) cannot be identified visually (Figure 5).



Figure 5: No signs of elements deficiencies or toxicities unless medical geological investigations re conducted to for the elements distributions and concentrations.

The study in northern Ghana

The health of soils determines the health of crops cultivated in such soils. Source of elements in food crops are from the underlying substrates. In this study food crops in some communities in northern Ghana were sampled, processed and analysed for Se concentrations. The crops subjected for this study were millet, guinea corn and maize the most staple food in the area. These crops do not require very

fertile soils to grow well and as the area is characterized by mono-modal type of rainfall has made the population to cultivate in large scale these types of cereals. It is known that Se levels in soils generally reflect its presence in food and the levels in human populations. Other researchers had found Se food content to be influenced by geographical locations, seasonal changes, protein content and food processing mechanisms, which at least the study carried out in northern Ghana confirms the Se concentrations due to geographic locations (Figure 6).

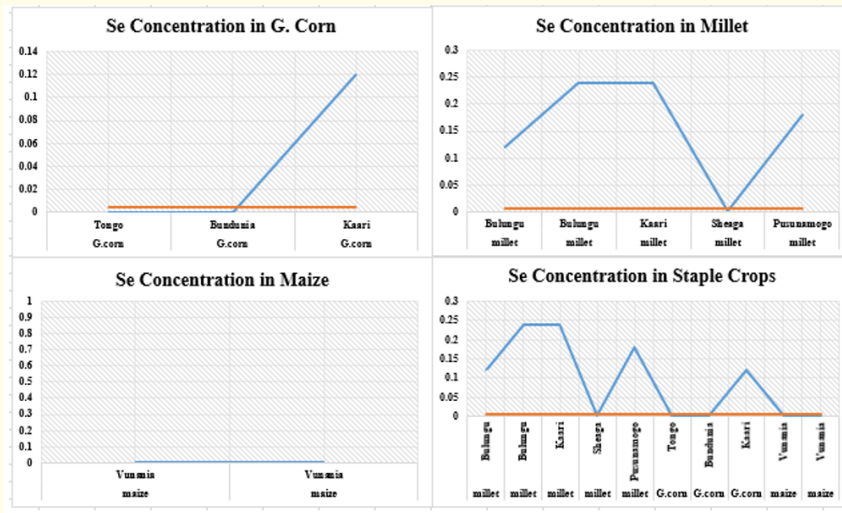


Figure 6: Selenium concentrations against the accepted baseline values for maize, millet and guinea corn in northern Ghana.

From figure 6 Se is lower than the accepted background values in Guinea corn at Tongo, Bundunia, lower than accepted values in maize at Vunania and low in millet at Sheega. All other communities in the three cereals had Se concentrations greater than the accepted baseline values. Excitingly, the characters of all these crops figure 7 were all the same.



Figure 7: Cereals sampled during the study for Se concentration in staples in northern Ghana.

The deficiency or excesses of Se in maize, millet or guinea corn did not influence the appearance of the crops.

Conclusion

The differences in Se concentrations in millets, guinea corn and maize in different communities confirms geochemical variations of elements across geographic locations and suggest that blatant believe that cereals are enriched in Se maybe a speculative conclusion. These eventually if not scrutinize carefully by factoring local elements uptake by the food crops can lead to outbreak of non-communicable diseases which hitherto were curtailed from consuming these nutritious food that seems to the nutritionist choice. In conclusion the author wish a strong collaboration among nutritionist, agriculturists and geoscientist at all local levels to compliment the advice on nutritious food therapies based on the correct levels of the essential elements and not just based on the food types.

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