GHANA SCIENCE ASSOCIATION

ADVANCING SCIENCE AND TECHNOLOGY

Everyday SCIENCE For Schools

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Self-Medication: Good or Bad?

"Self medication is a disturbing concept. Due to the dicey nature of the concept, an all-inclusive approach must be taken to ensure the safe practice of this concept."

Party rocked, bottles scattered

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Ghana Science Association (GSA)

Ghana Science Association

Introduction

The Ghana Science Association (GSA), a voluntary, non-profit making and multidisciplinary organisation of scientists, technologists and mathematicians was formed in 1959. The Association traces its origin to the West African Science Association (WASA) which was formed in 1953 at the University College of the Gold Coast. WASA was formed to provide West African scientists the forum to advocate the importance of Science and Technology as a necessity and bedrock for national development. The formation of GSA broadened the scope of activities from reading of scientific papers to involvement in national and international affairs. The Association was placed on government subvention under the Ministry of Education as far back as 1961 by a Presidential Fiat. Hence the Association is supported through budgetary allocation from the Ghana Government. Other sources of income include membership dues and proceeds from workshops and conferences. The GSA was mandated to promote, popularize and demystify science and create a scientific culture in the country. The Association has made tremendous contributions to National Development, Health and Economic Growth through scientific interventions. The Secretariat is a point where scientific and technological information and research findings are obtained by individuals and corporate bodies.

Membership of the Association is drawn from the Universities, Research Institutes, Industry, Government and Persons interested in the promotion of Science and Technology.

Vision and Mission

Vision

To become a dominant voice in Science and Technology advocacy by promoting and popularizing Science and Technology to meet national developmental needs.

Mission

Advancing Science, Technology, Engineering and Mathematics (STEM) through interaction and cross-fertilization of ideas of all interested people to: -

1. Popularize, promote and disseminate scientific information and technology transfer for national development.
2. Contribute to the development of national Science and Technology policy.
3. Collaborate with industry to set national research agenda.
4. Establish linkages with industry to promote the transfer and application of Science.
5. Seek affiliation and foster cooperative links with other national and international organizations.

Activities

1. Organization and participation in scientific conferences, workshops, seminars, symposia, public lectures, quizzes and science fairs.
2. Promotion of carrier development of scientists in Universities and Research Institutes in Ghana and elsewhere.
3. Publication of the scientific journal, magazines and books (e.g. Journal of the Ghana Science Association and Everyday Science for Schools magazine).
4. Training programmes for mathematics and science teachers to improve the teaching and learning of these subjects in schools and colleges of Education

Contribution to National Development

Issues of national importance have been regularly and consistently highlighted at biennial workshops, conferences etc. Communiqués had been submitted to Government and other stakeholders on very topical themes to help shape national policies.

Social Media and Food Choices

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The common practice nowadays is to have friends who post virtually all their daily activities on social media including the foods they eat, restaurants and fast food joints they visit and even who they eat with. The fantasy of "eat and share" which began with the Western worlds is now widespread and has caught up with Africans, and Ghanaians are no exception. Visits on social media like Facebook, WhatsApp, Instagram, Snapchat, Twitter, among others reveal the images of different foods being uploaded daily almost every minute. Most young people are driven to share what they eat just to have a competitive urge over their friends, with a slight thrill of "lucky me, bet you wish you had this!" and sometimes that feeling of being content with their food choices.

The trending foods are the chicken nuggets, shawarma, bacon, pizza, French fries, and ice creams whiles occasionally indigenous foods such as 'banku', 'fufu', 'ampesi', 'tuo-zaafi', and 'red-red' get a few hash-tags. Most of the fanciful foods predominant on social media have high contents of sugar, salt and fats. The advertisement of such foods are often a ploy by manufacturers to make excess profits at the expense of our health. For instance, the increasing number of alcoholic beverage adverts has greatly influenced many young people to abuse the consumption of beers and spirits as they make merry. People often forget that the negative effects of the consumption of unhealthy diet and alcohol abuse will surface with aging.

Most of our healthy traditional meals like 'eto', 'ebunu ebunu' soup, 'wrewre' soup and 'dawadawa' stew are becoming extinct due to urbanisation and modernisation as we see less and less of these meals. Also, the consumption of fresh fruits is not getting the needed attention because synthesized beverages and carbonated drinks have taken centre stage.

In recent times, the prevalence of chronic diseases like obesity, diabetes, hypertension, cardiovascular diseases, and cancer have increased significantly globally. This is mainly due to eating unhealthy diets coupled with a sedentary lifestyle. The advent of technology has made life more comfortable. Having regular exercises to maintain good health is verisimilarly also declining. This has evidently led to a surge in health awareness particularly regarding our diet.

People's interest in social media is still on ascendency with an estimated 2.5 billion individuals being connected through this platform by the end of 2017. With this projection, much more people are likely to have their food preferences and choices being influenced by their network of friends on social media. Already, social media is dictating and controlling our food choices; how we prepare our meals, portion of meals we consume, people we share our meals with, the times we eat and even our perception on nutrition. Thus, changing our food habit, behaviour and culture.

A rhetorical question comes to mind: "are we influencing or are we being influenced to eat right?" Our habits are often shaped by the things we see and hear, and with many people getting access to social media the right information about food choices should be disseminated. As youth we should begin reading and sharing more information on the role of food on health. It takes one person to begin a trend on social media. Thus, we all need to be advocates for healthy eating by influencing others in a more positive way. We should never forget that "every time we eat or drink, we are either feeding a disease or fighting it".

Why the Inside of Fruits Turn Brown When Exposed to Air?

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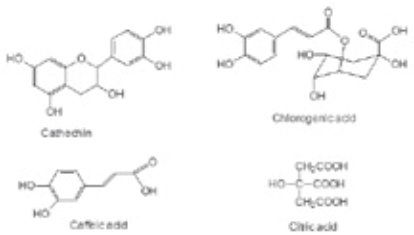
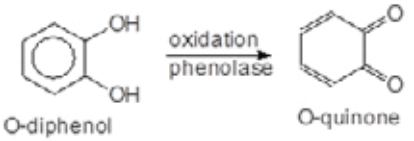
Have you ever cut your apple or pear into pieces and left for days before eating? Do you notice any change?

Apples, pears, or bananas and other fruits contain phenolic substances preferably called O-diphenols. Catechin, Chlorogenic acid and Caffeic acid are few examples of these O-diphenolic compounds.



These O-diphenolic compounds can easily undergo oxidation when exposed to oxygen or when catalysed by a special enzyme called phenolase or phenol oxidase to form ortho-quinones or "o-quinones."



The ortho quinones themselves have no color, but they further react with amino acids and oxygen in non-enzymic reactions to produce brown, polymeric melanins. This is how we get the brown color on the cut cells of the apple.

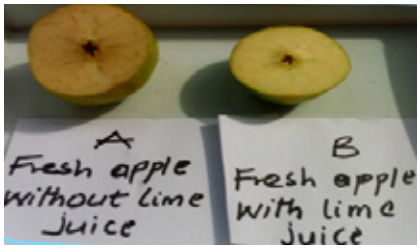
This is what happens to fresh fruits when they are cut into pieces. The original fresh fruit or vegetable soon turns brown, while still edible, and does not look very appetizing. However, this is a built in defence mechanism against bacteria and fungus when a fruit is cut opened.

The reaction mechanism involved in this case is oxidation. This only occurs when the cell membrane of the fruit is destroyed or damaged through a cut which exposes certain enzymes within the cells to oxygen. When this happens, the enzymes react to the oxygen creating an oxidized layer that provides some protection against foreign bodies. O-quinones are the substances that provide the protection from bacteria and fungi as they form a natural antiseptic.

How do we prevent the browning to occur?

If you want to keep cut open apples from going brown quickly as they do when just sitting on the kitchen counter, simply place them in a refrigerator. This will drastically slow the chemical reactions and thus inhibit the oxidation process. We can also avoid the apple's exposure to air via sealing it in an airtight bag or jar. This is referred to as sealing under vaccum. Another option here is to put the cut apple in water for a similar effect.

Chemical substances such as sulphites, citrates and SO2 can also be used. However, these substances are not ideal. A small percentage of sulphites can induce or trigger asthmatic attacks. A natural, safer and easy method of preventing enzymic browning is by the application of lemon or pineapple juice.



Lemon juice contains a carboxylic acid called Citric acid which alters the pH of the system and denatures the browning enzymes. Enzymes are pH specific i.e they act in a specific given pH medium. Any change in the pH medium dysfunctions the activities of the enzymes. The acids stop the polyphenol oxidase (the enzyme) from reacting with oxygen. Lemon juice and other acids apart from lowering the pH to inhibit the activity of the polyphenol oxidase, they are also rich in antioxidants that slow enzymatic browning.

Gamma Irradiation - Overview

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What is radiation?

It is an emission/transmission of energy in the form of electromagnetic waves or particles through space or medium. Radiation can be ionizing (gamma, X-rays and accelerate electrons) or non-ionizing (ultraviolet, infrared, and radio waves such as radar, TV, FM and AM radios).

What is irradiation?

It is a process in which a substance is exposed to radiation of various frequencies. The exposure can emanate from various sources, including natural sources. However, the term irradiation usually refers to ionizing radiation (capable of producing ions).

Ionizing energy can be produced from 2 major sources. These are:

- Radioisotopes (such as Cobalt-60 and Caesium-137 which emit gamma rays)
- Electrical machines (such as electron linear accelerators and X-ray machines)

Radioisotopes continuously emit gamma rays or photon (particle) in a 360 ° arc. Linear accelerators produce unidirectional beams of charged particles or electron beams. X-ray machines produce a focused beam of photons.

Gamma rays have very high intensity to penetrate dense objects than electron beams.

What is gamma irradiation?

It is a process whereby a substance is exposed to ionizing gamma rays in a highly controlled manner for a specific purpose. Cobalt-60 is the primary source of ionizing energy used in gamma radiation processing facilities. It is deliberately produced from a stable and nonradioactive metal, Cobalt -59 which is mined from ore deposits. When Cobalt -59 is bombarded in a reactor, it absorbs one neutron and becomes unstable radioactive Cobalt -60.

As everything in nature converges towards equilibrium and stability, the Cobalt-60 atom emits an electron and a gamma ray and with time decays to a stable, non-radioactive Nickel 60. Cobalt-60 has a half-life of 5.2714 years (1925.2 days). It is placed in specially designed doubly encapsulated stainless steel pencils housed in a specially designed system operating to strict standards and regulations.

Cobalt 60 can be stored safely in a pool of water. The chamber above the pool is surrounded by a thick concrete barrier that prevents gamma rays from escaping when the gamma source is elevated into the irradiation chamber. Product intended for irradiation is packaged, palletized (or placed in Tote boxes), and transported into the irradiation chamber using a conveyor. Gamma irradiation is classified as a 'Cold Pasteurization Process', since the temperature of the processed product does not increase. It does not leave residues in the irradiated products.

The Ghana Atomic Energy Commission (GAEC) has been operating a Gamma Irradiation Facility (GIF) (Cobalt-60 irradiator) since 1994. The irradiator which is housed at the Radiation Technology Centre of the Biotechnology and Nuclear Agriculture Research Institute (BNARI) was acquired through an International Atomic Energy Agency (IAEA) technical assistance project. In 2010, funds were secured from the then Export Development and Agricultural Investment Fund (EDAIF) (now EXIM bank) for upgrading the GIF to improve operational efficiency and allow full scale commercial operation.

Some peaceful applications of gamma irradiation

Gamma irradiation can be applied in the following major areas (Fig. 1):

- Food irradiation
- Decontamination of spices, herbal products and sludge (waste)
- Modification of polymers (both synthetic and natural polymers)
- Coloration of gems
- Tissue banking
- Sterilization of medical/ pharmaceutical items
- Sterilize insect technology (SIT)
- Mutation breeding

Each of the above areas of application of gamma irradiation will be dealt with in the subsequent editions.

Figure 1: Some applications of gamma irradiation

Source: http://www.symecengineers.com/uses-of-gamma-irridiation.html

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Basic Dental Care

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Basic Dental care involves brushing your teeth twice daily, cleaning your tongue twice daily and flossing once daily.

Also seeing a dentist for regular checkup and cleaning.

Brushing: use fluoride tooth paste and a soft –bristled toothbrush that fits your mouth comfortably. Don't rush, take time and do a thorough job.

Tongue Cleaning: you may brush twice a day and even sneak in an extra tooth brushing after lunch, but until you learn how to clean your tongue you may not be able to get rid of lingering bad breath (Halitosis).

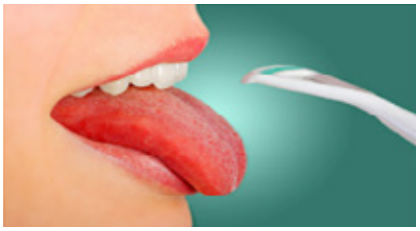
Use a tongue scraper for a more thorough cleaning. This tool gently peels the thin mucus – based layer of debris from the tongue.

Why you should use a tongue scraper;

- It is the best tool for cleaning the tongue; your tongue is a rough surface with many tiny crevices, and regular toothbrush bristles may not do a thorough cleaning job.
- You maintain a fresh breath all the time
- Your sense of taste in heightened

How to perform tongue cleaning

Using a small dab of tooth paste on the tongue, scrap by reaching to the back of the tongue, and then work forward towards the opening of the mouth.

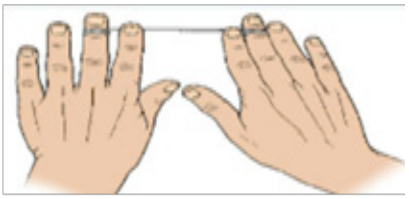


NB: *if your tongue feels sore or begins to bleed you are using the tongue scraper with too much force. Work slowly and with light pressure.*

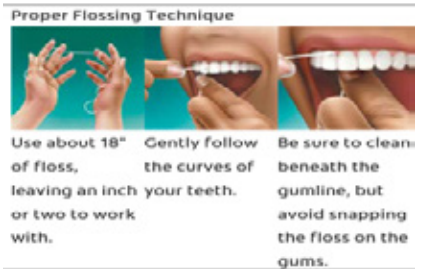
Concentrate on the center of the tongue where bulk of odor –causing bacteria lies.

Flossing

- Flossing; you can't reach the tight spaces between your teeth and under the gum line with a toothbrush; that's why daily flossing is important:
- How to floss:
  1. Break off about 18 inches (46cm) of dental floss, and wind it around your two middle fingers as shown below.



  2. Guide the floss gently between your teeth using a rubbing motion. When the floss reaches your gum line, curve it against one tooth.
  3. Take it one tooth at a time; use a rubbing up and down motion. Do this for all teeth.



Farmers' Perceptions of Climate Change – A Case Study in Sabegu in the Tolon District of Northern Region of Ghana

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Abstract

Forty-one pepper farmers in Sabegu in the Tolon District were purposively selected to assess their perceptions on climate change. Through interviews using semi-structured questionnaires, data were gathered from the farmers. Statistical Package for the Social Sciences (SPSS) was used to analyze the data and the results were interpreted in simple descriptive statistics. Results of the study show that 34.1 % of the farmers understand climate change as the change in temperature, 22.1 % said it is the change in the amount of precipitation, 17.1 % explained it to be the change in the precipitation pattern while 26.8 % indicated that it is the changes in both temperature and precipitation pattern.

Key words: Perceptions, farmers, Climate change, causes, Sabegu, Ghana

1. Introduction

Climate change is the average increase in global temperature. It has become a huge trend and will lead to significant global changes in the future (Deutsch et al., 2008). Climate change is believed to be the greatest impediment to the realization of the first Sustainable Development Goal of removing poverty and food insecurity globally, via increased agricultural production in developing countries (Amikuzuno and Donkoh, 2012). Generally, people base their perceptions of climate change on their personal experiences, knowledge and character (Lorenzoni and Pigdeon, 2006). The agricultural sector is inherently sensitive to climatic variations and globally it is the most vulnerable sector to the impacts and risks associated with climate change (IPCC, 2007). As pepper cultivation in Sabegu is mainly rain-fed with low external inputs, it is worth assessing the understanding of farmers on climate change and its causes.

Research Question

The research question that this study sought to answer was:

- What are the perceptions of pepper farmers in Sabegu in the Tolon District of Northern Region of Ghana on climate change?

2. Materials and Methods

General Description of the Study Area

Location and Population Size

The research was conducted at Sabegu in the Tolon District (Figure 1) of the Northern Region of Ghana. Sabegu consists of 42 households with a population of about 1150 people. The District lies between latitudes 90 15` and 100 02` north and longitudes 00 53`and10 25` west. It shares boundaries to the north with Kumbungu District, North Gonja District to the West, Central Gonja District to the south, and Sagnarigu District to the east (Tolon District Assembly, 2015).

Figure 1: District map of Tolon (Source: GSS, 2010)

Sample Size and Technique of data collection

Forty-one (41) farmers were purposively selected as representative of the total number of pepper farmers in Sabegu for interviews. The interviews were conducted through the administration of semi-structured questionnaires.

Source and Type of Data

Both primary and secondary data were collected for the study. The primary data were gathered from the farmers through the use of semi-structured questionnaires, and this included information on impact of climate change on pepper production and adaptation strategies used to overcome the impact. The farmers interviewed were all small-scale, rainfall-dependent pepper farmers. Secondary data was collected from sources such as journals and the internet.

3. Research Findings

3.1 Perception of Farmers on Climate Change and its Causes in Sabegu

Perception of Farmers on Climate Change

Results of the study indicate that all the farmers had some knowledge on climate change. 34.1 % of the farmers understood climate change as the change in temperature, 22.1 % said it is the change in the amount of precipitation, 17.1 % explained it to be the change in the precipitation pattern while 26.8 % indicated that is the combination of both changes in temperature and precipitation pattern (Figure 4).

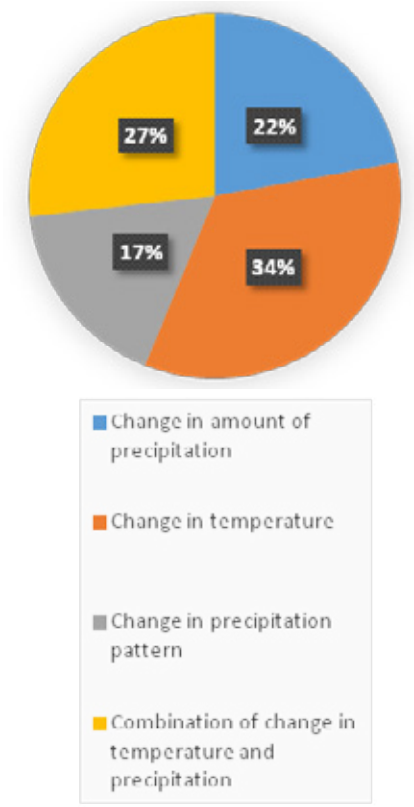

Figure 4. Perceptions of farmers on climate change in Sabegu

Perception of Farmers on the Causes of Climate Change in Sabegu

From the study, 56.1 % farmers attributed the causes of climate change to bush burning, 39 % to deforestation and 4.9 % to natural causes ('acts of God').

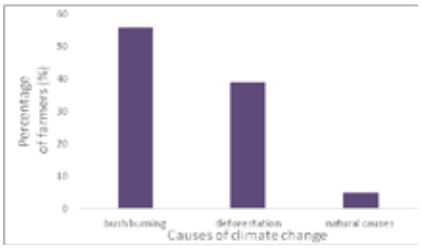

Figure 5. Perception of farmers on the causes of climate change in Sabegu

Perception of Farmers on Signs of Climate Change in Sabegu

Drought was mentioned by 58.5 % of the farmers to be the main indicator of climate change, while 31.7 % and 9.8 % of farmers respectively said heat stress and flooding were the signs depicting the occurrence of climate change (Table 2).

Table 2: Farmers perceptions on signs of climate change in Sabegu

Signs of climate change	Frequency	Percentage (%)
Drought	24	58.5
Heat stress	13	31.7
Flooding	4	9.8
TOTAL	**41**	**100**

4. Conclusion and Recommendation

4.1 Conclusion

Results of the research also indicated that the farmers have knowledge about the concept of climate change. In as much as they are aware of climate only 34.1 % have adopted strategies to deal with the impact of climate change while 65.1% have not adopted strategies. Farmer's inability to adopt adaptation strategies is partly due to their very low educational status (as 93 % farmers have no formal educational) and also due to resource unavailability. 34.1 % of farmers perceive the causes of climate change to be the change in temperature, 22.1 % farmers as change in precipitation and 17.1 % farmers as change in precipitation patterns. Farmers confirmed that climate change has adverse effect on crop yield and quality.

4.2 Recommendation

Based on the findings of this research, it is recommended that farmers should be sensitised by the Government, Ministries of Food and Agriculture, Environment, Forestry, etc. on the impact of deforestation and bush burning in order to solve the problem of climate change.

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Climate Change: Causes, Effects and the Way Forward

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Gradually but steadily, this world is gaining notoriety for being vulnerable to climate changes. Hardly a day passes without news item on the eruption of bush fires, floods, earth quakes, hurricanes, landslides and tsunamis wreaking havoc on lives and property, running into billions of dollars. Educational campaigns and uncountable appeals to the public to desist from acts that have the potential of sparking off this inferno seem to fall on death ears. It is therefore out of a sense of frustration and helplessness that I wish to add my voice to this crucial issue.

To begin with, climate change is mostly caused by bush fires. Bushfires are mostly caused by farmers who set fire to the grass on their land, in preparation for the cultivation of their crops. This is a very easy and therefore attractive way of preparing the land for cultivation. This outmoded agricultural practice is still pervasive amongst large sections of our farming communities. When they set such fires, they most often find it impossible to keep them under control. The fire consequently extends beyond their farms and fiercely spreads over several square kilometers, with incredible rapidity, destroying everything in its path. Related to the factor above is the smoke that comes from the fire. The smoke contains all sorts of greenhouse gases which are destructive to the ozone layer causing greenhouse effects. To add insults to injuries, the harmattan wind reinvigorates the fire and lays the large extent of forest bare. This leads to serious climate change.

Another contributory factor to the prevalence of climate change is the activities of those who go in search of game like guinea pigs. They set fire indiscriminately to the bush to get the animals out of their underground hideouts. While these prey run helter-skelter in a frightened mood, they are caught up in the raging fire. They are therefore burnt alive. Those unscrupulous fire setters do so without any regard for the environmental consequences and the destruction fire is bound to visit on both life and property, which the victims take a whole life-time to acquire.

Palm wine tappers also share the blame of the scourge of bush fires. They also fail to effectively quench the fire they make in boiling their palm wine. The strong harmattan wind has the capacity of carrying bits of the fire onto the nearby surrounding dry bush. When the dry bush catches fire, it spreads ferociously and implacably.

Another source of bush fire is those who carelessly throw away pieces of cigarettes they smoke. Some of them

fail to adequately quench the leftovers. Once they get into contact with the dry grass, within a twinkle of an eye, bush fire havoc is set into motion.

Slum settlers must also be held accountable for this sordid state of affairs. More often than not, they block the passage of running water making the whole place susceptible to flood. Millions of monies run into curbing the situation.

Illegal miners cannot also escape blame for being behind the prevalence of bad climate change. These people dig anyhow into the soil in search of minerals without any scientific approach. This eventually leads to landslide. Again, the smoke from the mining sites equally leads to air pollution and hence add value to greenhouse effects. Their activities most importantly cause water borne diseases.

The devastating effects of climate change are prodigious. It destroys the fertility of the soil over a long period of time. It ravages large tracts of forest along with its flora and fauna. It destroys the habitats of several animals. Many species of plants and animals face extinction as a result of persistent bush fires and greenhouse effects. It really disturbs the ecological order and balance. Life and property are always destroyed.

Whole villages and farms found in the way of advancing fires are razed to the ground. It therefore gives rise to grief and food scarcity. The smoke that emits out of the bush fire constitutes environmental hazards. It worsens the greenhouse effects. Governments and Non-governmental organizations spend lots of money to provide relief and rehabilitation for the victims of this misfortune. In other words, properties running into billions of cedis go up in smoke annually. This phenomenon irrefutably represents a serious setback to our efforts at socio-economic growth and development.

Since bush fires virtually erode both individual and collaborative efforts made over the years by the people and government, no stone should remain unturned in our drive to curb this menace. Farmers should prepare food at home and take it to the farm. Under no circumstances or no account should farmers make fire on their farms. Firefighting volunteer groups should be set up in almost every village. Existing ones should be reactivated and properly trained. They should be provided with firefighting gadgets. Smokers must be sanctioned if found. Proper settlements must also be considered to prevent flooding.

It is my fervent hope that these suggestions would be adhered to, so that climate change would no longer be obstructive and destructive to our developmental efforts.

How Mobile Communication Works II - The General System for Mobile Communication

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Introduction

In an earlier article, the elements common to a mobile communication system were explained. The method by which the elements were related to implement the first mobile communication system will now be considered. Mobile communication was first implemented commercially in Finland in 1992 by a company called Radiolinja (pronounced ra-dio-lin-ya). At that time almost all mobile phones in use were from that country called Nokia phones. **Fig. 1 shows some of the mobile phones that were first in use.**

Fig. 1. The figure shows images of the some the early mobile phone models. These modelsof mobiles phones were very hard to be stolen and cameras were bought separately from phones

The GSM architecture

The technique by which mobile communication systems worked is called the Global System for Mobile Communication (GSM) system. Fig. 2 illustrates the architecture of the GSM system.

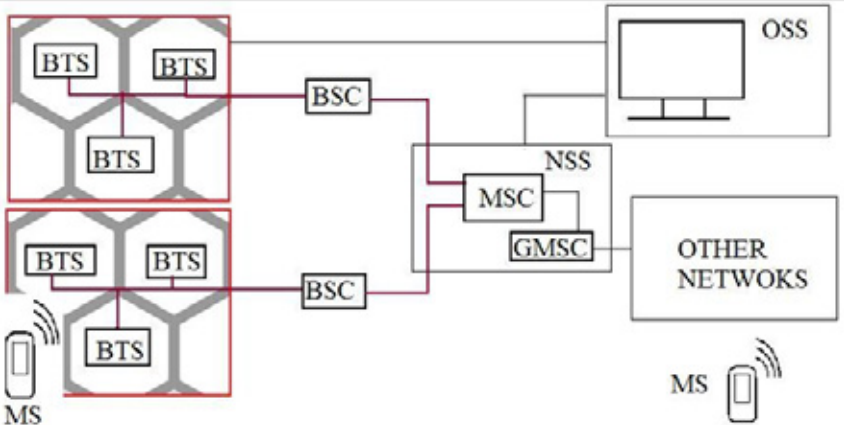

Fig. 2. The schematic shows a simplified configuration of the GSM architecture.

The system consisted of Base Transceiver Stations (BTS) and Mobile Stations (MS). BTS refers to transceivers mounted in high masts. In daily life, we recognize these masts as the so-called "communication poles". They are similar to the national electricity grid ("high tension poles") masts with discs mounted on them. Fig. 3 shows images of communication masts. The transceivers need to be held high above trees and hills to minimize obstruction (interference) to the communication signals they transmit.

Fig. 3. (left) In the urban centres transceivers are mounted on masts high on top of buildings. (Right) In other places the mast are built to be high above trees or electricity grid

A Mobile Station is a mobile phone or in current systems, those devices that can send and receive data wirelessly. In the GSM system only mobile phones could be used to make or receive calls. Also, in those days (second generation, 2G, technology) phones could only make voice calls and exchange short messages (SMS) text. In a cellular system, geographical space is divided into hexagons with a Base Transceivers Station

(BTS) at the centre of each hexagon. The signal transmitted by each BTS is strong within its region. If a user MS goes outside the hexagonal region of one BTS, the signal available from this BTS falls below a set or acceptable limit and the system hands the MS over to the BTS in charge of the new location. However, if there is no BTS nearby, a caller often hears a familiar error message that the target MS is "either switched off or out of coverage area". In Ghana, it is not clear if this message is always true. The mobile communication network contains other elements between the BTS and the MS that function to effect a call. For example, signal handover, as explained, is not done by the BTS or MS. All BTSs in a locality are connected to a Base Station Controller (BSC). (See Fig. 1). The BSC, among other things, does signal handovers, tracks the movement of all the MSs in its locality and routes incoming calls to them via the right BTS. The MS contains a Subscriber Identity Module (SIM) card which contains information about the user such as user's mother network company, user's number, phone credit etc. BSCs are in turn connected to a Mobile Station Controller (MSC). The MSC switches, maintains, terminates calls to MSs within its area. When calls are made between different networks, the MSC passes them to the Gateway MSC (GMSC) who does inter-network switching. The GMSC also routes calls between MSC in the same network.

From the network owner's perspective, the system is divided into the Base Station Subsystem (BSS), the network and switching subsystem (NSS) and both are connected to, monitored and maintained by the Operation Subsystem, OSS.

It is worth knowing that mobile communication systems have moved from first to fourth generation i.e. from 1G to 4G now although 3G is still common. GSM may be out of use but the concept is relevant to understanding mobile communication and some of the equipment have survived to the present technologies.

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Perspective About Marine Debris and Marine Education in Ghana

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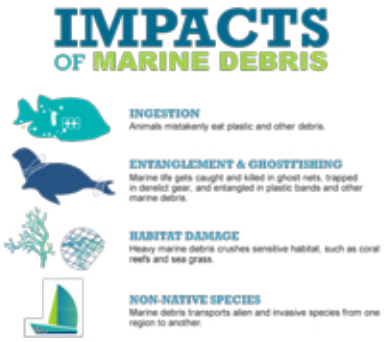
Ghana lies between longitudes 3° 15' W and 1° 12' E, and latitude 4° 44'and 11° 15' N. The country is located in West Africa. Ghana is bordered on the East by the Republic of Togo, the West by Cote d'Ivoire, the North by Burkina Faso and the South by the Gulf of Guinea. Ghana is richly endowed with diverse natural resources. The marine and coastal resources (e.g., lagoons, marshes, estuary, mangroves etc) of Ghana are utilized (fishery, industry, tourism, aesthetic, historical, cultural and educational) to meet the growing demands of the population. Increasing human activities such as urbanization, infrastructure development, industrialization and transportation exert pressure and steadily degrade the components of these fragile ecosystems.

Marine debris ("beach litter") is created by either intentional or unintentional activities through the discharge of plastics in a lake, sea, ocean or waterway. Floating oceanic debris mostly accumulates at the center of gyres (e.g., North Pacific gyre, contain the highest plastic debris, millions per square meter), and coastal shoreline, frequently washing aground. Marine plastic ("marine litter") pollution is a major problem in Ghana and worldwide. Use of plastics in Ghana is growing and inadequate waste management facilities results in more plastics entering the environment. Plastic enters the ocean via run-off, rivers and streams. Other sources included recreational beach users, people who drop litter on sidewalks and streets, plastics manufacturers and transporters, illegal dumping, and areas with inadequate trash receptacles. Plastics are generally non-biodegradable and have long lifespans (Fig.1a and b.). Plastic pollution in the ocean is a threat to both marine life (via ingestion, suffocation entanglement) and human health (e.g. they can accumulate persistent organic pollutants and facilitate their transfer up the food web).

Fig.1a-b Life cycle of marine debris ***(Source: https://www.pinterest.com/pin/140878294574866296/)***

Impacts of plastics



***(Source:** https://marinedebrisblog.files.wordpress.com/2015/09/mb0511151_marine-debri-poster_v11.png)*

What you cando

(Source: http://www.ascobans.org/sites/default/files/Marine%20Debris_E.jpg)

Improved waste management and environmental education are key steps to preventing plastic and other types of litter from entering the ocean. It is the responsibility of all stakeholders (e.g., government, scientific researchers, non-governmental agencies, industry and the public) to get involved to address marine pollution in Ghana. The time to act is now. We must work together to protect marine life and sustainable marine resources.

To be part of the solution, Smart Youth Volunteers Foundation is involved in four major activities:

- Marine Education; schools and public outreach, seminars and radio presentation – a key to an informed society for marine environmental protection.
- Advocacy; influence change of behavior to address the plastic pollution problem.

- Beach and river clean-up campaigns; a hands-on experience to stop pollution before it reaches the ocean.
- Plastic pellets collection; collecting plastic pellets in Ghana coastal areas/ beaches as part of international pellet watch, a global program. This connects local efforts in Ghana with a worldwide effort which includes monitoring of persistent organic pollutants.

We advocate for adoption of 6 Rs (Reduce, Reuse, Recycle, Responsibility Remember and Rethink):

- **REDUCE** plastic usage.
- **REUSE** plastics products.
- **RECYCLE** plastics product.
- **RESPONSIBILITY**-Act responsibly to protect the environment.
- **REMEMBER** to dispose properly your waste.
- **RETHINK** of your actions to make them less damaging to the environment.

Expected outcome:

- Increase advocacy on marine science and change in behavior patterns.
- Active engagement of young people as stewards for marine environmental protection.
- Embrace culture of sustainable lifestyle; buy less, consume less and recycle.
- Strengthen participation of all stakeholders for sustainable management of the marine resources.

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Estuarine Environment

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What is an estuary?

An estuary is defined by Pritchard (1967) asa semi-enclosed coastal waterbody, which has a free connectionwith the open sea, and within which saltwater is measurably diluted with freshwater derived from rivers. It is often surrounded by wetlands and forms an unique brackish water ecosystem (Fig.1a-b).

Thus estuaries are coastal aquatic habitats with fluctuating salinity due to changes in freshwater inflow and sea water oceanographic modification (e.g., tides, storms, wind rainfall) in space and time. The freshwater inflow regime (quantity, strength, and timing) contributes to unique mosaic (spatial and temporal) heterogeneous environment.

Fig.1a Amisa Estuary, Ghana

Fig. 1b Junge Estuary Ghana

Why are estuaries important?

Estuaries provide unique habitats for a great diversity of brackish and marine life. They serve as nurseries of the sea, feeding grounds, nesting areas, breeding grounds and rest areas for migrating and local shore birds, invertebrates, fish and marine mammals, because of the protected environment and abundant food supply.

Estuaries are important for the health of the oceans. Pollutants including nutrients in the sediment and water can be removed by the estuaries, neighboring wetlands and salt marshes before the sediment is deposited into the sea. Estuaries can also act as a buffer zone between the ocean and the land. They can minimize effects of flooding and storm surges and thus protect the shore, humans and buildings.

The economic values of estuaries include coastal and recreational fishing, aesthetics, touristic, educational and research usage. Estuaries are of cultural and historical significance. All over the world, people have always lived near estuaries, using them for food supply and transportation routes. Thus, estuaries have become part of our history and our heritage. They will be a part of our future, when sustainable managed and preserved for their ecological integrity.

The complex, dynamic estuarine environment results in the most productive habitats on Earth, supporting diverse species assemblages. Any anthropogenic alteration of the freshwater regime via domestic waste (e.g., fertilizers, insectides, chemical discharge from industry, nutrient load, organic matter), and/or habitat degradation due to development, deforestation of watershed and wetlands for firewood may alter the estuarine species composition, structure and ecological function.

How can we monitor estuarine conditions?

To monitor estuarine conditions, indicators of the ecosystem must be assessed. Indicators (physical, chemical and biological) can reveal the status of local environmental conditions of the aquatic ecosystem.

Water quality

The physical (e.g., temperature, water turbidity) and chemical (e.g., dissolved oxygen, nutrient concentration) properties of estuarine water are useful indicators of the present environmental conditions. Human activities (e.g., discharge of untreated sewage, and chemicals, fertilizer usage in agriculture, plastic pollution, and refuse damping) affect the function and structure of estuaries. They result in ecological and aesthetic problems such as anoxia, turbidity, eutrophication, bacterial pollution, etc. These problems indirectly affect human users of the estuarine ecosystem.

Sediment quality

The estuarine sediment maybe contaminated by chemicals, which can affect benthic organism inhabiting the sediment. Sediment cores and biostratigraphy are archives of past ecosystem responses to natural and human stressors.

Biological indicators

The presence of a specific organisms or ecological communities associated with particular environmental requirements (e.g., temperature, nutrients, salinity regime, habitat structure, sediment texture, etc.) in given space andtime is reflecting if the respective ecological niche was available. The desired environmental conditions define a specific ecological community in a given ecosystem.

Types of biological indicators:

A single – species (Population-level indicators)

Abundance or life history traits (recruitment, growth, mortality) of widely distributed, abundant species or perhaps less abundant, environmentally sensitive species, maybe ideal organisms to indicate the health and environmental conditionsof an ecosystem.

A particular knowledge of ecological environmental requests (chemical, physical and habitat) of a specific species must be known to define its potential indicator value. Thereafter, specific-indicator species may give a clue of the condition and thus health of the ecosystem.

Community indicators

Community analysis may be indicative of environmental change caused by single or multiple stressors and predictive of consequence at ecosystem level. Thus water quality may be evaluated though community structure analysis. Changes in water quality may affect the health of the ecosystem.

Why is there a need for multiple indicators to evaluate estuary ecosystems?

The application of multiple indicators helps to

- determine the holistic status (e.g., health and integrity)of estuarine ecological conditions
- assess the driving ecological factors influencing species composition (presence/absence and abundance) in relation to water and sediment quality.

Conclusion

Estuaries are partially enclosed environments along coasts, where fresh and salt water mix to brackish water. The presence or absence of estuarine organisms (biota) is indicating the estuarine environmental condition i.e. the estuarine water and sediment quality. Coastal waters and wetlands of Ghana are increasingly affected by human activities, especially by solid and sewage waste pollution. Waste management is still a huge problem, solely in the urban centers (i.e. Accra and Kumasi) over 4,000 tons of solid waste is generated daily. The capacity of waste management departments has been greatly overwhelmed by the ever-increasing amounts of waste, which is transported by rivers into estuaries. Thus, there is an urgent need to assessment the ecological health of these important ecosystems. Parallel, the sustainable management also requires to inform the public at large on the estuarine environments significance and environmental services to human.

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Learning: What is Your style?

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It has been argued that knowledge of learning styles can be useful to both teachers and students, in that teachers can adapt their methods to suit the learning styles of students and students with knowledge of their learning styles could be empowered to identify and use the techniques of learning best suited to their individual styles.

What is a learning style?

Learning style has been defined as one's habitual and distinct mode of acquiring knowledge, skills and attitudes. It gives a student an idea of how they learn. Certain learning style characteristics are biological, whereas others are developed through experience.

Evidential data available suggests that no learning style is better or worse than another. Most students can master the same content; how they master it is determined by their individual styles. In addition to wide variations in learning styles among students, a study of pre- tertiary students also identified environmental, emotional, sociological, physiological and psychological factors that could influence learning outcomes of any learning style employed by a student. This suggests a possible interaction between learning styles and other variables in determining the outcome of the learning process.

Several instruments for measuring learning styles have been identified, one of which is the Felder-Soloman Learning Style Inventory. This measures students learning styles according to

- how they perceive stimulation (either by Sensing or Intuition),
- input information (either Visually or Verbally),
- process information (either by being Active or Reflective) and
- how they attempt to understand (i.e. Sequential versus Global learning).

The Felder-Soloman Learning Style Inventory

Sensing versus intuitive learners

Sensing learners tend to like learning facts, as opposed to intuitive learners who often prefer discovering possibilities and relationships. Sensors often learn to solve problems by using well- established methods and dislike complications and surprises whereas intuitors like innovation and dislike repetition. Sensors are more likely than intuitors to resent being tested on material that has not been explicitly covered in class.

Visual versus verbal learner

Visual learners remember best what they see-- pictures, diagrams, flow charts, time lines, films, and demonstrations. Verbal learners get more out of words-- written and spoken explanations. Everyone learns more when information is presented both visually and verbally. Good learners are capable of processing information presented either visually or verbally

Active versus Reflective Learners

Active learners tend to retain and understand information best by doing something active with it--discussing or applying it or explaining it to others. Reflective learners prefer to think about it quietly first. "Let's try it out and see how it works" is an active learner's phrase; "Let's think it through first" is the reflective learner's response.

Sequential versus Global learners

Sequential learners tend to follow logical stepwise paths in finding solutions; global learners may be able to solve complex problems quickly or put things together in novel ways once they have grasped the big picture, but they may have difficulty explaining how they did it. Sequential learners may not fully understand the material but they can nevertheless do something with it (like solve the homework problems or pass the test) since the pieces they have absorbed are logically connected.

Conclusion

In my experience, knowing one's self could be the most important thing as self-knowledge holds the key to productivity and success. So know your style as a learner!

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Sweetpotato in My Cupcake?

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Imagine you had sweetpotato in your cake, doughnut, pancake and other pastry products you enjoy… Well this is the reason I am writing this article. To expose you to the possibilities far beyond what you could perceive concerning Sweetpotatoes.

Sweetpotato can be obtained in various varieties; the orange-fleshed, white fleshed, yellow fleshed and purple fleshed. I am guessing you have only come across the white?

Sweet potatoes are a great source of B6 vitamins and potassium, which are good for maintaining heart health. They also have a low glycaemic index (they have a low ability to increase blood sugar levels when eaten) and this is important in controlling blood sugar and maintaining energy. The high levels of manganese in Sweetpotatoes also contribute to blood sugar regulation, can stabilize your appetite and help the body metabolize antioxidants.

Magnesium also helps in de-stressing the body. Sweetpotato is packed with antioxidants, which have immunity, and ant-inflammatory properties, which help to prevent inflammatory disorders, which could lead to chronic pain, redness, swelling, stiffness, and damage to normal tissues in different body parts. The presence of beta-carotene, an inactive form of vitamin A, gives sweet potatoes an added benefit of improving hair and skin and preventing deficiency diseases such as night blindness and xerophthalmia. Gut health is maintained when sweetpotato is consumed due to the presence of high levels of dietary fiber.

However, orange-fleshed sweetpotato is the one of interest here because it contains a higher amount of beta carotene, a precursor of vitamin A and will add to the nutritional value and sensory characteristics of the product it is incorporated in.

How is orange-fleshed sweetpotato added to cake, pancake, doughnut and other pastry products? The sweetpotato is processed into either flour or puree and then added in proportion to the product's recipe.

The puree form of orange-fleshed sweetpotato can be used easily and consumers (consumer acceptance test) have accepted food products made from the puree.

The orange-fleshed sweetpotato puree as said earlier can be made very easily. You just need to wash your roots well, boil or bake (wrapped in aluminum foil) and then mash or puree. It can be added as is directly or stored in a freezer for later use.

Puree Made from Orange Fleshed Sweetpotato

Below is a recipe for cupcakes made from sweetpotato.

Ingredients

- 1 cup all-purpose flour
- 1/2 teaspoon nutmeg
- 1/2 teaspoon baking powder
- 1/2 teaspoon baking soda
- Iodized salt
- 1 stick butter, softened/ margarine
- 1/2 cup sugar
- 1/2 cup sweetpotato puree
- 1 1/2 teaspoons pure vanilla essence
- 2 large eggs

Method

In a medium bowl, whisk together the flour, nutmeg, baking powder, baking soda and 1/4 teaspoon salt. Set aside.

In a large bowl, add the butter and the sugar. Beat with a hand-held mixer until light and fluffy, 3 to 4 minutes. Add the orange-fleshed sweetpotato puree and the vanilla essence. Slowly beat in the eggs, one at a time. Incorporate the dry mixture into the wet mixtures together until thoroughly combined.

Using an ice cream scoop, fill each cupcake liner 3/4 of the way full. Bake about 20 minutes, until the tops turn golden brown and a toothpick inserted in the center of the cupcake comes out clean. Remove the cupcakes from the oven to a wire rack and cool completely.

Enjoy!!!

So you see, your favorite pastry can be enjoyed with sweetpotato with all its added benefits; health-wise and taste-wise.

Self-Medication: Good or Bad?

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Introduction.

Self-medication is the use of medicine in the treatment of a disease, disorder or recurrent disease or symptoms by an individual or on the advice of someone without consulting a doctor (Bennadi, 2013). Self-medication is on the rise and its practice has been increasingly recognized throughout the world (Goud et al., 2014). However, it occurs mostly in economically deprived communities (Shankar et al., 2002).

People practice self-medication based on several reasons and these include; financial and time constraints, inadequate health facilities and extensive advertisement of drugs (Bennadi, 2013). In Ghana, the practice is not uncommon (Donkor et al., 2012), as one will usually find hawkers selling drugs on the streets of the major cities within the country, especially in Accra and Kumasi.

In a study, conducted by Shankar et al. (2013) in west Nepal, 25% of the respondents believed that they had a minor disease which did not require the attention of a physician. Nineteen percent of the respondents also thought that, they had been treated of a similar disease and if they go to see a doctor, they will be given a similar prescription (Shankar et al., 2013).

Responsible self-medication (self-medication approved by health authorities) comes with some benefits and these include;

- Reducing the wastage of the inadequate health resources on minor conditions
- Lowering the costs of community funded health care programs
- Increase in productivity since absenteeism from work as a result of minor symptoms will be avoided
- The pressure on the scanty health care professionals and their services will be reduced
- The people in the deprived communities will get their fair share of health care

Self-medication has led to the increased microbial resistance to common antibiotics on the Ghanaian market, as well as serious health complications due to adverse reactions to medicines (Bennadi, 2013). The aforementioned is of global concern especially in developing nations where antibiotics are easily accessible and often abused (Bennadi, 2013). Interestingly, in the case of adverse side effects of a drug, one would still have to seek proper medical intervention, resulting in an increase in health expenses, which is exactly what they were avoiding at first (Awad et al., 2005).

Furthermore, a study conducted in Sudan revealed that the prevalence of self-medication with antibiotics within the population was 73%. Another study in India also showed a prevalence of 73% (Bennadi, 2013). These figures are a cause for alarm and must not be over-looked (Awad, 2005). All these indicate the alarming rate of self-medication in the world.

Conclusion

Self-medication is a disturbing concept. In Ghana, where a poor economic status is clearly evident, coupled with inadequate health care facilities especially in deprived communities, people are not well informed on the dangers associated with the practice of self-medication. We are in a dilemma whether to accept and encourage the practice of self-medication or not. Due to the dicey nature of the concept, an all-inclusive approach must be taken to ensure the safe practice of the concept. This can be achieved through sensitization and education regarding self-medication and ensuring strict measures for drug advertisement. The mode of dispensing drugs at the various facilities and outlets must be done with strict supervision and qualified professionals must execute these services to make health care easily accessible and safe.

An improvement in education and understanding about the practice of self-medication may result in rationale use, thereby limiting the various complications of self -medication (Bennadi, 2013).

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Kelewele in the belly, peels on the floor

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