

PESTICIDE POISONING MONITORING OF CLIENTS AT KEDI HEALTH CARE CENTER IN NAVRONGO

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Abstract

Fruits and vegetables are highly nutritious and form a key food commodity in the human consumption. They are highly perishable due to their low shelf life. These food commodities are reported to be contaminated with toxic and health hazardous chemicals like calcium carbide, ethephon and oxytocin which are used for artificial ripening of fruits and for increasing the size of fruits and vegetables respectively. The indiscriminate use of chemicals has led to pesticide residues in humans due to crop contamination with natural occurring toxic substances and heavy metallic substances. Out of a sample of 70, 63% were males and 37% were females. The low number of females was due to financial constraints. Sixty seven percent of those who were interviewed were single, widowed or divorced. This indicates that those who were single took independent decisions as far as health care was concern. Ninety percent of the respondents had ever been to school and 81% could read so illiteracy was not the cause of pesticide poisoning. Forty nine percent of the respondents had no income and 99% eats vegetables. Of those who eat vegetables 57% occasionally eat vegetables while 43% eat vegetables frequently. Analysis indicated that, 54% of respondents obtained vegetables from their farms and 36% from the market. The 10% obtained vegetables from friends or relatives. Sixty eight percent female and 58% men had abnormal concentration of pesticides in their blood because the female eat a lot more vegetables than males. There was no much difference between the married (58%) and single (60%) in the concentration of pesticide in their blood and indicated that pesticide poisoning does not depend on ones marital status. Concentration of pesticide in the blood is a cumulative effect resulting from the consumption of other vegetables, fruits and grains which have been treated during production and storage. Vegetables and other food stuff should be properly cleaned before use. Those who use vegetables without washing had more abnormalities (67%) in their blood than those who washed (59%).

Keywords: Abnormal, Concentration, Pesticide, Cumulative, Organophosphate, Organochloride

1. Introduction

Fruits and vegetables are highly nutritious and form a key food commodity in the human consumption. They are highly perishable due to their low shelf life. These food commodities are reported to be contaminated with toxic and health hazardous chemicals like calcium carbide, ethephon and oxytocin which are used for artificial ripening of fruits and for increasing the size of fruits and vegetables respectively. Calcium carbide is carcinogenic and had been banned under PFA rules, 1954. Ethephon is a pesticide and has not being recommended as a ripening enhancer. Oxytocin is a mammalian hormone and used as a drug in veterinary services but may be used for quick ripening of fresh fruits and vegetables. The indiscriminate use of chemicals has led to pesticide residues in humans due to crop contamination with natural occurring toxic substances and heavy metallic substances. Pesticides are used in management of pests and diseases in agricultural and horticultural crops. It is established that pesticides could become a nuisance if they are misused.

Some of the negative effects of pesticides misuse include low crop yield, extinction of soil micro-fauna and flora and undesirable residue accumulation in food crops (Edwards, 1986). Pesticides can leave adverse effects on the nervous system. Other effects are cancer, liver, kidney and lung damage, loss of weight and appetite, irritation, insomnia, human metabolic disorder, Learning problems, behavioral disorder and dermatological problems. Pesticide residues are potentially harmful to non-targeted organisms than pests and diseases and the major concern being the interfering with the reproductive systems and foetal development as well as asthma (Gilden et. al, 2010). The pesticide residue found in fruits and vegetables may include residues of both banned and restricted pesticides.

A high intake of fruits and vegetables is necessary to prevent vitamin deficiency, reduce cancer; cardio vascular disease and obesity. Fruits and vegetables are attacked by pests and diseases unlike in other crops during production and storage leading to damages that reduces the quality and the yield.

Pesticides may be absorbed by the plant surface and enter the plant transport system or stay on the surface of the plant. Pesticides are known to increase agricultural production tremendously as these chemicals act on pests that destroy agricultural produce. Pesticide behaviour depends on its stability, physico-chemical properties, the nature of the medium into which it is applied, the organisms present in the soil and the prevailing climatic conditions (Graham-Bryce, 1981). Pesticides are human-made and naturally occurring chemicals that control insects, weeds, fungi and other pests that destroy crops. The product use of pesticides may improve our diet by decreasing the cost of food and increasing the availability, abundance, quality and variety of foods. The presence of pesticide residue in foods especially in vegetables is a growing concern worldwide, notably, among Spanish producers, traders and consumers. In china, large quantities of Organochlorine Pesticides (OCP's) particularly hexachloric dihexane (HCH) and Dichlorodiphenyl-trichloroethane (DDT) were produced and used in agriculture and public health until 1983.

Worldwide there is 44% increase in the use of herbicides over the past decade (KARANTH et. al, 1999). India currently uses about 60 000t of pesticides. It was estimated that from 1951-1984, 10,000 - 20,000 metric tons (MT) of HCH and 16,000 MT of DDT were used in Sichuan, China (Li et. al, 1998, Liu et. al, 2006). A recent survey in Sichuan found that OCPs were detectable in all surface soils (Xing et. al, 2009). It is also suspected that soils could be contaminated with chemicals or with their degradation products (Krishnamurti, 1984). In developed countries such as the European Union, there is a coordinated programme for all the member countries to follow from the European commission and the member states programmes (EFSA, 2010). Pesticide usage in the United States in particular has been registered with the Environmental Protection Agency (EPA).

Okello (2001) has reported that Kenyan farmers implement United Kingdom pesticide standards to be able to market their beans to UK retailers. Most African countries have adopted the CODEX MRLS but are unable to monitor and enforce those (Anonymous 2009). A survey conducted in vegetable growing areas in Ghana identified Lindane, Uden Karate and Dithane as the most used pesticides by vegetable growers and for personal hygiene as scabicide (Brown, 1978, EPA, 2002). Pharmaceutical uses of Lindane has been banned because it causes seizures and damage to the nervous system and also weaken the immune system (PANNA 2007).

To meet the over growing health concerns, the European Union (EU) has set new directives for pesticides at low levels in vegetables. In Africa and particularly in Ghana, regulations and policies are not enforced even if they exist. Intensive pesticide use on vegetable production threatens health from the microbiologic and pesticide dimensions. Even though efforts have been made toward safer cultivation of vegetables in Ghana (Sonon, 2001), standard recommendations to address the pesticide situation in Ghana: better legislation, law enforcement and integrated pest management often do not match the capabilities of farmers and authorities.

1.1 Research Questions

How are fruits and vegetables cleaned before use?

What percentage of patients have abnormal pesticide concentration in their blood?

Which calibre of people suffer greatly from pesticide contamination?

1.2 Objectives

The main objective of the research is to assess pesticide concentration in the people who patronize the Kedi clinic at Navrongo and to give advice on safe vegetable and fruits consumption. The specific objectives are:

To assess how vegetables are washed and consumed,

To determine the proportion of people who have abnormal deposits of pesticides in their blood.

To determine the caliber of people who are affected by pesticide contamination.

1.3 The Study Area and Methodology

The research was conducted in the Kassena-Nankana East District (KNED) (Fig 1) which lies within the Guinea Savannah woodlands. It is one of the nine (9) districts in the Upper East Region of the Republic of Ghana. Navrongo is the capital of Kasena Nankani East District. The district shares boundaries with Burkina Faso to the north, Kassena-Nankana West and Bolgatanga Municipality to the East, Builsa District to the West and West Mamprusi District in the Northern Region to the South. It is the fifty-sixth most populous in Ghana in terms of population, with a population of 27,306 people (GSS 2012). Its population in 2005 was estimated to be 25,470. The terrain is flat and the ecology is typical of the Sahel- arid grassland with occasional shrubbery. Navrongo is an important market town noted for its fruits and vegetables. Navrongo is located between longitude 1°5'25"W and 1.09028°W and also between latitude 10°53'5"N and 10.88472N_

The people of Navrongo are a mixture of Nankani speakers from Zecco in what is now Burkina-Faso, and Kassena speakers from Tielebe (also in Bukina Faso). The Kassena arrived first in the area, whilst the Nankani arrived later after experiencing pressure from Mossi expansion. The two groups, though they differ linguistically, share many cultural traits. The town was founded around 1740. During the 19th century, the town became an important staging post on the Sahel caravan route. The wealth associated with this route encouraged fighting for control between the different ethnic groups of the area. At the beginning of the 20th century the British established a base at Navrongo. The town was "civilised by force of arms", and inter-ethnic conflict declined. Chiefs loyal to the British were installed and "free labour" was used to build roads and government buildings. Locals were also sent to the south of Ghana to mine and build railways.

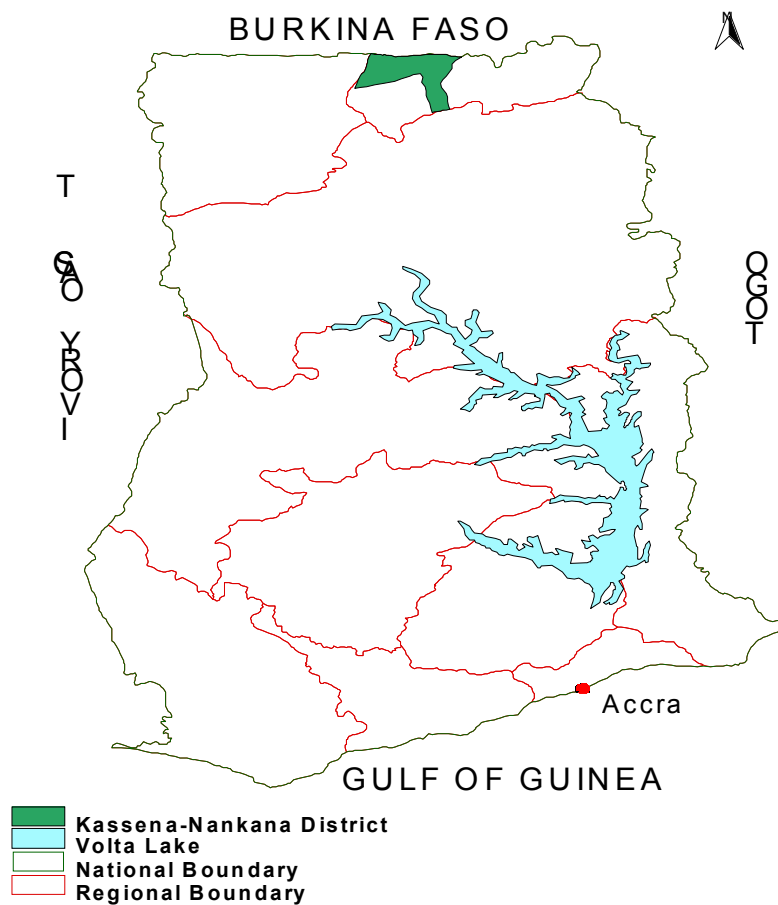


Fig 1. Sketch map of Kasena Nankani East District

A Catholic mission was established in 1906 by the White fathers ("Pères Blancs"), a French group made up of French-Canadians. They came to Ghana from Upper Volta (now Burkina Faso) due to French anti-clerical laws (the Fathers believed they would be expelled from Upper Volta). The British allowed them to set up in Navrongo on condition that the school that they were to establish would use English only. Despite a difficult beginning (the Fathers had learnt the wrong local language and only attracted 5 students in the first 18 months), the school eventually became a success – a British official in 1927 said that it was the best school (of only 5) in the north of Ghana.

The population is now split fairly evenly between the Kassena and the Nankani speakers. Indigenous African beliefs are followed by the majority. Around a third are Christians, while 5% are followers of Islam. Like other people in the Sahel region, levels of both fertility and mortality are high. Partly because of this, a health research centre has been established in the area, with some success. Subsistence level agriculture is the usual occupation of the area, as well as the rearing of goats and cattle. The Nankana people are part of the Mole-Dagbani language group and in the great time of the Mossi-Dagomba states formed part of the chiefship of Tongo and adjacent Nangodi. The word "Navrongo" is an Anglicization of the town's Nankani (a dialect of Frafra) name NavorIngo. This in turn comes from its Kasem name navoro, which combines the word naga (meaning foot or leg) with voro (meaning the sound of stepping onto crunchy, dry soil).

The Navrongo-Tono dam is one of the largest agricultural dams in West Africa and serves as a place for year round farming. About 2,490 hectares of land is irrigated with water from the 2 mile long dam which serves seven villages in the Kassena Nankana District. The dam was built in the late 70's and early 80's by Taysec, a British engineering company. The popular cash crops being cultivated on the project are rice, soya bean, and tomato. Future cash crops may also include cashew. While ICOUR tomatoes are marketed in the southern regions of Ghana, the soya bean is sold to industries throughout Ghana. The dam allows for farming around the year and has greatly aided in the development of Navrongo. Unfortunately the dam has also created a problem by creating the ideal conditions for a certain type of snail which participates in the life cycle of the schistosomiasis parasite. This parasite invades the body through the skin and resides in the intestinal tract or walls of the bladder. It can cause painful bleeding and, if left untreated, sterility.

The Quantum Resonance Magnetic Analyzer (2008-2012 model) shown in Fig 2 was used to test the pesticide concentration in the body system of patients who patronized the Kedi Heaalth Care Center at Navrongo.



Fig 2. Quantum Resonance Analyzer (Right) connected to a computer monitor

The machine has a USB pot that contains the software of the machine always inserted into the computer. The USB cable is connected from the machine to computer monitor. The test rod which the patient holds is also connected to

the monitor to sense the body organs through the palm. The machine uses electromagnetic waves to sense the internal organs of a person. Biotic data such as Sex, Age, Height and Weight are required for the analysis.

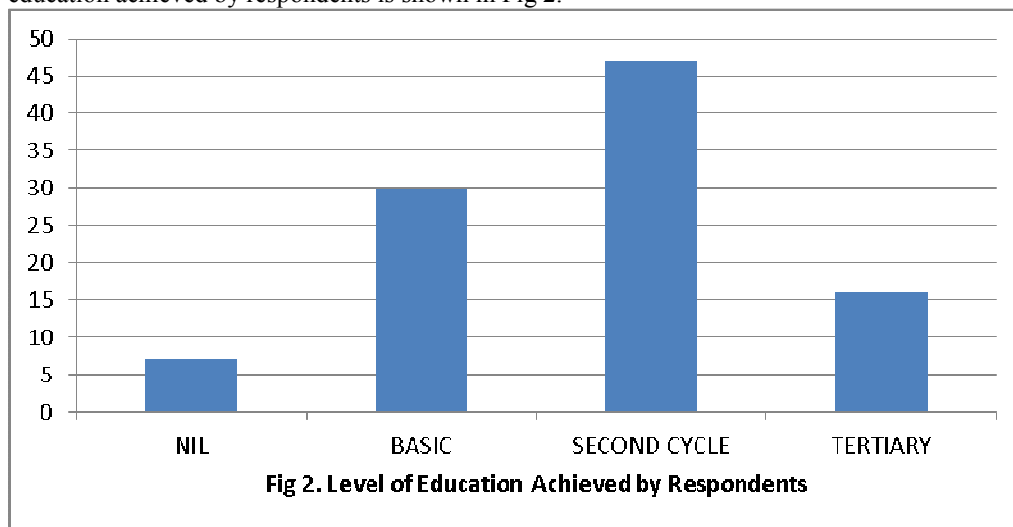
Patients were educated and their permission sought before they were taken through the test. The individual was not allowed to eat immediately before the analysis. The patient was allowed to rest for five (5) minutes to calm him/her. Any metallic object in possession was collected from the patients. The arm of the patient during the analysis remains straight stretch and holding on to the test rod gently. He or she was prompted to relax, not to speak and to keep steady breathing.

The biotic data collected was compared to what is sensed by the machine. This allows the machine to determine whether concentration is normal or not. A concentration between 0.013 to 0.313 is regarded normal because every individual at birth already has some amount of toxicity in the blood stream. However as a result of the diet of the individual, concentration of pesticide in the blood can increase or decrease beyond acceptable levels. Patients who were confirmed to have abnormal pesticide concentrations in their body system were taken through detoxification through the ionization process.

Questionnaire was administered to only patients who were willing to go through the pesticide monitoring test. Microsoft Excel and SPSS were used to draw graphs and analyze the data respectively for the questionnaire administered.

2. Result and Discussion

The clients who visit the Kedi health care center are mostly (76%) adults because treatment is quite expensive and awareness of the center is limited. Out of a sample of 70, 63% were males and 37% were females. The low number of females was due to financial constraints and their inability to take independent decisions because usually, their husbands bear the cost of medical care of both the wives and children. 67% of those who were interviewed were single, widowed or divorced. This indicates that those who were single took independent decisions as far as health care was concern. Ninety percent of the respondents had ever been to school and 81% could read. The level of education achieved by respondents is shown in Fig 2.



Forty nine percent of the respondents had no income and 99% eats vegetables. Of those who eat vegetables 57% occasionally eat vegetables while 43% eat vegetables frequently. Analysis indicated that, 54% of respondents obtained vegetables from their farms and 36% from the market. The 10% obtained vegetables from friends or relatives (Fig3).

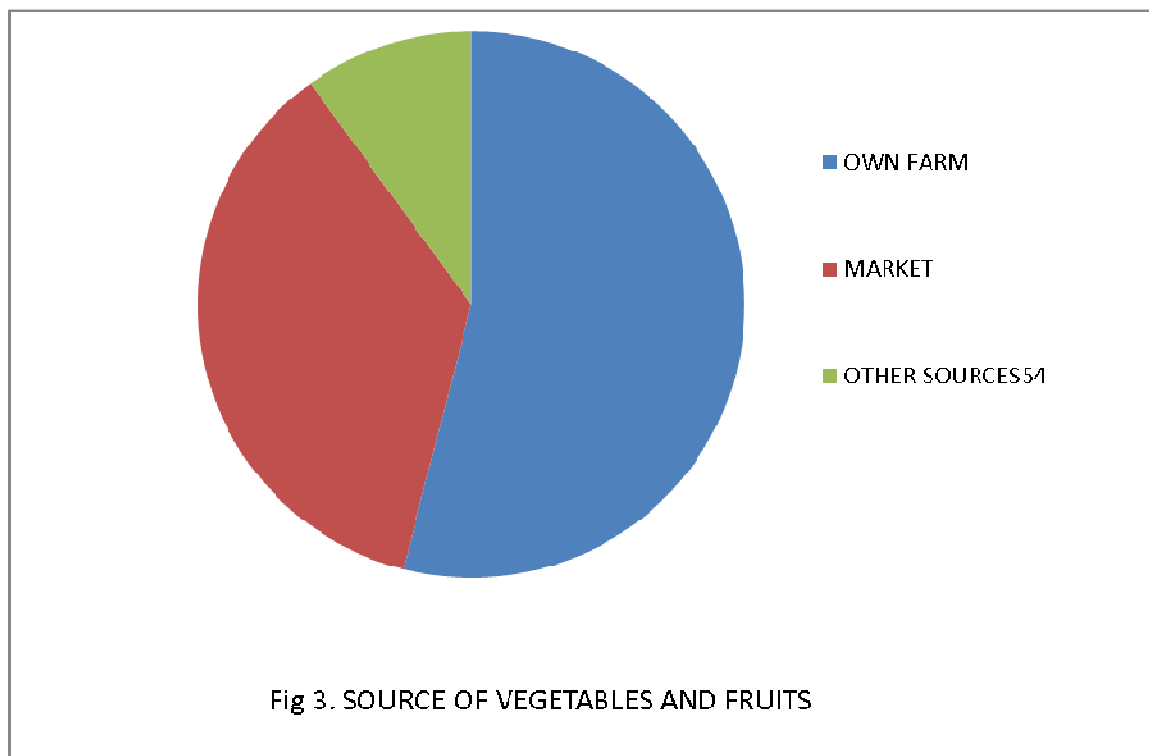


Fig 3. SOURCE OF VEGETABLES AND FRUITS

The cleaning pattern of vegetables before consumption is: washing with water (76%), washing with salty water (17%) and washing with vinegar (7%). Respondents were observed to come from different districts besides Kasena-Nankana districts because the health facility at the Kedi health care can only be found in Bolgatanga Municipality.

As one grow older more pesticides are deposited in the blood stream and hence the risk of abnormality (Table 1). Sixty eight percent female and 58% men had abnormal concentration of pesticides in their blood because the female eat a lot more vegetables than males. There was no much difference between the married (58%) and single (60%) in the concentration of pesticide in their blood and indicated that pesticide poisoning does not depend on ones marital status.

Table 1. Age Distribution of Pesticide Abnormality in Patients at Kedi Health Care

AGE	NORMAL	ABNORMAL
<20	7	5
21-30	7	7
31-40	8	7
41-50	3	13
51-60	1	6
>60	1	5
TOTAL	27	43

Pesticide poisoning in the study area could largely be due to the consumption of vegetables and fruits. This is because 80% and 78% of those who consumed fruits and vegetables had abnormal concentrations of pesticide deposits in their blood. However concentration of pesticide in the blood is a cumulative effect resulting from the consumption of other vegetables, fruits and grains which have been treated during production and storage. Vegetables and other food stuff should be properly cleaned before use. Those who use vegetables without washing had more abnormalities (67%) in their blood than those who washed (59%). The time of pesticide application is essential for safe consumption. Application time of pesticide is necessary to enable the consumer to wait for the pesticide to degrade before use. Organochlorine insecticide and organophosphate insecticide were mostly used to control pest. It was revealed that 58% of the 84% of the population who used Organochloride insecticide had abnormal pesticide concentration in their blood and 75% of the 16% who used Organophosphate had abnormal concentration of pesticide in their blood. This implied that organophosphates have more health effects on the people than organochlorine insecticides.

3. Conclusion

Ordinary water is used mostly to wash fruits or vegetables. A combination of washing methods such as using ordinary water and salty water or vinegar will be ideal. Males had more abnormal concentration of pesticide in their body systems than female because males are exposed more to pesticide especially during spraying and handling. The abnormality of pesticide in the individual depends on the amount and type of pesticides that he/she has consumed over a period of time. It is therefore possible that the aged would have more pesticide concentration in the blood stream than the younger ones. The use of pesticide, though is necessary to boost the production of fruits and vegetables in Ghana and particularly the Kasena Nankani East District, precautionary measures are necessary to avoid poisoning.

4. Recommendation

- Application time of pesticide is necessary to enable the consumer to wait for the pesticide to degrade before use.
- Farmers should read instructions of pesticides before use to avoid wrong usage, over dosage and under dosage.
- Consumers of fruits and vegetables should wash them thoroughly before use.
- The Ministry of Food and Agriculture (MOFA), General Agric Input Dealers Association (GAIDA) and the Environmental Protection Agency (EPA) should organize periodic training to fruits and vegetable farmers.
- Pesticide traders should also be educated to educate farmers at the point of sales.
- Banned chemicals must not be allowed into the country by the Food and Drugs Board (FDB) in collaboration with the Customs, Excise and Preventive Services (CEPS).

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Reference

- Anonymous (2009). Questionnaire summary: Global MRL Initiative – Africa. Alexandria, Egypt 09.05.2012, available from [Htp:r4.rutgers.edu/GMUS/MRL Workshop. Htm](http://r4.rutgers.edu/GMUS/MRL%20Workshop.htm).
- Brown A.W.W. (1978). Ecology of pesticides John Wiley and sons, New York, N.Y.
- Edwards C.A. (1986). Agrochemicals as environmental Pollutants. In control of pesticide applications and residues in food A guide and directory. (B. Van Hofsten and G. Eckstrom, ed.) Swedish science press, uppsala.
- EFSA (2010). 2008annual report on pesticide residues according to article 32 of egulation (EC) No 396/2005. EFSA Journal 2010, 8 (6) 1646.
- Gilden, R.C. Huffling, K and Sattler B (2010) Pesticides and Health Risks. JOGNN, 39, 103-110.
- Graham-Bryce I.J. (1981). The behaviour of Pesticides in soil. In the chemistry of soil processes (D.J. Greenland and M.H.B. Hayes, ed). John Wiley and sons Ltd.
- Karanth , N.G.K, Amita Ram, B.E Asha, M.B (1999). Rapidtests for monitoring pessicide residues in the environment. Jornal of Environmental Sciences 3 (1), 1-10.
- Krishnamerti, C.R. 1984. Pesticide Residues in food and Biological tissues. Indian National Science Academy, New Delhi.

Li, YF, Cai, DJ and Singh, A. 1998. Technical hexachlorocyclohexane use trends in China and their impact on the environment. Archives of Environmental Contamination and Toxicology, 35: 688-697.

Liu L, Jian A, Ren N, Jiang G, and Li Y. (2006). Gridded inventories of historical usage for selected organochlorine pesticides in Heilongjiang River Basin, China. Journal of Environmental Science, 18 (4): 822 – 826.

Okello, J.J. and Swinton, S.M. (2010). From circle of poison to circle of virtue: Pesticides, export standards and Kenya's green bean farmers. Journal of Agriculture Economics, 61, 209-224.

PFA (Prevention of Food Adulteration Act). 1954 the prevention of Food Adulteration Act, Lucknow, Eastern Book Publishing Co.

PANNA (2007). Ban Lindane now! [Http://www.panna.org/campaigns/lindane.html](http://www.panna.org/campaigns/lindane.html). (22/05/2012).

Sonou M. (2001) Periurban irrigated agriculture and Health risks in Ghana. Urban Agric Management 3:33-34.

US Environmental Protection Agency (EPA) (2002). Pesticide re-registration: Lindane.

Red Facts EPA's office of pesticide programme special Review and Re-registration Division. U.S.EPA, Washington, DC.

Xing X, Q.S, Odhiambo J.O, Zhang Y. And Liu, Y. (2009). Influence of Environmental variables on spatial distribution of organochlorine pesticides in Sichuan, West China. Environmental and Earth Sciences, 59(1) : 215 – 222.

Questionnaire on Pesticide Poisoning in Kasena Nankani East District of Ghana

The intention of this questionnaire is to bring out data on pesticide poisoning and consumption of vegetables and fruits by the people of Navrongo. The data will be treated confidentially.

1. Age A. <15 B. 16 to 25 C. 26 to 35 D. 36 to 45 E. 46 to 55 F. >56

2. Sex a. Male [] b. Female []

3. Marital Status: A. Single B. Married C. Widowed D. Divorced

4. Educational status (a) No education [] (b) Educated []

5. Level of education if applicable. A. Basic B. Second cycle C. Tertiary level

6. Can you read? A. Yes B. No

7a. Employment status a. employed [] b. unemployed []

7b. If employed how much are you paid in cedis per month?

A. Less than 100 B. 100 and 150 C. 150-200 D. 200-300 E. More than 300

8. Do you eat vegetables or fruits? a). Yes b). No

9. Which type of vegetables do you eat?

A. Cabbage B. Lettuce C. Carrot D. Ayoyo E. Okro F. Other

10. Which type of fruits do you eat?

A. Mango B. Water Melon C. Apple D. Tomato E. Banana F. Others

11. Do you just eat the fruit or vegetable after plucking or purchase? A. Yes B. No

12. If you are to clean your fruit or vegetable before use, how would you do it? A. Wash with water B.

Wash with water and salt C. Wash with water and vinegar

13. How often do you eat vegetables or fruits? A. Everyday B. Three times a week

C. Once a week D. Occasionally

14 Where do you get your vegetables or fruits? A. From own farm or garden B. From market C. Other source

15. If you have vegetables or fruits in your farm, do you control pest and diseases using chemicals? A. Yes

B. No

16. Which Chemical do you use in spraying your fruits and vegetables?

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