

**THE EFFECT OF WATER POLLUTION ON HUMAN HEALTH**  
**A CASE STUDY OF TUNGAN GANA IN PAIKORO LOCAL**  
**GOVERNMENT AREA**

**A PROJECT**

**BY**

**DANJUMA TANKO**  
**REG. NO, PDG/GEO/99/2000/054**

**DISSERTATION ESSAY SUBMITTED IN PARTIAL FULFILLMENT OF**  
**THE REQUIREMENT FOR THE AWARD OF POSTGRADUATE**  
**DIPLOMA IN ENVIRONMENTAL MANAGEMENT, DEPARTMENT**  
**OF GEOGRAPHY, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA.**

**FEBRUARY 2001**



## **DEDICATION**

First to Allah Almighty for he is doing great things in my life. This study is heartily dedicated to the memories of my late father Mallam Tanko Warder Paiko (Saidu Paiko) and my living mother Mallama Dako Tanko (Maryam Saidu). May his soul rest in perfect peace and long live the later.

Last but not the least to my wife, Mallama Aishatu A. Aliyu and children Mallama Hauwa, Mallama Jamila, Mallama Amina, Mallama Maryam, Mallama khadizat and lastly hardworking and obedient Mallama Halira Aminu my nephew.

## ACKNOELEDGEMENT

First and foremost, I shall like to give thanks to the AL-Mighty ALLAH for sparing my life to date. I remain thankful to the AL-Mighty for his POWER, AFFECTION and MERCY to me to see to the success end of this project.

The success of this research would not have been achieved without the full cooperation of my project supervisor, Dr. (Mrs.) Odafen .O. and co-project supervisor, Dr.A.S. Abubakar whose correction, guidance and courage led to this marvelous success.

My thanks goes to Mallam Dauda Dada in civil Engineering Department, F.U.T, Minna and Alhaji Yakubu,Local Government service Commission, Minna for shading Light and advice for the success of this course. My profound thanks to my beloved mother, and the entire family for their patient, encouragement, love and Affection.

I am greatly indebted to the Head of Department, Dr. M. T.'Usman and the rest of the Departmental lecturers; I specially thank them for their contribution to the success of this project . My appreciation goes to Mallam Alhassan D. Aliyu, Niger State Task Force on Guinea worm Eradication Programme, Minna. Mallam A. Abubakar, NGIP, Niger State, Health Facilitator on Dracunculiasis, DFRRI, Minna and to my relations friends, well-wishers and other people whom is not possible to mention their names but have but have contributed irmensely one way or the to the achievement of the study.

Finally, I extend my profound gratitude to Mohammed Ahmed, Adamu Tanko Paiko, Zakari Yusuf, and the rest of my classmate. Our understanding patient love and Affection enable us to part peacefully.

May Allah bless you all.

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## ABSTRACT

Tungan Gana has been chosen as a study area in Paiko district of Paikoro Local Government Area of Niger State in view of the yearly outbreak of Guinea Worn infection in the village. The epidemics prevent the people from performing their socio-economic activities. Several preventive, curative measures were adopted by various Governments and Non. Governmental Organisation's (NGO's) in assuring the Eradication of the disease but to no avail.

The pollutants such as animal and human excreters, dead and broken tree branches, grasses and shrubs Sediments transported by run-off or strong wind to sources of drinking water.

Poisons including pesticides, insecticides, fungicides and chemical fertilizers containing nitrogen, phosphorus and sulphur. These are passed from one organism to another inform of food chain and so become concentrated causing health hazards to the entire community- developed chemical characters of water body.

Garbages and rubbish as domestic waste are washed away to the sources of drinking water that result to undesirable changes in the physical, biological, and chemical characters of the water.

Therefore, there is the need to identify and analysis water pollutants and profer control measures, preventive and treatment techniques to infectious disease call-Guinea Worn in this study area.

These could be possible through the collections of information from magazines related textbooks, Bulletins, Journals, Newspapers, previous related work or any information relevant to this project work. Interviews and observations will be another cateria.

Finally recommendations will be given for present, and future generation utilization.

## CHAPTER ONE

### 1.1 INTRODUCTION

Tungan Gana is a village situated in Tungan Mallam Ward, Paiko district of Paikoro Local Government Council about 8 kilometers away from Tungan Mallam, Ward Headquarter. The village had been in existence since 1956 about 45 years ago. It migrated from former Gana village approximately few kilometers Northeast of present settlement, named after the Head or Eldest son of the family. Their reason for migration is not different from other types of settlement, it was based on inadequate crop yields, inadequate pastures and fresh water supply, long distance trek of villagers to the nearest town for socio-economic needs of the people.

However, before living Gana village, the population was then that of clustered family. They expand the population through customary or extended family inter-marriage. The people here are Hausa/Fulani by tribe, came to Paiko district as Normadic Fulani in search of pastures for their cattles. As they enjoyed the vegetal cover, thus made the area as their homes. They presently reared little cattles, sheep, chickens, rams, goats as hobbies but not as Normadic as it was the case before. Such livestock are used for visitors and poverty alleviation situations.

On reaching the new settlement, the family leaders known as Village Head decided to change the old name to a new one know as TUNGAN GANA. There are Muslims and Christians but Muslims predominant. The village is now a mixture of Gbagyi, Hausa, Yoruba and other indigenous tribes. The settlement has one source of drinking water- the Dam, one government health clinic and one primary school. Due to menance of Guinea worm disease or infection 5 (Five) boreholes was dug/ drilled for the village.

## **1.2 Statement of the problems**

Water pollution of Tungan Gana is the causes of Guinea worm disease going by the contributions made through Non- Governmental organization and different Governments in Eradication programme. Therefore, the re-infection, and effect of the disease (Guinea worm) on human health will be given priority and its transmission, preventive and treatment techniques on sources of drinking water

## **1.3 Aims and Objectives**

- i. To identify sources of various water supply to the community in order to identify water pollutants.
- ii. To identify water-borne diseases in sources of water supply and focus research on one of them.
- iii. To give preventive and treatment techniques to the sources of water. Short notes on its transmission.
- iv. To find out the effect of the disease on human health.
- v. Recommend for prompt action.

## **1.4 Justification of the Study**

Environmental geography exists in order to study variations in phenomenon from different places to different places and its value as an academic discipline on the extent to which it can clarify the connections between different features of the same area. The central geographical questions is “why is it like these here?” Tunga (1981).

To this point, the researcher seeks to find out the extend of the effects of water pollution on human health because it is an endemic Guinea worm infection area, a dreaded disease that prevent day-to-day activities.

## 1.5 **Significance of the study.**

The important of this research work will enable the community and its environment to benefit from the finding of this project, developing the habits of environmental friendly, preserve, prevent and treat water before consumption. In doing so, the entire community will be free from infection of Guinea Worm disease and other related ones.

## 1.6 **Geographical Background of the Study Area.**

The village can be characterized by its Topography, geology, water resources, soils, vegetation and climate. These elements are described as follows.

### (a) **Topography.**

They are typified by gently undulating terrain interlaced by riverine depressions. Generally, the height variation from crest of hill to water course varies around 50 metres more or less. This produces in the immediate vicinity of someone on the ground rather in short views of a kilometre or less. These views are made even shorter by the typical savannah vegetation of the sight. This visual environment will no doubt be broadened by clearing of vegetation for farmlands and other new farm areas.

A large visual scale introduced by the above mentioned inselbergs getting from the gently undulating plain. These are intended to be used as design focal points conveying the sense of the longer scale of the village.

### (b) **Geology**

The major rock types underlying the village are described into three categories

(i). **Metamorphic Rock**

Migmatite underlying majority of the village. Porphyritic Gneiss, underlying the Dam site while Granitic Gneiss are found in the Northeast portion of the village.

(ii) **Igneous Rock**

Hills acted outcrops of the village plains. Granite (fine to medium grained forms heaps near the Dam at Northwest zone of the village.

(iii) **Sedimentary Rock.**

Rocky located in streams and Dam beds, consisting of largely sand, with rare gravel beds and local deposit of clay.

(c) **Water (surface)**

The Dam surface and depression of the village when looked vertically is in rough shape, draining the crescent of village development area.

The hills makes the run-off to flow into the constructed Dam and other run-off plains of the village site. These run-off converges into the Dam.

(d) **Soil**

The soils underlying the village are generally deep and well drained type. Although specific data are not available, presumably, these soils are also more fertile than many other soils. While some may regard developing the village on the area as wasteful of good agricultural activities, there is also an equal advantage of making it possible to undertake successful backyard gardening to increase food supplies in the village. The humus of the topsoil enriched the soil for agricultural potentials.

(e) **Vegetal Cover**

Generally, the vegetation of the village is characterized by rocky highland in all directions almost surrounding the village. A view of the village from one of the hills closed to the Earth Dam showed a gentle undulating lands with rocks and trees, grasses and shrubs clotting the landscape giving it a beautiful sight. The height of the trees are of uneven nature showing low and highlands with grasses and shrubs at intervals. A good vegetal cover or domain for biodiversities to harbour.

(f) **Climate**

A healthy living environment will depend on maximizing the aspects of the environment which reduce the environment problems such as heat and the effect of humidity and protection from rain and dust. Well-detailed climate information is not available, however, the little obtained from indelible print of achievement of Paikoro Local Government showed the climate conditions of the district is not much different with that of the Local Government Areas. Thus, the district experiences distinct dry and wet season.

- i) Rainy season in the village start around the the month of April. The rain tapers off very rapidly after the month of October. The mean monthly distribution shows a tendency for concentration in four to five months. The village annual rainfall is in the month of August to September, with annual precipitation varying from 1000mm in the North to 1400mm in the South. The duration of the wet season ranges from 170 days or month in Northern part to 210 days or more in Southern of Tungan Gana village in a year.

Another weather phenomenon is associated with the presence of inselbergs. These features exert an influence on Local weather greater than their sizes.

There inselbergs start off conventional activity and cause intense relief rain in their immediate surroundings.

(ii) The climate with moderate temperature, a sunny afternoon and clear bright sky i.e notably, it is hot at afternoon and cold at night, less during the rainy season. However, human sensibility to temperature is greatly affected by relative humidity.

(iii) Wind and Dust.

There are two major air masses dominating the climate of the village. The tropical maritime air mass and the tropical continental air mass. The tropical maritime air is formed over the Atlantic Ocean to the south of the country. It moves inland generally from South West to Northwest direction bringing warm and moist air, while the tropical continental air mass associated with the Northwest trade winds and tropical maritime air mass gives the South West monsoon winds. The intensity and duration of each type of wind over a particular place vary due to the interfaces of these two air masses.

The days are very hot but the cloudlessness night's means that at night there is considerable loss of heat by radiation from the earth. The temperature drops sharply often to dew point, giving rise to early morning temperature in versions to early morning fog. This is further complicated by setting dust particles which have the effect or reducing visibility to a hundred metres away with daylight renewed isolations clearer. The fog, although, the dust particles continue to float in the air to settle as thin film over furnitures and other objects.

## 1.7 Limitation and Scopes

This research is limited to water pollution and its effect on human health. It will be discussed in total within the scope of Tungan Gana village

in Paiko District, Paikoro Local Government Council of Niger State. It will cover such areas as sources of various water supply and water pollution, its effect on human health, its transmission, preventive, treatment and consumption. Recommendations shall be giving for prompt action.

## CHAPTER TWO

### 2.0 LITERATURE REVIEWS

#### 2.1 SOURCES OF WATER SUPPLY

The sources of water supply generally are the ponds, streams, springs covered wells, boreholes, and Dam. The sources of drinking water at Tungan Gana village is the river, stream, pond and constructed Earth Dam, a self-help project.

#### 2.2 SOURCES OF WATER POLLUTION

Pollution is a word that comes from a Greek word meaning defilement. Pollution can be defined as "An undesirable change in the physical, chemical or biological characters of air, water or land that will be harmful to human and other life, industrial processes, living condition and cultural assets.

Adedibu, (1985) noted that the economic activity of any community would determined to a great extent the quality and type of waste generated by the people. In an agrarian economy, the common types of waste are in the form of leaves, food remnants and harvest waste among others. Source of land or surface pollution according to Onwioduokit (1998), most environmental problems are due to the production or consumption of goods whose waste production translate easily into pollutants. The composition of the wastes may be garbages or rubbish.

Man induced forest and grass fires due to agricultural practices added greatly to source of pollution in certain season of the year. This scenario is exemplified by bush burning and deforestation processes during farming activities.

Viets, 1971 opined that the animal waste have become an environmental problem in recent years.

In most of the countries, the waste recycled to croplands and the system was ecologically sound but where the animal waste is consideration, the cost of spreading it on the fields is uneconomical as a fertilizer.

Disposal of waste either in solid or liquid form into streams especially those that are dumped at the front or backyards of the village huts or residential areas later are washed away by run-off, carrying along with it germs and bacteria from surface dirt. It seeps through the soil and contaminate ground water. Garbages disposal attract flies, rats, cockroaches and other insects. These spread infectious diseases contaminating the source of water supply therefore, transmitting water-borne diseases such as Diarrhoea, Desyntry, Hepatitis, Cholera, Typhoid, Worms including Guinea worms. These sources of water are the pond, open hand-dug well, river, stream and Dam. The usual practice is to dump such waste on land or water especially in stagnant water that harbours mosquitoes, breed later spread malaria and filamasis. This stagnant water also is a recipients of other activities at the source of drinking water such as fishing, livestock drinking place, clothes and agricultural washing, recreation or bathing place in the village.

Women put finishing touches to man's agricultural activities such as harvesting and processing the seeds for storages or sells. Examples of such seeds include melon, locust beans, new yams, and groundnut. These organic wastes are not good in the river because they increase the Bio-chemical Oxygen Demand (B.O.D.) of the stream or Dam. This resulted in low Oxygen content of the water and aid the growth of water organisms (Cyclops or water fleas) which are disease vectors.

Besides, aquatic animals are suffocated and villagers who have little or no choice (rainwater or well water) but to use water from stream and rivers are left to face the problem.

Source of water pollution is from the discharge of unwanted biological, chemical and physical material, into water bodies from the man's environment (Julius, 1987). Thus, the pollutants are usually chemical, physical and biological substances that affect the natural condition of water.

There are physical parameters as odour, colour, temperature, solids (residues), oils and grease. In surface water courses, colour, oil and grease are concern in relation to nuisance concentration.

Chemical parameters comprises organic and inorganic constituent. The most used test to described the organic content of a material as the amount of oxygen demand (B.O.D), which is defined as the amount of oxygen required by bacteria decomposing organic material in sample under aerobic conditions at 20<sup>0</sup>c over a 5- days incubation period (Canter L.W 1977), soluble organics as represented by high (B.O.D) wastes, causes depletion of Oxygen.

Inorganic parameters in water quality considerations include salinity, hardness, alkalinity, acidity and the content of iron, chlorides, nitrogen and phosphorous among others. Acids, alakalis and toxic substances for example have the potential for causing fish kills and creating other in balances in stream ecosystems.

Biological parameters include conliform, fecal conliform and viruses among others. Total conliform and fecal conliform organisms are used as indicators of the presence of pathogens (Sadauki, 1999/2000).

Biological factors of living organisms, from micro-organism to fishes, which populate the wastes are very sensitive and react to the harmful polluting effects. The quality and quantity of their species, the changes in their composition, life functions, the appearances of new species, the lack of other species in several cases- are even better indicators of the damaging changes affecting water quality than physical instruments.

Aquatic organisms attached to the bed live on the surface of the mud (benthon). It is also known, that other organism form a characteristic coating (periphyton) on the surface of aquatic plants or stones, certain, tiny little organisms adhere to the body of other animals (e.g. water flea species). Mainly on the surface film of still waters, communities of freely moving organism with a larger body (plankton) fixed to the coat and communities of microscopic organism (neuston) may develop. Water as an environment is most complex. Water itself as a whole and its so-called influence factors affect aquatic organisms. Such influence factors are dissolved gases and salts, temperature, light, pollution and the circulation rate of water. The impact of these factors makes possible or, on the contrary, hinders the presence of certain species and thereby affecting the formation of the entire life community in one way or the other (Thienemann 1926).

### 2.3 EFFECT OF WATER POLLUTION ON HUMAN HEALTH

Water pollution has direct impact on health in the form of bacterial disease, production of cancer, genetic defects and birth defects, varieties of acute and chronic toxicity in humans. Water pollution affects ecosystems through which an impact on human beings may subsequently be felt. Household detergents that contain phosphates may flow into oligotrophic water and lead to eutrophication of the water bodies. Consequently, there will be an overgrowth of algae and a rapid deterioration of water quality.

Effects of water pollution are that impure, contaminated water has been a leading cause of fatal disease in human. Water-borne disease such as cholera, typhoid fever, dysentery, bilharziasis, hepatitis are common (Umoh, 1999/2000),

According to Akinyeye, (1999-2000), during transportation, eroded soil come in contact with large quantities of chemicals, which have different levels of toxicity. These infiltrate surface and ground water and limit the use of water resources for recreation, economic purposes, drinking, etc. These chemicals are usually pesticides, herbicides, fungicides and fertilizers used in large amount in agriculture.

Effects of the waste disposal associated with human health are numerous leading to the breeding of rats and the eventual out-break of epidemics emerged which equally resulted in more death tolls (Olokesusi, 1994). This in essence means that improper environment Management (pollution) is capable of translation into a number of serious problems that have potential to affect human lives. This implies that diseases arising from waste compilation are as highed below which are washed away into water bodies.

Uncollected waste encourage the breeding of flies, cockroaches, rats, etc. These categories of pests easily transmit diseases that can greatly affect human health and pollute the surface water and underground water resources during water percolation processes. At times waste contaminates the portable water and most people ignore the pollution and consume the water. Such categories of people are easily attacked by cholera, dysentery, Diarrhoea, typhoid fever, yellow fever, river blindness, and Guinea Worm diseases, etc (Turner, 1979). This explained that, growing population expand the village, refuse dump rates increase.

This give rise to offensive odours as a result of decomposition of the organic waste leading to discomfort and psychological imbalance to the people residing nearby or to people passing through the area. At the onset of rainy season it is washed into rivers, streams, ponds or into the Dam polluting it.

In another development, dirty water due to pollution constitutes as death traps to man, there have been several occasions when out-breaks of epidemics were traced to contaminated water. Unplanned and unregulated development of both surface and ground water resource could also have drastic impact on the physical environment and the hydrological cycle. This development may ultimately lead to the incidence of excessive run-off and health hazards. Pollution generally deteriorate the quality of the environment such activities include agricultural practices, leading to phosphorus accumulation in water taking by fish will have harmful effect on human. A number of problems associated with effect of water pollution have been created due to the presence of pollutions human landscape (excrete). The concentration of various chemical in water bodies poses as problems to man, Van-ketal et al (1987) observed that there is a serious environmental stress due to the application of agro-chemicals on a number of human activities, for instances, the use of pesticides and gamalin 20 has greatly led to the destruction of aquatic lives such as fish when consumed have human health problem and also pollute the water bodies.

#### **2.4. Most pronounced water-borne disease GUINEA WORM infection (DRA CUNCULASIS) it's history.**

The mature female guinea worm usually emerges through the lower limb of the guinea worm patient after growing for a period of about one year inside the host.

The mature worm causes a blister to form on the skin, and when the affected part comes in contact with water, the worm breaks through and releases hundreds of thousand of larvae into the water.

If the water source is small, a still pond, for example, there will likely be tiny water fleas called "Cyclops" that swallow the larvae perceiving that these are food. In fact the guinea worm larvae continue to grow inside the Cyclops, and when human being swallows water containing these infected Cyclops, the disease is established and the cycle continues.

Guinea worm line of action is as this, inside the stomach of the person, Cyclops are digested, freeing the guinea worm larvae. The larvae quickly escape into the small intestine and penetrate through the intestine wall into the abdomen. Male and female worms mate about 3-4 months later, after which the male worm dies. The female continues to grow, all the while migrating, usually towards the lower limbs, where after a total of about 12 months she is ready to emerge and deposit her own larvae into the pond.

## **2.5 EFFECTS OF GUINEA WORM DISEASE**

Guinea worm disease itself does not kill people, but the pain and in capacitation caused by the ulcer where the worm protrudes, is a sources of much economic and social hardship. The disease disrupts many if not most of essential daily living activities of the guinea worm patient. When members of the family are affected by Guinea worm disease, children miss many days of school, parents who farm cannot plant crops or harvest, and mothers in particular, are unable to care for their children and also loose profits from their small businesses. These looses impede National development and promote cycle of poverty, disease and ignorance that afflicts poor rural dwellers.

## 2.6 TRANSMISSION

Treatments and Preventions are strategies involved to eradicate dracunculiasis. To avoid methods of treatment and preventions, steps are taken to avoid its transmission.

- a. **WADING** by an affected person who has opened ulcer in a pond where villagers collect their water.
- b. **DRINKING** water that has contaminated by Guinea Worm larvae.
- c. There are other important environmental factors involved in transmission such as the presence of the immediate host, i.e. species of small crustacean Cyclops (water fleas).

## 2.7. PREVENTION

Even without a vaccine or an effective drug, dracontiasis is, theoretically, an easily prevention and eradicable disease. It is transmitted exclusively through drinking water from water pollution source and man is its only important reservoir host.

The provision of safe drinking water, is the most cost-effective, rapid and permanent methods of preventing the disease. In addition, it reduce the morbidity of the chronic water shortage present in rural areas. The introduction of simple hand-pumps (boreholes) or dug-wells (covered) in villages with endemic disease. The four main strategies or the control an eradication of dracontiasis are:

- a. Health education, including boiling and filtering contaminated drinking water, prevention water polluting by infected individuals and the use newly monofilament nylon and cloth filters as well as sand filtration system.
- b. Vector control by treating ponds periodically with temephos to kill Cyclops (water fleas).

- c. The provision of safe sources of drinking water and protection of existing ones.
- d. The segregation and treatment of individuals with active disease to reduce morbidity and transmission.

## 2.8 TREATMENT

Treatment aims to relieve symptoms, expedite worm expulsion, promote healing of ulcers, prevent complications and rehabilitate the patient.

Antibiotics and tetanus toxoid are valuable in minimizing bacteria complications and preventing tetanus.

The tedious method of removing the emerging worm by winding it onto a stick is still used locally. This is in substitute of the victims to use the traditional puncturing of guinea- worm blisters and ulcers with red-hot-iron, and the need to use case management as pain-relieving and as a incentive for reporting, the use of "TAMALE" oil to manually extract Guinea worm in large scale, training and retraining on routine manual extraction.

## CHAPTER THREE

### 3.0 DATA AND COMPUTATIONAL TECHNIQUES

Documentation was possible through Newspapers, magazines, Bulletins, Textbooks, Journals, Previous related works, interviews and observations

#### 3.1. DATA

Documentations or literature reviews

The following findings had lead the researchers to established facts about the existing of guinea worm in Tungan Gana because of the present of Cyclops (i.e. water fleas.)

Knie, 1966 and Weber, (1973) opined that, the concentration of ammonia, nitrate, phosphate, iron, oxidzable matter and detergent when significantly exceeds the accepted limits. Also the results of plankon and benthos examinations reflects the impact of pollution.

In a similar situations Leighton (1966) defined pollution as the contamination of air, land and water that may have harmful affect on life. The scholar further narrated that, the pollutants when injected into the biosphere in greater quantities, affect the functioning of ecosystems and exercise adverse effect on plants, animals and man. The major pollutant are carbon particles, metallic dusts, tars, resins, sulphur compound, nitrogen compound, halogen, radioactives, e.t.c.

The agricultural sector is responsible for addition of pesticides in the soil and water. Pollen releases by vegetation and dust from deserts and volcanic activity are also considered pollutants.DDT, sulphur an industrial waste are the major source of water pollutions opined by Sharma, (1979).

Biological finding was expressed by Thienemann, (1926) that living organisms, from micro-organisms to fishes, which populate the water, are very sensitive and react to the harmful, polluting effects. The quality and quantity of their species, the changes in their composition, the lack of other- in several cases are even better indicators of the damaging changes affecting water quality than physical instruments. Aquatic organism attached to the bed live on the surface of the mud (benthon). It is also known, that other organisms form a characteristic coating (periphyton) on the surface of aquatic plants or stones. Certain, tiny little organism adhere to the body of other animals (e.g. water flea species). Mainly on the surface film of still waters, communities of freely moving organisms with a large body (pleustons) fixed to the coat and communities of microscopic organisms (neustons) may develop. Water as an environment is most complex. Water itself as a whole and its so-called influence factors affect aquatic organisms, such influence factors are dissolved gases and salts, temperature, light, pollution and the circulation rate of water. The impact of these factors make possible or, on the contrary, hinders the presence of certain species and thereby affecting the formation of the entire life community in one way or the other.

In a related development, a research conducted by State Ministry of Health, PHC Dept. of Paikoro Local Government and Jimmy and Rosalyn Carter foundation showed that guinea worm exist in Paikoro Local Government as stated below: -

The guinea worm Eradication programme was instated within the Chanchaga Local Government in 1988, upon the creation of the new Local Government ,Paikoro inherited virtually all of the Guinea worm cases.

A project was conducted from November, 1992 through March 1993 in which about 75 villages based workers were trained in the life cycle of prevention and treatment of Guinea Worm. All villages were given enough filter cloths, providing at least 2 per household.

### **3.2 METHODOLOGY OR COMPUTATIONAL TECHNIQUES**

#### **a). INTERVIEW**

Appendix I shows the questions issued to the village-head as all enquiries were asked to be directed to the leader who have authority to response to issue at the village level.

#### **b). OBSERVATIONS**

Observations was possible through coming in contact with the community. Visit to Dam, available bore holes, clinic, educational place, refuse disposal site, piled cut-down tree's trunks.

In Tungan Gana, the villagers move freely, only countable number of people was seen with the disease about to be healed after two years, that is, 1988 intervention of the carter foundation, State Ministry of Health and Paikoro Local Government to destroy the source of the drinking water-Dam. The persistence of the Guinea worm is "Even where there is access to portable water, some prefer to drink water from streams, ponds, some people out of the village visits relations and friends thus, could drink from other sources of water different from their own source exacerbating the spread of the disease.

But studies have shows that knowledge alone may not be enough, as knowledge about causation, prevention and treatment have not always led to action people's cultural altitude strongly influences their perception of causation, prevention and treatment.

Guinea Worm re-infection is common among victims, which means that these people either failed to comply with recommended, preventive measures or perhaps they may never have been told that the disease can be prevented.

This study is opined by Williams, (1991) that "Outbreaks of communicable disease have been increasing world-wide. Reasons for this include faster travel and greater distance covered, urbanization, overcrowding, poor nutrition, and lack of safe drinking water and sanitation, poverty increase the risk of acquiring diseases, and its consequences."

Another factors that influence readiness to adopt recommended actions include on individual's perception of threat of the disease, perception of susceptibility to the diseases, soico-cultural factors (which influence beliefs about causation, prevention and treatment). Cries to action are also important, they include health messages, media information and the influence of others such as opinion leaders or relatives and neighbours who may or may not have suffered from the disease.

Guinea Worm eradication have succeeded in its infections menances record have shown that Dracunculiasis (commonly known as Guinea Worm disease).

For intance in Nigeria the most recent National case search in 1990/91 documented 270, 404 victims of the disease in 4,744 endemic villages. This is a drop from 653, 620 affected people identified in the first case search 1987-88), but still represented a substantial burden of suffering of the Nation. Observation also indicated during the course of the project work that the Dam was ordered by Rosalyn Carter foundation in collaboration with both State of Ministry of Health and Paikoro Local Government to destroy the Dam as part of Guinea worm Eradication programme and installed

5 boreholes in the village to ease water supply problems. Presently one out of the 5-boeholes is functional, effort are on pipe-line to reach repair the remaining 4-boreholes.

## CHAPTER FOUR

### 4.0 ANALYSIS AND RESULTS

From the data collected, various methods for water pollution indicators are sort out. Their parameters are chemical and biological criteria. The results are clearly provided to the nature of the water body polluted.

4.1 The following finding indicate or established the existence of major water pollutants such as oxygen demanding waste (B.O.D), pathogens and fecal coliform bacteria, nutrients, synthetic organic and inorganic compound and some cases heat, But major one is the pathogen that lead to Guinea worm infection such researches conducted are by Knie, (1966), Weber, (1967), (1973), Leglinton, (1966), Sharma, (1979) based on chemical parameters and Thienemann, (1926) based on biological parameter of organisms activities (i.e. water flea or Cyclops) furthermore, the presence of guinea worm disease in Tungan Gana village resulted to destruction of the village Dam. Advice was given by Jimmy and Rosalyn Carter foundation and State Ministry of Health in collaboration with Paikoro local government council in a bid to eradicate guinea worm disease in 1998. Thereby, the council chairman was awarded the first place Annual Jimmy and Rosalyn Carter Award for Guinea worm disease Eradication.

Another contributor in water pollution theorem is by Viets, (1971) is that the animal waste has become an environmental problem in recent years.

In another additional observation made by the researcher showed that the village litter human faeces and animal waste all over residential areas during the visit first week of March, 2001 later washed away by run-off into sources of their drinking water which pollute the water supply.

## 4.2 RESULT

From the above analysis, Temperature of water, turbidity, colour, Nutrients, Ammonia, bio-chemical or biological oxygen demand (B.O.D) results to the pollution of water and can not be safe for consumption. Various diseases such as cholera, typhoid and guinea worm infection could emanate for instance.

### i. **Physical parameter**

Washing away of garbages. Human, animal and agricultural activities does so with sediment of topsoil into source of water thus, polluting it. The water becomes turbid so change water colour to brownish.

### ii. **Chemical parameter**

According to Ruttner (1975) that a rise in ammonia and organic nitrogen/ phosphorous are related to pollution of water. He lists over fertilization, degradation of faecal matter of human and animals as well as uneaten food and garbage's as water pollutants.

### iii. **Biological or Biochemical Oxygen Demand (B.O.D)**

Biological oxygen demand gives a measure of the amount of oxygen required by micro-organism to decompose an organism matter in a water sample under specific set of condition. This is in terms of garbages, human and animal wastes. If it entails agricultural chemical fertilization, it is called Biochemical Oxygen Demand for example. Dead organic matter in streams or Dam decays.

Bacteria carrying out this decay need oxygen and if there is enough bacteria activity, the oxygen in the water can be reduced to levels so low that fish and other organisms die. A stream or stagnant water like Dam without oxygen is a dead stream or Dam for fish and many organisms thus given the Dam an ordour and colour changes brownish, a sign of polluted water

with various infectious disease. The amount of oxygen required for such biological/ biochemical decomposition is called **BIOLOGICAL/ BIOCHEMICAL OXYGEN DEMAND (B.O.D)** a commonly used measured to water quality. B.O.D is measured as milligram per liter of oxygen consumed over 5 days at 20<sup>0</sup>c. Dead organic matter is also a contributor to stream and river pollution and from natural sources (such as dead leaves from a forest as well as from agriculture.)

Diseases- carrying micro-organisms are important biological pollutant's. Among the major water – borne human diseases are cholera, typhoid and guinea worm. Because it is often difficult to monitor the disease-carrying organisms directly, the count of human fecal coliform bacteria as a common measure of biological pollution and a standard measure of microbial pollution. These common, harmless forms of bacteria are normal constituents of human intestines and are found in all human waste. The threshold used by the council on Environmental quality for pollution is 200 cells of fecal coliform bacteria per 100 millimeters of water.

Another biological parameter is lack of sufficient nutrients for the support of aquatic plants and organic matter to function thus made water bodies to be contaminated.

This Dam constructed by the people of Tungan Gana might have contributed one way or the other in eutrophication of their sources of drinking water through chemical and biological parameters. Naturally by run-off carrying along with it sediment of subsoil particles which are rich in humus and iron contents- physical parameter.

Already data available indicated that the village was once guinea worm infected area. Going by the research conducted, it actually coincide with the same findings of bacteria, pathogens (i.e. water flea species or Cyclops) in their source of drinking water, Thienemann, (1926) and when swallow could lead to GUINEA WORM INFECTION.

## CHAPTER FIVE

### **5.1 SUMMARY, RECOMMENDATION AND CONCLUSION**

#### **5.2 SUMMARY**

It is very important to know that whatever damage is done to the environment contribute one way or the other to the water pollution.

However, this study reveals that growing environmental consciousness on the part of the populace on save drinking water and treatment of ulcer and prevention from guinea worm transmission couple with environmental education awareness will certainly yield fruits now, and future generation unborn in the village.

#### **5.3 RECOMMENDATION**

To avoid persistence re-infection of guinea worm disease and eradicating it, wadding, filtering, boiling are the fastest techniques to use and provision of boreholes, covered hand-dug wells, treated surface water with Abatement are easiest way to eradicate guinea-worm disease.

#### **5.4 CONCLUSIONS**

Environmental awareness education and prompt actions will go a long way to abate the problems of water pollution and enhancing community's quality of life. It will, in addition, bring about citizens who understand the use of unsafe water (polluted) and safe drinking portable water and different between the two for health preservation and enhancement.

## APPENDIX 1

1. What is the name of this village?
2. How many years of the settlement existence?
3. Why then you migrate?
4. Do you mean this land is fertile?
5. Do you mean this place have drinking water?
6. What are the source of drinking water during rainy season?
7. What is the source of drinking water during rainy season?
8. What are the uses of water in the village?
9. How do you dispose excreta in the village?
10. How do you dispose garbages or rubbish in the village?
11. How is system of agricultural system taking place in the village?
12. Do you perform any rituals before planting?
13. What type of business do you engage in the village?
14. Do you receive chemical fertilizer supply from any quarter?
15. Do you notice any symptoms when taking the water?
16. If yes, what type of disease is common?
17. Do you know the method of transmission of Guinea worm?
18. Have you knowledge of the disease?
19. What is the colour of the drinking water?
20. What action have the leaders took to arise the situation of the Guinea worm?
21. What are the ages off person infect person?
22. how long it takes to infect person?
23. How long it takes to heal?
24. What is the population of the village?
25. What is the income of patient before infection (approx)
26. What is the income of patient after infection (approx)

27. Do you receive help from any quarter?
28. How many clinic do you have?
29. What medication did you use during the infection?
30. What type of water treatment do you practice?
31. Is the clinic private or Government own?
32. Is there any enlightenment programme on Guinea worm prevention?
33. How do you receive information?
34. When during the year is the disease most common?
35. How many educational institutions do you have in the village?
36. How many pupil/students graduated?
37. What advice do you to render for sustainable development of he village?

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