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IMPACT ASSESSMENT OF UNICEF IN RURAL WATER SUPPLY AND SANITATION

(A CASE STUDY OF PAIKORO LGA, NIGER STATE)

BY

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PGD/GEO/01/02/241

A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, FEDERAL UNIVERSITY OF TECNOLOGY MINNA. IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF POSTGRADUATE DIPLOMA (PGD) IN ENVIRONMENTAL MANAGEMENT.

NOVEMBER, 2003.

CERTIFICATION

his dissertation entitled "Impact assessment of UNICEF in rural water supply nd sanitation (A case study of Paikoro LGA, 1991-1994)" by Issa Mohammed)adi meets the regulations governing the award of Post Graduate Diploma of he Federal University of Technology Minna, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

his project work is dedicated to my father Alhaji I.M. Dadi and my mother atima I.M. Dadi.

ACKNOWLDGEMENT

I wish to register my sincere gratitude to my Supervisor, Dr. S.A. Abubakar for his sincere encouragement, cooperation for finding time to scrutinize this work and making useful comments and suggestions.

I am equally grateful to all lecturers for the knowledge imparted on me and for their guidance, encouragement, tolerance and understanding.

I am profoundly indebted to Janet Adio who resiliently word-processed the manuscripts over and over again. I also wish to recognize the immense contributions of Mal. Alhassan Aliyu and other staff of Epidemiological unit, Niger State Ministry of Health as well the Community Health Workers in Paikoro Local Government Area during my period of data collection.

My boundless gratitude goes to my father Alhaji I.M. Dadi for his support, inspiration and encouragement and also to my wife and children who most time missed me, for their patience, understanding and sacrifice, I am sincerely indebted to them and very much appreciate their endurance throughout the period of the study.

Above all, I am grateful to Allah (Alhamdu-lilah) for the strength, grace, favour, wisdom, knowledge and divine mercy given me to accomplish this task.

ABSTRACT

Guinea worm disease (Dracunculus Medinesis) is one of the most debilitating disease in rural communities with little or no access to potable water. In light of this UNICEF has committed a lot of resources in the provision of rural water supply in these communities. The disease is most prevalent among peasant farmers in Nigeria, thus, making their contributions to Gross Domestic Product (GDP) very low since their mobility and virility are greatly curtailed.

In Niger State, Paikoro Local Government area in particular has a total of sixteen communities were endemic of guinea worm disease. The index of endemicity (IE) used in this study indicated that the local government area ranged from hyper-mildly endemic. All the communities are located in the rural and poorly accessible with unsafe drinking water sources (Ponds).

The study has focus, on the effects and impacts of rural water supply and sanitation on the prevalence of guinea worm disease. Awareness Education of the villages is vital and highly recommended to the eradication of guinea worm.

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CHAPTER 1

INTRODUCTION

United Nations Children's Fund (UNICEF) is an International Agency assist countries/states in terms of resources/manpower in areas of education, iculture and water supply. UNICEF have being assisting Nigeria, icularly Paikoro LGA, Niger State. In the area of rural water supply through construction of borehole, as a result of outbreaks, spread as escalating cases uinea worm disease and other water borne diseases.

Guinea worm disease (Dracunculiasis), is a painful incapacitating iction caused by the parasite Dracunculus Medinesis. The disease occurs in African countries and in parts of India and Pakistan. Guinea worm disease is tacted from drinking contaminated water, usually found in poor nmunities where safe drinking water is unavailable and the people have poor owledge about the cause and transmission of the disease. It is a debilitating ease that gives its victims agonizing pain, often preventing them from lking or performing any activities.

Guinea worm is the third leading cause of tetanus, which have a high ality rate in this country.

Guinea worm disease can be eliminated totally from communities as a sult of provision and utilization of protected water sources year round e.g. rehole and dug wells. And by filtering drinking water through a cloth, and oiling the water or treating the water with tenephos (abate).

1988, Federal Republic of Nigeria, at its National Council on Health, made racunculiasis a reportable disease, established the Nigeria Guinea Worm radication Programme (NIGEP) and mandated its national task force (NTF) to elineate the spread of the disease. Then a NIGEP secretariat was then stablished at Federal Ministry of Health together with National task force and he state task forces in each of then twenty-one (21) states, and FCT, Abuja (see ppendix 1)

Niger State much attention and dedication has been directed toward dication of Guinea Worm disease in collaboration with UNICEF, NIGEP, As and Global 2000, but the numbers of those affiliated is still relatively n. Which shows much as to be done to arrest the situation.

THE STUDY AREA

Niger State is one of the second-generation states of the Federal Republic of Nigeria. The state was created by General Murtala Mohammed regime in 1976. Niger State is within the middle belt of Nigeria, which is characterized by relatively sparse and fragmented population. The capital of the state is Minna bordered in the North by Sokoto, North-West by Kebbi State, the West by Benin Republic, North-East by Kaduna State and South-West by Kwara State (Fig. 1.2). Then Niger State had 25 Local Government Councils, which Paikoro is one of them (Fig. 1.3). Paikoro Local Government LGA Headquarter is about 22km off Minna-Suleja road, and created in 1991. Shiroro, Northwest by Chanchaga, and the West border it in the West by Katcha, Northeast by Muya and Southwest Agaie Councils.

2.1 CLIMATE

Paikoro LGA (study area) of Niger State belongs to the middle belt of Nigeria. It experiences district dry and wet season, with a mean annual rainfall ranging from 1100mm – 1600mm. The wet season occurs annually between many October, and between November-April is dry season. The mean maximum temperatures, which do not exceed 39c usually, occur in December – January.

CULTURE

The Paikoro LGA is made up of many ethic communities each with its cultural identity. The major tribes are Gwari, Koro with others as Nupe, Hausa, Kambari, Igbo, Yoruba and Dakarkari. In Paikoro LGA, the man is the head of the family and expected to be responsible for the family, and generally extended family system is practiced. The major occupation in these area are, farming, animal rearing and handcraft.

Although each ethic community has its culture, religious linings affect most cultural background. According to 1991 census Moslems represented 59.7% of the LGA population, while the Christians amounted to 3.7%. Believes in Traditional African religion amounted to 36.6% conservatively Moslems has 65%, Christians 10.5% and others 24.5%.

2.3 GEOLOGY AND HYDROGEOLOGY

Geological Paikoro LGA of Niger State falls into basement complex of Nigeria. And consist of gneiss, schist that are highly rich in Oligoclase, feldspar, little muscovite, medium grained non-prophylactic rocks. Essentially the rocks are biotite granite and gneiss. As originally formed (basement complex rocks) some do not have necessary hydraulic characteristics requirement for adequate water supplies. They have a solid structure, which produces both significant water storage, and transmit post emplacement structural and metamorphic changes. It could also produce significant alterations in these rock masses, thereby enhancing their potential usefulness for water supplies. Rocks in these areas commonly posses physical features that can provide reasonable a large volume of water to wells. These features are, jointing, fractures, weathering and solutions. Sometimes these features could not be found in the existing basement rocks of the endemic guinea worm, villages. Making it impossible for the exploitation of ground water, which is safe

good drinking water for the prevention and eradication of guinea worm disease. Exploration of underground water resources of Niger State came into line light in 1980, when the Niger State Water Board purchased two drilling rigs. This drilling activities continues until 1987 when the United Nation Children's Fund (UNICEF) donated two new drilling rigs to Niger State for the provision of rural water supply and sanitation, when guinea worm and other allied water borne disease were seriously affecting our rural dwellers. Reservoirs of estimated dimension of 0-50m or less have been exploited in the past.

3 STATEMENT OF PROBLEM

Lack of good safe drinking water, is the major problem for the outbreak of guinea worm disease. And water related borne disease in Paikoro LGA, Niger State UNICEF and other agencies have committed a lot of resources to provide alternative source of safe good drinking water for the rural dwellers for the prevention and eradication of guinea worm disease. (see plate 1.3).

.4 AIMS AND OBJECTIVES OF THE STUDY

The main purpose of these projects is to determine UNICEF Impact Assessment in the area of provision of rural water supply and sanitation to the eradication of guinea worm disease in Paikoro LGA. Within this, we the following specific objectives;

1. To identify the pattern and intensity of spread of the disease in terms of space, seasons, gender and age group.
2. To assess the social and Eco-climatic characteristics that are associated with prevalence of guinea worm in the study area.
3. To show the harmful effects of the guinea worm on the rural populace.

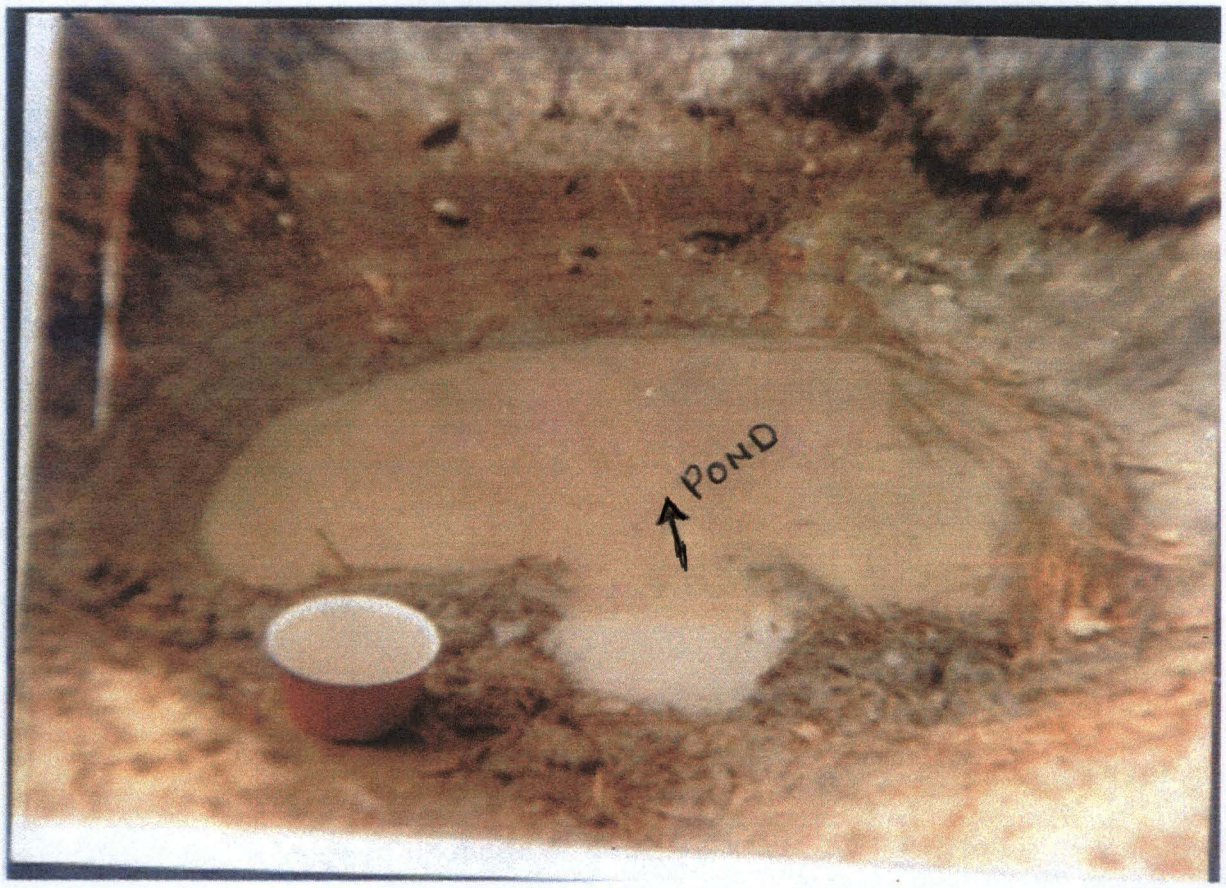
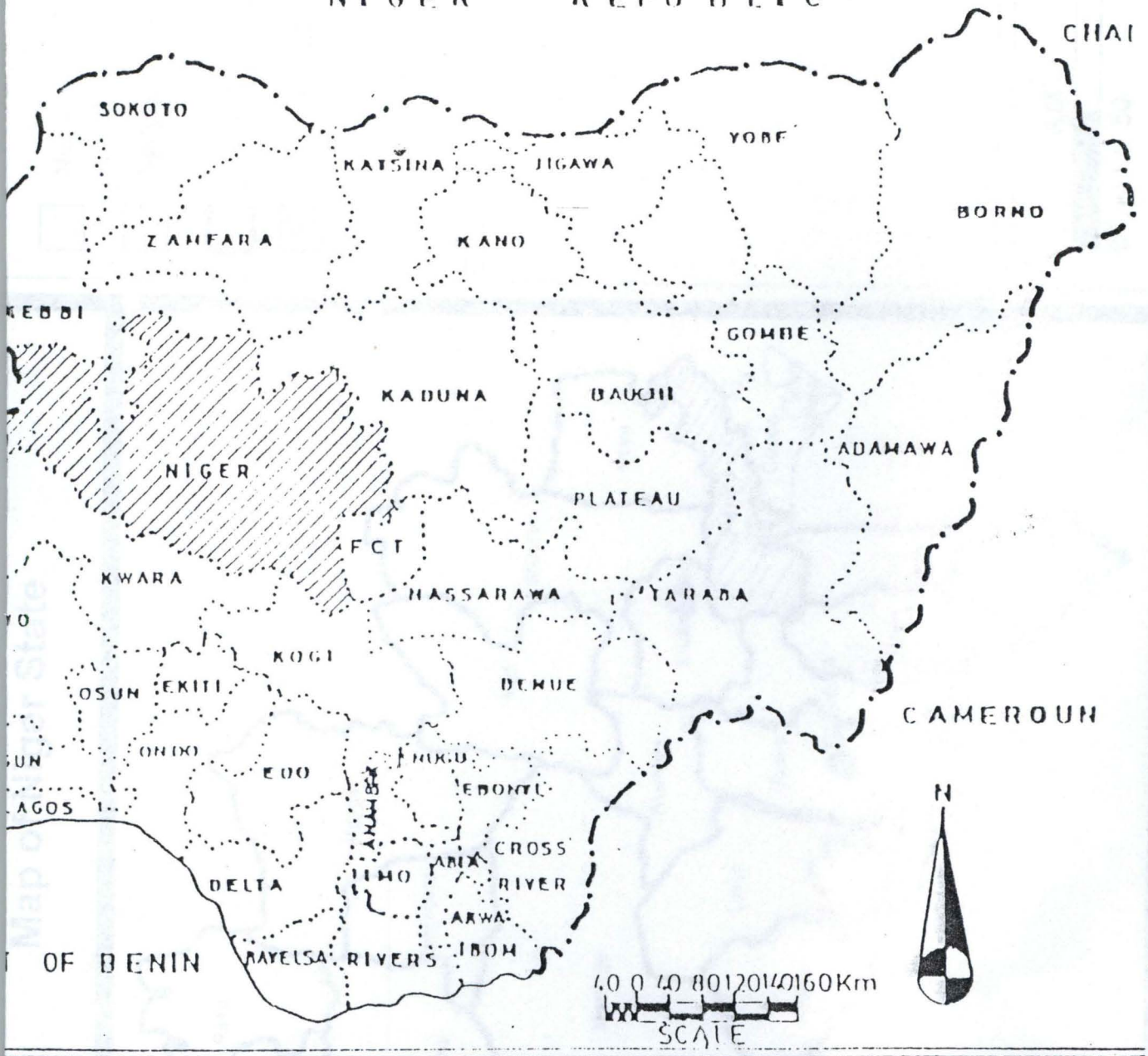


Plate 1.3. Community water source (Pond)



LEGEND

National Boundaries . . . . . —·—·—

State Boundaries . . . . . ·····

Study Area . . . . . ▨

MAP OF NIGERIA INDICATING NIGER STATE

Source :- Geography Department F.U.T Minna (1999)

Fig 1.2

4. And to recommend or provide advice for the eradication of guinea worm infection in the study area and Nigeria in.

1.5 JUSTIFICATION OF THE STUDY

This study intends to assess the impact of UNICEF in the area of rural water supply and sanitation in the prevention of guinea worm disease in Paikoro LGA. Guinea worm disease has been recognized for many years (Muller 1977) and its occurrence reduced in some areas where it was previously highly prevalent, studies by Belcher et al, (1975) and Edungbola (1980 a,b) gave revealed that the disease is increasing in prevalence, distribution intensity and importance in parts of Nigeria and else where in the world, especially among the rural and poorly accessible communities where water availability is a major limiting factor and the knowledge of its mode of transmission is unknown.

The study will also present an account of the distribution endemicity, of the disease and the effects of Eco-climatic factors on the prevalence of the disease so as to prevent its outbreaks.

1.6 SCOPE OF STUDY

This study covers the whole Paikoro LGA, particularly communities where guinea worm disease is currently prevalent. Field surveys were carried out in the study area both in the dry and wet seasons. The guinea worm data focus on the prevalence, duration, age, water sources etc of the disease.

General constraints include personal experience of the researcher such as impossible terrain. Language barrier and retrieval of administered questionnaire from villages and getting some of UNICEF/NIGEP activities records.

CHAPTER II

2.0 LITERATURE REVIEW

2.1 Background

A lot of work has been done on guinea worm disease in Nigeria for example, the Nigeria guinea worm eradication Programme (NIGEP), established in 1988, has done a lot in the control and eradication of guinea worm in Nigeria, particularly in Niger State. NIGEP divided Nigeria into four health zones, with each zone supervised by a guinea worm zonal facilitator. The zonal facilitators form a direct link between the NIGEP – secretariat and state task forces (appendix 1). S.D. Onabamiro, in 1951-1958, carried out a research in South Western Nigeria which stands among the leading contributions worldwide to the knowledge of early stages of the development of Dracunculisis Medinesis in mammalian host. R. Muller 1971, discovered one hundred and sixty two (162) guinea worms, in 10 days he killed 43 in 48 days after infection, 153 of the discovered guinea worms were found in the subcutaneous tissues surrounding the auxiliary and lingual lymph nodes. Also in 1954 Onabamiro, identified up to 30 Cyclops species and sub pieces in ponds in South Western part of Nigeria, a which were new to science but 21 were the species responsible for infections in Nigeria. In 1979 M.O. Abolaran reported that a village called Wawa, near Kanji Lake, Borgu LGA of Niger State now. Out of 1678 persons examined, 98 people have Dracunculis Medinesis and he traced the source to a small lake created, by a cattle dam in close proximity to the village as reservoir of infection. L.D. Edumgbola, in 1985, estimated Nigeria and other West Africa country where the disease is endemic, active guinea worm transmission occurs virtually in every state, although the level of endemic varies. He projected that at present about 2.5 million of this experience temporary incapacity for 1-3 months while 12,000 suffer irreversible disablement.

In 1986, V.A. Ilegbodu, R.A. Wise, B.L. Christerise, and O.O. Kale, carried out study of guinea worm infection in Ibarpa district in Oyo State. And they arrived at the following prevalence of the infection at different times. 12.3%, 13.5%, 32.4% and 35%. And attributed to the following reasons.

1. Water supply to the district was generally low throughout the year.
2. There were extended periods in which no water was pumped to the place.
3. The volume of water pumped varied periodically, lower volumes (less than 40Lts/day recommended by World Health Organization for tropical climate), usually during the daytime.

L.D. Edumgba, and S.J. Watts, (1983) carried out an investigation on the epidemiological assessment of the distribution and endemism of guinea worm infection in Asia, Kwara State. And showed the disease was widespread and highly prevalent there, 6,250 people in eleven (11) villages were examined and 53% had the infection and more adults than children showed evidence of active dracunculiasis.

In the area studied prior to the water installation project, 5058 individuals were examined. And a total of 2422 (47%) individual had either Dracunculiasis blisters or ulcers. An overall reduction of 71.8% was achieved in 18 months following water supply provision. He attributed that to the provision of piped water reduces the transmission of the disease.

2.2 GENESIS OF GUINEA – WORM DISEASE

The disease is a disabling infection, transmitted through drinking water containing cyclopoid copepods (water fleas), harboring infective larvae of parasite. Dracunculiasis Medinesis. Once a person has drunk guinea-worm infested water, it takes about one year for the guinea-worm to mature and move to a position where it emerges form the person's body when the worm is ready to come out, a blister appear (plate 2.2) which cause a painful burning feeling.

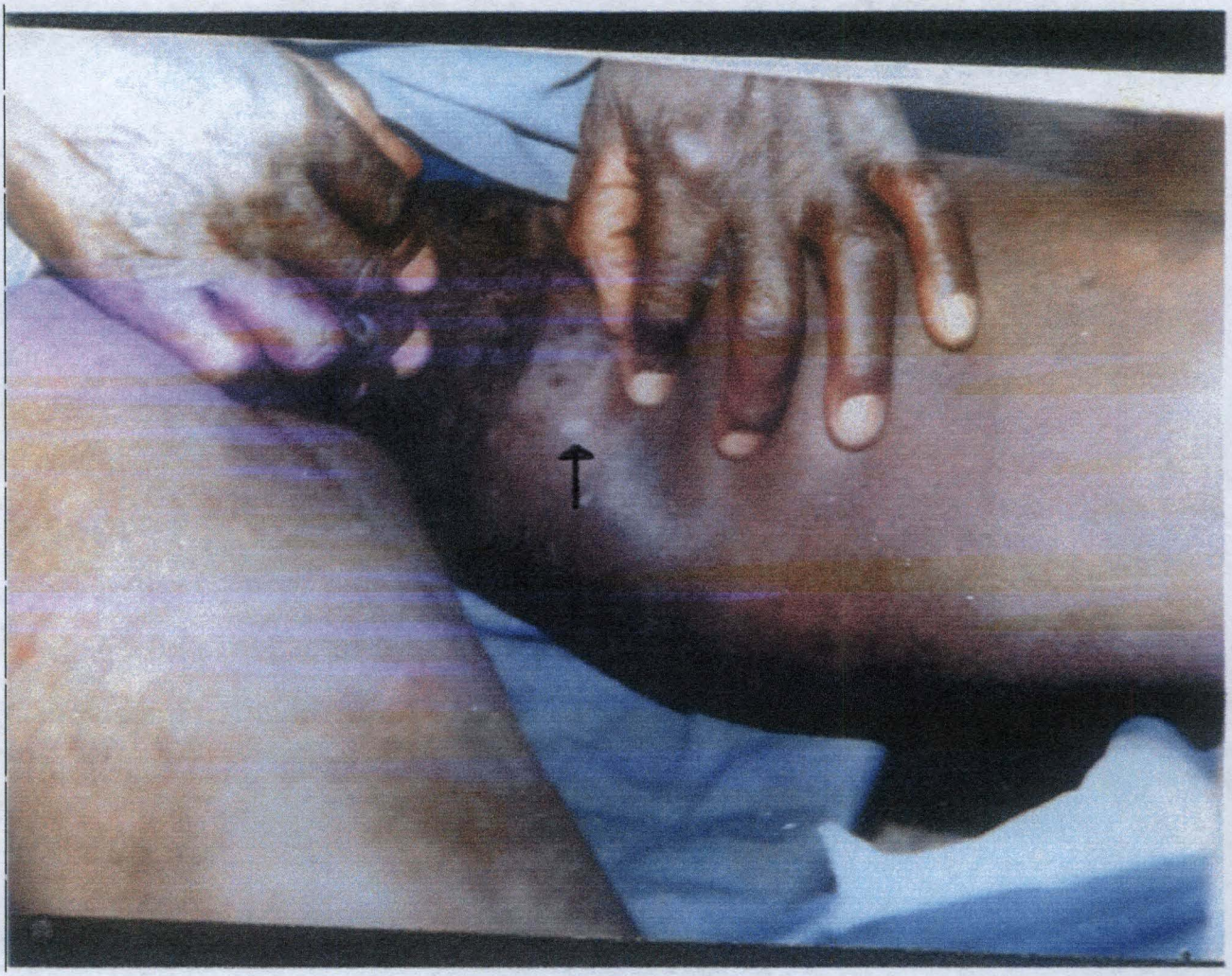


Plate 2.2 Painful blister - i e boil like vesicle at the lap.

The infected person may try to relieve the pain by immersing the blister in water.

When coming into contact with water, whether to relieve the pain, or to gather drinking water, or for any other purpose, the blister breaks and thousands of tiny guinea-worm larvae are expelled into the water.

The most common place for a worm to come out of the body is either the legs or the feet. However, a worm may sometimes emerge from the hand, arm, head, breast, chest or other part of the body. It may be possible for some one to have guinea-worm coming out at once from different sites. Once in the water the guinea-worm larvae either die or are eaten by water flees called Cyclops. Inside the Cyclops, the larvae continue developing. When a human drinks the water containing these Cyclops with guinea-worm larvae inside, the human provides the final home where the guinea worm can continue its development into the adult. Over the next year, it matures, and mates in the human's abdomen and then it migrates to the surface of the skin to emerge as an adult. And so the cycle continues.

2.3 VECTOR CONTROL

The effective means for the eradication and the spread of guinea-worm disease include;

1. Constructing safe water sources e.g. boreholes, dug wells and rain harvesting.
2. Filtering drinking water, with use of straw cloth.
3. Boiling drinking water, which kills other disease causing germs.
4. Building physical barriers to keep infected people from entering drinking water e.g. walls around wells, fences around pond.
5. Health education and community action to deter infected persons from entering water, e.g. information campaign designation persons to gather water for infected persons.

2.4 CLASSIFICATION OF GUINEA – WORM

Classification of guinea worm is based on the stages of development disabilities as;

1. Pre-emergent (Mild) – Disability where a patient is mobile and suffers little or discomfort.

2. Emergent (Moderate) – Disability is where the patient is mobile but suffers a considerable discomfort.

3. Complicated (Severe) – Patient is immobile, or is unable to use the affected limb and suffers a considerable discomfort.

The disability could be physical but sometimes emerges from the scrotum and which could interfere with one ability to produce children.

Studies shows there is no effective drug that could stop developing larvae or destroy the mature worm in human body. It was observed that the infected people resort to making incisions (sakiya) at the site of guinea worm swelling (a thin iron rod placed in fire until its tip has become red-hot. It is brought out and places on the skin suspected to be harbouring the worm). This is mostly done in a gently manner, because breaking the worm can cause serious complications.

And this only helps to reduce the negative consequences of guinea worm infection as to:

1. Alleviate the patient's pain and suffering.
2. Prevent serious complications
3. Return the patient to normal life and work as early as possible.

Stages, signs and symptoms of guinea worm could be grouped as follows:

Table 2.1 Classification of Guinea worm Diseases.

STAGE	SIGNS AND SYMPTOMS
Pre-emergent	Blister, localized itchiness or burning, mild-swelling, mild pain, worm visible under skin.
Emergent	Reputed blister, one to three worms emerging, no or localized secondary infection, moderate pain, limited or no incapacitation e.g. patient still unable to perform daily routine tasks. E.g. bathing.
Complicated	Cellulitis, discoloration, extensive swelling, involvement of joint e.g. Knee, elbow, location of worm in breast or genital region.

Source: NIGEP

CHAPTER III

3.0 METHODOLOGY – TECHNIQUES OF DATA COLLECTION AND ANALYSIS

3.1 DATA COLLECTION

The data gathered for this study covered and represented the area under study. The data is reasonably adequate and reliable enough for the identification and analysis of the aim and objectives of this study. This study was carried out in Paikoro Local Government area, with a population of (109,356) as at 1991. The study was based on data from three types:

1. The prevalence data obtained through the use of questionnaire.
2. The transmission site data based on survey of ponds and other water sources used in the communities.
3. The prevalence data obtained from UNICEF Programme in the area of rural water supply project.

3.1.1 Data Prevalence of Guinea Worm

Data on guinea worm disease prevalence were obtained for the period of (1991 - 1994). The surveys were carried out on a house to house basis to record respondents age, community, sex, occupation, level of education, marital status, duration of residence in the community and source of drinking water. When an infected person was found, the number (location of worm ulcer on the body), duration and severity of the infection were determined and recorded. In addition, information on the medication used, the type of water treatment practiced and the perceptions of the origin of the guinea worm disease, its mode of transmission, its impacts, when it was first introduced into the village and when (during the year) the disease is most prevalent. (Appendix 1).

3.1.2 Survey of Communities' Ponds and other Domestic Water Sources.

Information on water sources was obtained from communities' residents and visits the locations of the communities' domestic water sources (natural and man made). Samples of water were collected from endemic villages of the Paikoro LGA form borehole, ponds and hand-bug wells used as drinking sources. On the same day of the collection, 5ml, of 10% formation were added to a liter of each sample to immobilise the Cyclops. And later found out the water from pond and some hand-big well contains Cyclopes. And this data were augmented with data from numerous agencies and ministries in Niger State and Nigerian Guinea Worm Eradication Programme (NIGEP) North West Zonal Office, Ilorin.

3.1.3 Data Prevalence from UNICEF Programme and NIGEP.

Data of UNICEF activities in the area of rural water supply for the eradication of guinea worm disease for period of (1991 - 1994). It was shown that UNICEF had commentated a lot of resources (fund) to Paikoro LGA via Niger State through WATSAN project for the construction of boreholes (Appendix 02) and other alternative water source for example, dug wells and spring water development. Information was also obtained from statistical summaries of National task force on Nigeria guinea worm eradication programmes, Ministry of Health, Niger State.

3.2 COMPUTATION SHCEMES AND EQUATIONS

3.2.1 Index of Endemicity

The proportion of infected persons to the number of respondents in the study area using the index of Endemicity (I.E), formulated by the author. This is a quantitative expression of the number infected persons against the number of respondents in all communities in Paikoro LGA. This is expressed as:

IE = $C X {}^{x}/_{y}$, where

IE = Index of Endemicity

C = No. Of Infected Communities in Paikoro LGA,

X = No. Of Infected Persons,

Y = No. Of Respondents,

The implication of this index is summarized in tabular form in table 3.1.

Table 3.1 Index of Endemicity

S/NO	INDEX OF INFECTION	IMPLICATION
1	1<1.20	Hypo-endemic
2	1.25<1.40	Mildly endemic
3	1.45>1.90	Highly-endemic

The classification intervals in table 3.1 are based on author's fieldwork (2003).

3.2.2 Index of Incapacitation

3.2.3 This index was used to measure the level of severity of guinea worm infection on the affected community. It is measure of ration of number incapacitation over the ratio of number infected by guinea worm during the study period.

I.e. I.I. (Index of Incapacitation) $= \frac{\text{No. Of infected persons incapacitated}}{\text{No. Of infected persons.}}$

A person was said to be incapacitated if he or she could not perform effectively their daily domestic duties such as going to school, farm, playing and fetching water.

3.2.4 Index of Susceptibility

Variation in infection was analyzed using the susceptibility index (S.I). This is a quantitative expression of degree of susceptibility of residents in the endemic communities to guinea worm infection using the number of guinea worm cases and the number of safe water sources.

S.I $^{x}/_{y}$

Where S.I. = Susceptibility Index

X = No. Of guinea worm cases

Y = No. Of Safe water sources

The implication of this index, which is based on author's field survey, is presented in table 3.2

Table 3.2 Susceptibility Index Table

S/NO	INDEX OF INFECTION	IMPLICATION
1	≤ 0.00	Extremely Susceptibility
2	$< 0.00 \leq 0.167$	Moderately Susceptibility
3	> 0.167	Mildly Susceptibility

CHAPTER IV

RESULTS

4.1 SOCIAL ASPECTS OF GUINEA WORM INFECTION

4.1.1 General Distribution Patterns

Studies carried out for the period of (1991-1994) revealed that sixteen communities area are currently endemic of guinea worm disease such as,

1. kusura
2. Gwam
3. Jere Paipi
4. Karkato Sindagbe
5. Nagoyi
6. Topi
7. Bugo Tumbi
8. Gabadna
9. Tunga Gana
10. Nagopita Jatai
11. Yidna Sandiyi
12. Jita Nupubi
13. Lukpma
14. Yunga Mallam
15. Nagogi Kukugbe
16. Dagbe.

Source: Author's Field Survey, 2003.

Questionnaire distributed was based on the number of communities/villages endemic of guinea worm in Paikoro Local Government Area (LGA).

A total of 800 questionnaires were randomly administered, fifty (50) per community and a total of 647 (80.88%) were filled and of these 198 respondents or 30.50%, of total sample were suffering from guinea worm disease (see table 4.1).

Table 4.1 – Number of Questionnaire Administered and Retrieved in the Communities.

LGA	No. of Communities Surveyed	No. of Questionnaires Administered	No. of Questionnaires Retrieved	% in LGA /Study Area
PAIKORO	16	800	647	80.88

Source: Author's Field Work 2003.

4.1.2 Guinea worm Endemicity in Paikoro LGA.

Using the index of endemicity (see table 4.2), showed that Paikoro Local Government with an index of 4.9 was endemic in terms of villages infested and also in terms of number of subjects infested during the survey. Paikoro with a total number of 198 infected subjects found during the survey.

Table 4.2 - Index of Endemicity

LGA	No. of Communities	No. of Respondents	No. of Infected	% in LGA	CX X/y
PAIKORO	16	647	198	30.60	4.9

The community like Tunga Gana has a total of 105 infected persons with account for 53.0%. And Dagbe that has one (1) infected person that represent 0.5%. (see table 4.3). Thus, from the index of endemicity table (Table 3.1) Paikoro LGA showed out clearly to be highly endemic area.

Table 4.3 – Guinea worm Endemicity Villages/Paikoro LGA

S/NO	VILLAGES	NO. OF INFECTED PERSON	PERCENTAGE IN PAIKORO (LGA)
1	Tunga Gana	105	53.0
2	Jita Nupubi	23	11.6
3	Napopita Jatai	17	8.6
4	Tunga Mallam	9	4.6
5	Bugo Tumbi	8	4.0
6	Kasura	6	3.0
7	Topi	5	2.5
8	Yindayi Sandiyi	5	2.5
9	Gwam	4	2.0
10	Lukpma	3	1.5

11	Nagoyi Kukugbe	3	1.5
12	Jere Paipi	3	1.5
13	Karkato Sindagbe	3	1.5
14	Gabadna	2	1.0
15	Nagoyi	1	0.6
16	Dagbe	1	0.6
	TOTAL	**198**	**100**

Source: Author's Field work 2003.

4.1.3 Prevalence of Guinea worm Disease by Age and Economic Implication.

Table 4.4 Shows lower prevalence guinea worm disease in children below the age of 10 years (16.7%) than the older subjects who has active guinea worm infection (83.3%).

Table 4.4 – Prevalence of Guinea worm Disease by Age

Age Group (Yrs.)	No. of Subjects Interviewed	No. of Subjects Infected	% per Age Group
<10	95	33	16.7
10-25	130	63	31.8
26-55	220	71	35.9
>55	202	31	15.6
TOTAL	**647**	**198**	**100.0**

Source: Author's Field Survey 2003.

The observed lower prevalence among children under 10 years old than among the older subjects could be attributed to variation in the degree of exposure (see section 1.2), which prevented the manifestation of defection of guinea worm disease in children less than one year old. Furthermore, exceptional care of children in the form of extended breast feeding and boiling

of their water with various leaves, roots and other medicinal products, could be important in killing most of guinea worm larvae contained in the Cyclop which children infest with their water.

The disease was found to be high in the adolescent (10-25) the youths and adults (26-55). These groups represented the major productive age groups. These age group together accounted for 134 (67.6%) of the 198 infected subjects. The effects of the guinea worm disease on these age groups had a formidable impact on productivity and development of the affected areas. Prolonged illness of farmers, which overlapped, with critical period of farming activities, affected agricultural productivity and caused poverty and misery.

A comparative study of income of infected person before and during infection is shown in table 4.5 and 4.6. it was observed that the number of those who earn over N20,000.00 before infection dropped from 60 (30.3%) to 45 (22.7%) during the infection. Similarly, the number of those who earned between N5,000 – N10,000 and the number of those who earned less than N1,000 increased from 20 (10.1%) t0 55 (27.8%).

The per capital income in the Paikoro LGA is drastically reduced by guinea worm infection implying that poverty level of infected subjects will be high which in turn will make it difficult to "access" medical treatment.

Table 4.5 – Income or Productivity before Guinea worm Infection.

Years	>20,000	10-20,000	5-10,000	1-5,000	<1,000	Total
91	19	15	8	8	6	56
92	14	13	7	6	4	44
93	15	14	14	5	7	55
94	12	11	12	5	3	43
TOTAL	**60**	**53**	**41**	**24**	**20**	**198**
%	**30.3**	**26.8**	**20.7**	**12.1**	**10.1**	**+00.0**

Source: Author's Field Survey, 2003.

Table 4.6 – Income or Productivity During Guinea worm Infection

Years	>20,000	10-20,000	5-10,000	1-5,000	<1,000	Total
91	15	9	12	12	24	74
92	13	7	8	8	11	51
93	7	7	5	9	10	38
94	10	2	3	10	10	35
TOTAL	**45**	**25**	**28**	**45**	**55**	**198**
%	**22.7**	**12.7**	**14.1**	**22.7**	**27.8**	**100**

Source: Author's Field Survey, 2003.

4.1.4- Prevalence of guinea worm disease by sex.

Table 4.7 reveals that there was no much difference between male and female infection rate. And this could be due to similarities in the degree of exposure, as everyone in the communities drank from the same water sources.

Table 4.7 – Prevalence of Guinea worm By Sex.

Sex	No of infection	% of infection
Male	100	49.5
Female	98	50.5
Total	198	100.0

Source: Author's field survey, 2003.

4.1.5 – Prevalence of Guinea Worm By Occupation.

As shown in table 4.8, the bulk of the infected respondents were farmers. This is obviously so because of the setting of the communities (i.e. rural). About 45.5% of these infected were farmers, this was followed by Traders (20.2%). Followed by Students, unemployed and civil servants accounted for 19.1%, 8.1% and 7.1% respectively.

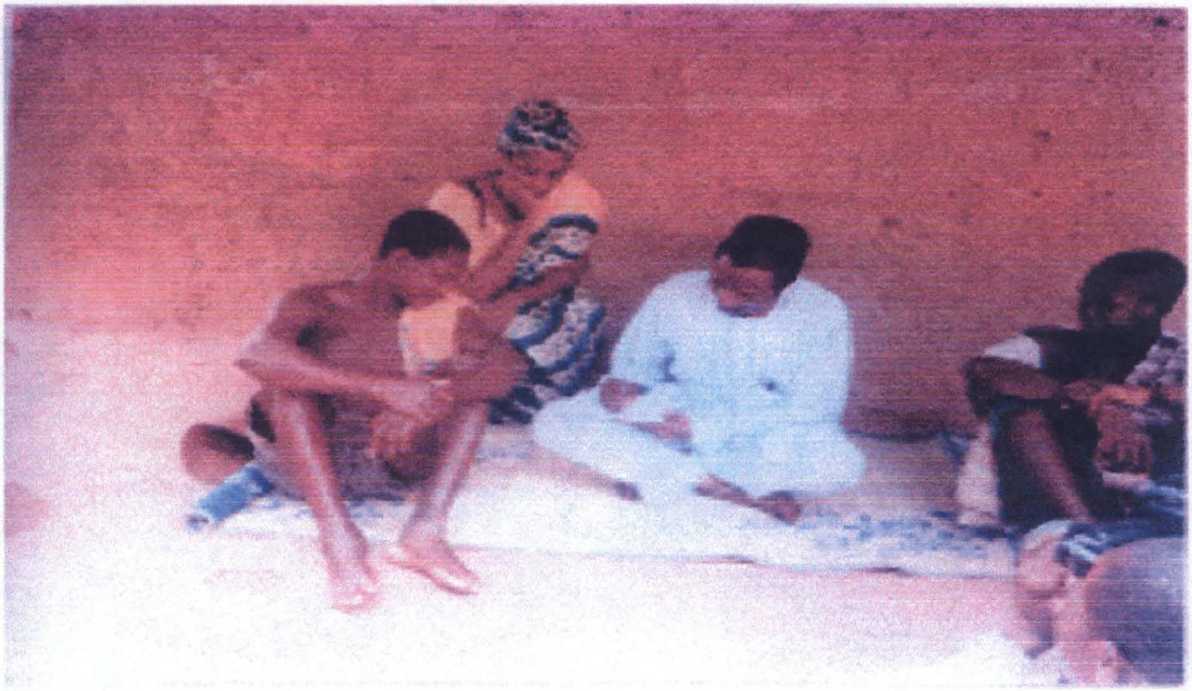


Plate 4.1 Guinea worm disease located below knee

Plate 4.2 Lesion located at the ankle.

Plate 4.3 Lesion located below the ankle.

Plate 4.4 Lesion located at the wrist and the breast.

Table 4.8 – Occupation of Subjects Infected by Guinea worm.

LGA	Unemployed		Civil Servant		Farmer		Trader		Student		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	
Paikoro	16	8.1	14	7.1	90	45.1	40	20.2	38	19.2	198
%		**8.1**		**7.1**		**45.1**		**20.2**		**19.2**	**100**

Source: Author's Field Work, 2003.

4.1.6. Anatomical Location of Guinea Worm Lesion.

Most infected subjects (87.4%) found during the survey had their lesions (wounds) below the knee particularly around the ankles (see plate 4.1-4.2). The rest had them at anatomical sites, which confirm to those of various literature review (see plate 4.3 – 4.4).

Since infection were predominantly located below the kneel, most farmers, because of their inability to walk long distances abandoned their distance fertile farmlands for the barren and insufficient farm areas just outside the residential area. For the same reason women left food crops un-harvested on farms. All these resulted to low income and productivity (see section 4.1.3).

Table 4.9 – Anatomical Location of Guinea Worm Lesions.

LGA	Above the Kneel		Below the Kneel		Total
Paikoro	No	%	No	%	
Total	**25**	**12.6**	**173**	**87.4**	**198**
%		12.6		87.4	100.0

Source: Author's Field work, 2003.

4.1.7 Severity of Infection Measured by Level of Incapacitation.

The severity of the disease was measured by the number of incapacitated subjects (see appendix 2 item 10 and section 3.2.2). About (79.3%) in the

study area were incapacitated to the extent that they could not perform effectively their daily activities, such as going to farm, school or market etc. The rate of incapacitation was high among the old 88.7%, and the youngest with (78.8% of the subjects infected in this age group were incapacitated) see table 4.10.

The age related resistance resulted largely for the greater debilitating effect of guinea worm disease on the young and old subjects than other age groups in the study area.

Table 4.10 Severity of Infection Determination by the Number of Incapacitated Subject in Different Age groups.

Age Group	No. of Infected Subjects	No. of Subjects Incapacitated	% Incapacitated in each Age	Overall % of Incapacitated Subjects
<10	33	26	78.8	16.6
10-25	63	47	74.6	30.0
26-55	71	63	88.7	40.0
>55	31	21	67.7	13.4
TOTAL	**198**	**157**	**79.3**	**100.00**

Source: Author's Field Survey, 2003.

4.2 ECOLOGICAL FEATURES ASSOCIATED WITH THE PREVALENCE OF GUINEA WORM.

4.2.1 Transmission Site (Water Sources).

In all the communities studied, their main source of water during the dry and rainy season were ponds (see table 4.11).

Table: 4.11 – Distribution of Infected People by Source of Water

Source of water	No of infected subject.	Percentage
Pond	166	83.8
Hand Dug wells	20	10.1
Bore Holes	12	6.1
Total	**198**	**100.0**

Source: Author's Field Survey, 2003.

About (83.8%) of the infected subjects had ponds as their main water sources. The ponds were either shallow or deep. The water in the deep ponds was cleaner than those in the shallow ponds. Usually ponds near the villages were used during the rainy season while those a little far away from the villages were used during the dry season, when ponds near to the villages were dried up.

While Hand-dug wells were located at various distances usually not more than 1.5 kilometers from the communities. Hand-dug wells observed were used for domestic purposes such as drinking, bathing, washing of clothes and other domestic activities. Drinking water was stored in pots made up of clay, metal or plastic with practically no treatment.

During the period of transmission (dry season mainly) when water volume had reduced considerably due to intense heating from the sun and subsequent increase in evaporation rate bathing and washing did not occur directly in these ponds, but water was habitually fetched by wading a few feet into the ponds where a bucket, bowl or calabash could be easily be filled. The indiscriminate digging of soil in desperate search for water during the peak of water scarcity, have given rise to the multiple sites of transmission within the ponds.

The examination of water samples taken from the communities ponds, hand-dug wells and from water storage pots revealed the presence of Cyclops, poor colour, taste and odour.

The water samples from the few available boreholes were free from Cyclops. This makes the boreholes the only safe water sources in the community. Most of the boreholes were non-functional and couldn't be relied upon for the domestic water needs and this accounted for (6.1%) of the infected subjects. Using the number of safe water sources (available functional boreholes and Hand-dug wells provided by UNICEF) and the number of guinea worm cases in each community, susceptibility index was used to calculate the degree of exposure of the subjects in these endemic communities to guinea worm disease (see section 3.2.3). The susceptibility index indicated that seven (7) villages were extremely susceptible to guinea worm disease and this represent (43.8%). The susceptibility index also revealed that four villages were moderately susceptible while five communities were mildly susceptible (see table 4.12).

Table 4.12 – Calculation and Tabulation of Susceptibility Index.

S/NO	VILLAGES	NO. OF CASES (X)	No. of available safe Water Source	Index of Susceptibility (y/x)
1	Tunga Gana	105	5	0.05
2	Jita Nupubi	23	2	0.09
3	Napopita Jatai	17	1	0.06
4	Tunga Mallam	9	2	0.20
5	Bugo Tumbi	8	1	0.13
6	Kasura	6	2	0.33
7	Topi	5	0	0.00
8	Yindayi Sandiyi	5	0	0.00
9	Gwam	4	0	0.00
10	Lukpma	3	0	0.00
11	Nagoyi Kukugbe	3	0	0.33
12	Jere Paipi	3	1	0.33

13	Karkato Sindagbe	3	1	0.00
14	Gabadna	2	1	0.50
15	Nagoyi	1	0	0.00
16	Dagbe	1	0	0.00

Source: Author's Field work 2003.

4.2.2 – Seasonal Distribution of Guinea Worm Disease.

The critical periods with respect to guinea worm infection were dry season, early rainy season and late rainy season (see table 4.13). During the dry season intense sunshine and low humidity facilitate the evaporation of water from ponds and other open surfaces. Dry season (i.e. is between November to March) recorded the least number of (5.1%) of guinea worm cases, followed by late rain of August – October having (14.1%). The rainy season (April-July) recorded the highest number of guinea worm cases of 80.8%. The transmission period coincidence with the dry season, because of the insufficient water supply during the dry season. However, the manifestation of the disease coincide with the rainy season because of the incubation period of the disease.

Table-4.13-Number of Guinea Worm cases by seasons

LGA	Nov.-Mar Dry Season	April-July Early Rainy Season	Aug.-Oct. LRS	Total
Paikoro	10	160	28	198
Total	**5.1**	**80.8**	**14.1**	**100**

Source: Author's Field Survey, 2003.

4.3 – Prevalence of UNICEF in the Eradication of Guinea Worm Disease

4.3.1 – UNICEF Assessment

Niger State has been one of the states in Nigeria, that is suffering cases of water borne and excreta-related disease e.g. guinea worm, diarrhoea etc which is common among the rural populace particularly in Paikoro Local Government

Area, that is highly endemic in guinea worm cases. To eradicate these disease safe potable water and good environmental sanitation is a cornerstone to the success. In light of these UNICEF an international organization donated two new drilling Rigs to Niger State in 1987, for the provision of rural water supply to guinea worm endemic villages and other villages in need of water (see appendix 3).

4.3.2 – Water Supply and Water Status.

Between 1991-94, UNICEF assisted in the construction of boreholes in the infected guinea worm disease communities. About 56.3% were provided with boreholes, while 47.3% are still waiting for the safe water supply (see table 4.12). in the area of water status, about 43.8% had safe water supply, while 56.2% had no safe water (see table 4.13).

Table 4.14 – Water Status

LGA	No. of Villages with functional borehole	No. of Villages with non-functional borehole or without	Total
Paikoro	7	9	16
%	**43.8%**	**56.2%**	**100**

Source: Author's Field Survey, 2003.

4.3.3 – Health Education

A large percentage of infected communities received health education (68.8%), while about (31.2%) required health education (see table 4.14).

Table 4.15 – Health Education Coverage.

LGA	No. of Villages that received H.E.	No. of Villages without Health Education	Total
Paikoro	11	5	16
%	**68.8%**	**31.2%**	**100**

Source: NIGEP, Niger State.

4.3.4 – Filter Distribution in the Infected Communities.

43.8% out of the total infected villages have been supplied with filters. Other infected villages of 56.2% still have problem of filters not supplied to them (see table 4.15).

Table 4.16 – Filter Received in Infected Villages

LGA	No. of Villages with Filters	No. of Villages without Filters	Total
Paikoro	7	9	16
%	**43.8%**	**56.2%**	**100**

Source: Author's Field Survey, 2003.

4.3.5 – Village Health Workers Established in Infected Villages.

Only (31.2%) of the infected villages had village health workers formed with the help of UNICEF. The remaining (68.8%) lack village health workers (see table 4.17).

Table 4.17 – Village Health Workers Established.

LGA	No. of Villages with Filters	No. of Villages without Filters	Total
Paikoro	5	11	16
%	**31.2%**	**68.8%**	**100**

Source: Author's Field Survey, 2003.

CHAPTER V

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

The study has investigated the role of Climatic, ecological, social variables in the pattern of spread of guinea worm disease and UNICEF, Impact Assessment in the provision of rural water supply and sanitation in Paikoro LGA. The studies observed that sixteen communities in Paikoro LGA are currently endemic with guinea worm disease are predominantly in rural and poorly accessible area with unsafe drinking water sources. Transmission of guinea worm disease takes place during the dry season and early rainy season while the manifestation of the infection occurs during the rainy season. Hence the highest record coincide with the critical period of farming activities, leading to the low productivity.

This study had highlighted the eco-climatic and social characteristics and implications associated with the prevalence of guinea worm disease in the study area. This study also reveals that over 80% of the subjects were using water (ponds and hand-dug wells) infected with Cyclops (intermediates host) of the infective guinea worm larvae (see section 4.2).

The spread of the infection is largely due to ignorance of the mode of its transmission and high density of infected Cyclops in the stagnant ponds where the communities obtain their drinking water. This situation makes the susceptibility rate of all the individuals in the affected communities very high especially during the dry season and early rainy season (see section 4.2.2).

The study also reveals that guinea worm disease (dracunculiasis), is caused by a thread like round worm called Dracunculus Medinacasis. This disease is endemic at various degrees in sixteen communities of Paikoro LGA (see section 4.1.2). The excessive and prolonged guinea worm incapacitation were largely due to multiple infections, the anatomical location of the infections and secondary bacterial infection resulting from negligence, ignorance and

unhygienic procedure of local management. And this prolonged illness has important socio-economic consequences in the infected communities.

This study also show the UNICEF, contribution in the area of provision of rural water supply to the endemic guinea worm communities and other villages in need of water (see appendix ix 2, section 4.3). Although the cases was still high as a result of non-functioning of boreholes provided and non in some villages (see table 4.14). This reveals that successful eradication of guinea worm disease lied on what people do that is by their behaviours and practices.

5.2 Recommendation

As a result of the implications (social, agricultural, economic) highlighted in the study. Due to the nature of the life cycle of guinea worm, the worm is very vulnerable to small changes in the environment and it is not unrealistic to hope for its total eradication. On social and eco-climatic variables influencing the endemicity of dracunculiasis (guinea worm) in Paikoro LGA, the following are recommended for the eradication of guinea worm disease.

1. More attention should be given to climatic parameter guinea worm disease to understand the mechanism that affects the incidence and spread of guinea worm disease.

2. It must be emphasized that although provision of potable water may did in the control of the disease, the approach towards the goal must be simple technology and easily maintain. Experience with some endemic communities (e.g. Tunga Gana) had indicated that the provision of the borehole alone could not bring about complete guinea worm eradication because non-functioning of the borehole and unfavourable geological conditions. An intensive geological study of the communities must be

carried out before installing boreholes and trained based mechanics to ensure the workability of such boreholes.

3. Health education, which brings about positive impact on the cultural norms, will also be required as well as follow up surveys for the boreholes.

4. The local method of treating managing guinea worm disease is crude, unsafe and has resulted in serious complications, including death, the practice should be discouraged through the introduction of environmental education on the implications of guinea worm disease in the local government area and public awareness through seminars, conferences etc organized for the people in the study area. Effective prevention and control of guinea worm requires the education of community members.

5. Improve hand dug wells (with rims and covers) should be encouraged in the endemic communities as it could be easily be constructed and maintain than borehole. Finally LGA, State, Federal Governments and International Agencies should further support the infected communities through the provision of safe water and logistical support.

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APPENDIX 2

QUESTIONNAIRE (FOR THE VILLAGERS OR PATIENTS)

GUINEA WORM DISEASE IN PAIKORO LGA, NIGER STATE.

Age of respondent

. <10 yrs ☐ (2) 10-20 yrs ☐ (3) 20-30 yrs ☐ (4) 30 yrs & above

SEX – Male..... Female.....

Marital Status.

(a) Single (b) Married (c) Divorced (d) Widowed.

Level of Education.

(1) Non formal Education (2) Formal Education

Religion

(a) Moslem (b) Christian (c) African Traditional Religion (d) Paganism

Occupation:

(1) Civil Servant (2) Farmer (3) Trader (4) Student (5) Unemployed.

Duration of residence in the Community

(1) <2years (2) 2-4 years (3) 4-10 years (4) 10-15 years

Source of drinking water during the rainy season.

(1) Hand-dug Well (2) Spring Water (3) Borehole (4) Pond.

The number of people infected in the household.

(1) None (2) 1-2 (3) 2-4 (4) 4-10 (5) All.

When infected person(s) was first found.

(1) <1 month (2) 1-3 months (3) 3-6 months (4) > 6 months.

What were the anatomical location (part of the body where the disease is manifesting).

(1) Leg (2) Upper Kneel (3) Upper Body

Duration of infection:

(1) < 1 month (2) 1-3 months (3) 3-6 months (4) > 6 months.

Severity of infection

Unable to perform daily routine (like going to farm, market, school etc).

(1) Full disabled (2) Partially disabled (3) Minor.

Number of disease lesions (infection sites)

(1) One (2) Two (3) Three (4) Four and above.

Any knowledge of the cause of guinea worm disease.

(1) Yes (2) No.

Do you know its mode of transmission?

(1) Yes (2) No.

Approximate annual income (or particularly equivalent) before infection

(1) >N20,000 PA (2) N10-N20,000PA (3) N5-10,000PA (4) 1-5,000PA

Approximate annual income (or particularly equivalent) during infection.

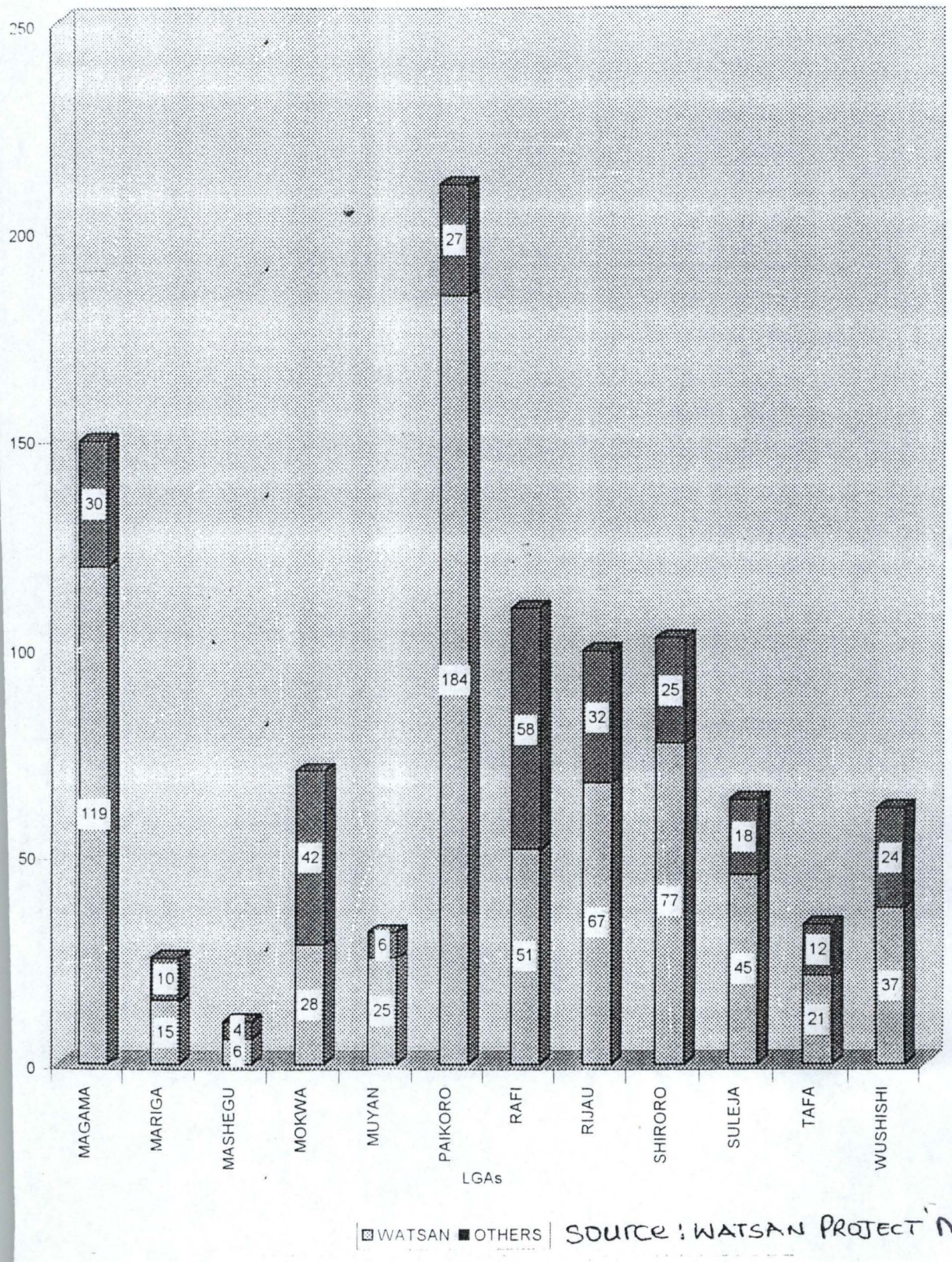
(1) N20,000PA (2) N10-20,000PA (3) N5-10,000PA (4) 1-5,000PA

When (during the year) is the disease most commons? (Time of emergence of adult worm).

(1) Dry season (Nov.-Mar.) (2) Early rainy season (April-July)

(3) Late rainy season (August-October).

STACK BAR CHART FOR BOREHOLES DRILLED BY WATSAN AND OTHER AGENCIES IN EACH LGA



SOURCE: WATSAN PROJECT MINNA.