

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
University of Khartoum

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**Socio-Health Impacts of Water Projects Implementation By:
Plan –Sudan Organization In ElTawila village, white Nile State**

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Dedication

I dedicate my research to:

- ❖ My father who taught me to pronounce my first letters.
- ❖ My mother who gives me warm love.
- ❖ My brothers and sisters who stood beside me.
- ❖ My colleagues who did not hesitate with their encouragement.
- ❖ All those who know scientific research and yearns for its benefits.

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Abstract

This study highlights the Socio-Health Impacts of the water projects implemented by Plan- Sudan organization in collaboration with ELTawila community in White Nile state, which is going to be measured in two dimensions namely; the socio-economic impacts and the health impacts. There is recognizable degree of instability among the rural people due to shortage of drinking water during summer season. Moreover, the children aged 8-15years particularly girls, are found to be directly responsible for fetching water on behalf of their family that affects their schooling.

The data collected using the questionnaire tested and fed to a personal computer using (SPSS) statistical package for social sciences. Descriptive statistics as mean, frequency and cross tabulation used to analyze the data. Frequency distribution and descriptive statistic were calculated. The sample size of these families was 105 respondents. The sample was selected randomly after divided the village to five areas.

The finding of this study was found that the water was unclean and untreated, the percentage of water related disease has increased, thus the families expenditure on health services increased. Families' water consumption rate is significantly increased after the project. The project has positive change on minimizing the expenditure on water and provides the stability of families and children.

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Chapter one

Introduction

1. 1. Research topic

We all believe that we can create a better world in which all people meet their basic needs like water, food, shelter and educationetc.

Water is one of the most essential needs for life. Without it, man cannot survive for more than a few days. God has made every living thing dependent on water for its very existence.

Water one of the fundamental resources, is at once one of the most common substances. Water covers most of the earth surface, but most of that is ocean, by volume. The water found in lakes, rivers, and the soil at underground levels shallow. This amount is regularly renewed by rain and snowfall and thus available on a sustainable basis.

Globally, of the three standard categories of freshwater use- for agriculture, industry, and domestic (personal, household and municipal). An overall basic water requirement of 50 liters per person per day as minimum standard to meet four basic needs – for drinking, sanitation, bathing and cooking.

In 1990, Gleick estimated 55 countries with a population of nearly 1 billion people did not meet this standard as a national average.

Yet the supply of freshwater is finite and threatened by pollution. In much of the world-polluted water, improper waste disposal and poor water management cause serious public health problems. Such water related diseases as malaria, cholera, typhoid and schistosomiasis harm or kill millions of people every year. About 2.3 billion people in the world suffer from diseases that are linked to water. Due to all this problems of water,

some NGOs have significant role to contribute in solution of these problems in developing countries.

Sudan is one of the developing countries, which faces the problem of water shortage and water pollution. This problem has led some NGOs to have interest in developing a concept of putting water problem as their first priority for solution.

1. 2. Problem Statement: -

According to the country strategic Plan (CSP), it has been found that only 2.8% of the rural people have accesses to safe drinking water all year around. The baseline data carried out for Guli locality show that there is recognizable degree of instability among the rural people due to shortage of drinking water during summer season. Moreover, the children aged 8-15years particularly girls, are found to be directly responsible for fetching water on behalf of the family. By so doing these, children will be exerting effort and time and in many cases, they lose the opportunity for education. On the other hand, their rural communities tend to use traditional unhealthy water sources that cause many of contaminated water related to diseases. In addition to that, the families spent high percentage of their income to buy water, which increase the burden of the families. Against this package, Plan-Sudan Guli program unit decided to participate with other partners, such as the government and communities to help in solving above-mentioned problems so, the PHC&WES program is the key plan intervention to solve this problem. Due to the mentioned facts the study need to measure the impact of water supply project whether the impact is positive or negative, which will affect the development of the area.

This study intense to explore the impact brought out by intervention;

- 1- Is there is negative impact between the socio-economic and water supply?
- 2- Is there is negative impact between health and water supply?

1. 3. Research Objectives:

- (1) To measure health impacts of water provision in terms of
 - 📄 To measure water related diseases.
 - 📄 To explore family income against health services cost
 - 📄 To examine population knowledge, attitude and practices (KAP) about water supply and sanitation and related diseases
- (2) To measure socio economic impact of water provision in terms of
 - 📄 To assess saving and spending rates.
 - 📄 To measure children education situation and retention.
 - 📄 To measure public services spending rate.

1. 4. Research Hypotheses:

- 1- Unclean water has negatives health impact in ELTawila village
- 2- Unclean water has negatives socio-economic impact in ELTawila village

1. 5. Research Methods

The data collected by using the following tools

- (1) The primary data collected from ELTaweela village through :
- (2) Interview with (leaders, health cadres such as medical assistant, public health officer...etc.
 - i. Questionnaires KAP (Knowledge Attitudes and Practice) adult male/ female
 - ii. Observation (walking) water source and houses.
 - iii. Focus group discussion (FGD)
- (3) Secondary data, which were available from, plan Sudan office, ministry of health, rural water corporation, and locality.

1.6. Data collection and analysis

The sample size of these families was 105 respondents. The sample selected randomly after divided the village to five areas. Data collected by using questionnaires to answer by families, interviewing with medical assistance , community leaders, water corporation and focus group discussion .

The data collected using the questionnaire tested and fed to a personal computer using (SPSS) statistical package for social sciences.

Descriptive statistics as mean, frequency and cross tabulation were used to analyze the data. Frequency distribution and descriptive statistic were calculated.

1. 7. Organization of the study:

Chapter one include Introduction about water source, water health problems and also the chapter include water problem statement in the area of study, objectives in term of measure health and socio- economic impact of the project , hypothesis and the questionnaire , interview and observation are the methods which used to assess the impacts . Chapter two includes the water provision and NGOs role in Sudan In chapter three, partake of the water in Sudan and area of the study. Chapter four content the frequency and chi-square tables and discussion. Chapter five includes the conclusion of the study and recommendation.

Chapter Two

Water Provision and NGOs in Rural Areas

2. 1. Water Provision

Some 70% of the earth's surface is water, but most of that is ocean. By volume, only 3 % of all water on earth is fresh –water and most of this is largely unavailable.

It constitutes two-thirds of body cell matter and 90% of all body fluids, including the blood as well as the lymphatic and spinal fluids. It is necessary for all biological processes, which have no place without the body. Furthermore, it contributes to the regulation of body temperature through perspiration.

Every day, the body excretes two to three liters of water: 1.4 liters through the kidneys, about 0.8 of a liter through the lungs and a very small amount through the intestines. This loss is compensated for by the fluid intake in food and drink.

Water is also essential for ablution, bathing, personal cleanliness, cleaning of one's home and personal effects, as well as for general hygiene. It is indispensable to agriculture and industry. (Prof. Abdel-Alfattah, 1995)

All the fresh water we find on earth is of salty origin, as it comes from seawater, which covers three- quarters of the surface of the earth.

There are three types of fresh water: atmospheric, surface, and deep or under ground water.

The term "atmospheric water" covers all that falls on earth in the form of rain, hail and the like.

“Surface water” refers to water found on the surface of the earth which may be flowing, as in streams and rivers, or still, as in lakes.

"underground water" is water which has seeped down through porous soil.

2. 2. Water in the Globe: -

At the beginning of the twenty first century, the earth, with its diverse and abundant life forms, including over six billion humans is facing a series of water crisis. (**Internet, 2006**)

All the signs suggest that it is getting worse and will continue to do so, unless corrective action is taken. This crisis is one of water governance, essentially caused by the ways in which we mismanagement. But the poor people, who are blighted by the burden of water related disease, living in degraded and often dangerous environment, struggling to get on education for Their children and to earn living and to get enough to eat.

Water related diseases are among the most common causes of illness and death, affecting mainly the poor in developing countries.

Water born disease causing gastro-intestinal illness(including diarrhea) are caused by drinking contaminated water, vector-borne diseases (e.g. malaria and schistosomiasis) are passed on by the insects and snails that breed in aquatic ecosystem, water washed diseases(e.g. scabies, trachoma) are caused by bacteria or parasites that take hold when there is insufficient water for basic hygiene (washing, bathing ,etc). in 2000, the estimated mortality rate due to water sanitation hygiene-association diarrheas and some other water/ sanitation-associated diseases (schistosomiasis , trachoma, intestinal helminthes infections) was 2,213,000.

There were an estimated 1 million deaths due to malaria. World wide over 2 billion people were infected with schistosomiasis and soil-transmitted helminthes, of whom 300 million suffered serious illness. The majority of those affected by water-related mortality and morbidity are children aged less than five years. (**Internet, 2005**)

2. 3. The Role of NGOs in Sudan: -

The term 'non governmental organization (NGO) came into current in 1994 because of the need for the UN to differentiate in its charter between participation rights for intergovernmental specialized agencies and those for international private organizations. (**Internet, 2006**)

Sudan like other developing countries, witnessed a process of rapid urban growth. The rural –urban migration, which led to a progressive overloading of housing and social services and deterioration in the urban environment. The provision of social services in these settlements became too difficult, making the government call the international community to provide assistance in the provision of services, which has been expressed by the intervention of NGOs to provide such services.

The UNDP, FAO, the government of Norway, Sweden and Denmark financial support to improve the monitoring of crop condition, nutritional and health surveillance.

There were many rehabilitation and developmental programmes already being implemented by the NGOs covering some areas of resettlement and rehabilitation in the area of health, natural resources, environmental and natural resources conservation, education and training and alternative energy sources.

NGOs provide different kinds of aids to the needy like emergency relief, disaster reduction and rehabilitation. They also worked hard to achieve a balanced and comprehensive long term development improvement of the welfare of the Sudanese people (**Khairy, 2002**).

In the field of water, sanitation and hygiene education no doubt that water supply and sanitation are basic needs, satisfying them represent meeting

requirements for survival, 60% of the population in developing countries live without adequate supply of drinking water while 75% live without any kind of sanitation facilities, so very high cost spent for eliminating water born diseases. For example, Action Conre La Faim has a wide spectrum of activities in this sector **(Ali, 2002)**.

Plan Sudan one of the international NGOs with a big role in sustainable development in some areas of Sudan.

2. 4. Background on International Plan – Sudan: -

Plan is an international humanitarian, child centered development organization. It supports development intervention in five domains- health, education, habitat, livelihood and building relationship between the developing and developing countries. The programs cover 45 countries and benefit children in Africa, Asia and Latin America. Resources for the programs are mobilized from 15 countries. Plan programs are implemented in economically poor areas within countries and Plan staff or partner are present at all levels of the program countries. This enables us to interact with the local line ministries as well as the communities about various development programs implemented by the local governments and Plan.

Plan is a non-governmental organization (NGO) and has consultative status with UNICEF (United Nations International Children's Emergency Fund) and UNESCO (United Nations Education, Scientific and Cultural Organization).

Plan Policy:

Plan's vision is of a world in which all children realize their full potential in societies, which respect people's rights and dignity.

Founded over 60 years ago, Plan is one of the world's largest international child-centered development organizations. It has no religious, political or governmental affiliation. Plan works with children, their families and communities in 45 of the world's poorest countries, building the skills, the structure and the recourse to give children an equal chance to develop into healthy, educated and responsible adulthood.

Through years of experience, Plan knows that the impetus for change must come from the communities themselves. Its staff put real emphasis on listening to all sections of a community, from the leaders to the most

marginalized groups of women, children and so on together; they discuss how the present and future lives of the children can be improved. Using an integrated approach.

Plan work is broadly based around five key areas; Health, learning, habitat, livelihood and building relationships. Individually, each of these areas is crucial to the development of the child, together, they provide a strong , integrated approach that focuses on the whole range of children's needs.

By actively involving all members of a community in the planning process, plan ensures their ownership of the subsequent projects. Plan works with them to develop the skills both to identify their needs. Plan helps them to develop and establish the recourses needed and to learn how to manage them most effectively in the long-term. In this way plan avoids the possibility of a community becoming dependent on external support. Instead, Plan ensures a real depth of understanding in the process of development and the ability to continue that development long after Plan has moved on.

Funding:

Raising funds in 15 countries, Plan raises one US\$ 300 million a year, primarily through child sponsorship. Sponsors make regular contributions to support Plan work in their specific sponsored child community.

This means it has access to predictable funds, allowing long-term work to be planned. Sponsorship donations do not go directly to the whole community so that all their children have the chance of better future.

Plan Sudan operates in Sudan in 1977. Specifically, covers three program units, located in Kassla Administrative unit, Um Shanig Administrative unit "at the eastern side or Gazira State" and Sulimanya at the southern side of Khartoum State. But at the early beginning of Eightieth of this century Plan had phased-out from Sudan to restart its programmes in the middle of

Eightieth of this century. Since its second phasing-in programmes units were relocated in a new areas - administrative units - including; Ed-Duweim, Alaga, Guli, and North Kordofan. In addition to the old programme unit of Kassala that still remains without change.

Here is a brief about the main country programmes through which Plan achieving its objectives.

Livelihood:

With strategic objective as: Improving children's welfare by increasing family income and food security

For many years, Plan has been helping the lowest income families to save money. One of our main activities involves setting up credit and savings groups that allow extremely poor individuals to save and borrow money to start small businesses or projects. This helps and encourages families to plan and take control of their own futures and provides a more secure environment for their children to grow up in. Local organizations such as Come to Save help us set up these groups.

Last year, there were 105 credit and savings groups with more than 10,000 members. Nearly 1,900 people benefited from low-interest loans.

Sukumer Roy, a shopkeeper, was one of the beneficiaries:

“Two years ago, I lost my right leg while I was working with a power tiller in the field. I had no way to survive financially. Now, I am saving for my

future security. I have taken a loan and established a grocery shop. I earn money every day and it helps me to increase my family income.”

Growing up healthy:

With strategic objective as: Ensuring children’s survival, protection and healthy development

In some parts of Sudan, communities have extremely limited access to health care. Last year, we set up a mobile health team (two medical workers and an administrator) to visit 21 villages at least once a month. The main purpose of the team was to provide check-ups to pregnant women who don’t have the means or money to travel to a clinic. The workers also trained 38 midwives, who created their own mobile clinics. The difference was marked, as Wagar, a new mother, explained:

“It was my first pregnancy. When I was almost nine months pregnant, the health workers discovered that I had some problems, so they transferred me to Kosti hospital for more consultation. To my astonishment, this consultation was free. Because of all this care, I have had my first delivery safely.”

Habitat:

With strategic objective as: Building secure, safe and healthy environments for children

The desert is encroaching deeper into Sudan, especially in areas where we work in White Nile State. Droughts (like the devastating one in 1995)

contribute to desertification, or the expansion of the desert, which means that farmers cannot grow as much food. Cutting down trees for firewood for cooking makes the problem even worse.

Last year, we implemented more projects to slow down desertification: 800 gas stoves and gas cylinders were distributed to families in six communities to reduce deforestation; fences were built to slow down the shifting sand dunes; and awareness-raising sessions and meetings were organised to find other solutions to stop the growing desert.

All these activities will help to ensure a better environment for communities to grow food, enabling them to better provide for their families as a whole and children in particular.

Learning:

With strategic objective as: Helping children, youth and adults learn and develop life skills

There are many barriers to receiving an education in Sudan, including a shortage of functioning schools, supplies and teachers. Last year, we increased access to education at many levels – pre-schools, primary schools, secondary schools and through adult education classes. In particular, we encouraged the enrolment of girls at all education levels. Some of the successes included:

- Furnishing and equipping 63 kindergarten classrooms
- Ensuring primary school children had access to 7,269 textbooks and 2,190 sets of supplies

- Training of 58 adult literacy teachers
- 125 sets of library books were sourced for primary schools
- 395 primary school teachers attended training, directly benefiting 21,275 pupils (**Internet, 2006**)

Chapter Three

Water in Sudan – El-Tawila area

3. 1. Water in Sudan: -

Sudan is the largest country in Africa with a geographical area around 250 million hectares and a population of 26.5 million. Political location bridging the Arab world to Africa. It has plenty of sunshine, vast productive land estimated at 84 million hectares while the actual area under crops has not exceeded 12 percent. It has also plenty of water resources from the Nile system, rainfall and ground water.

Extending from the arid north to the wet tropics in the south, Sudan has several agro- ecological zones with a variety of climatic conditions, rainfall, soil and vegetation.

3. 2. Water resources:

Water resources in the Sudan include surface water and groundwater spared over large parts of the country. Both resources are utilized for a agricultural production by the use of canal system from dams, pumps and embankments (flood) and wells.

Rainfall:

Rain is the major water resources for agriculture followed by the Nile system.

The Nile System:

The Nile system traverses Sudan from south to north. The Nile basin system in the Sudan comprises the blue Nile –rahad-dender

system, white Nile –bahr EL-Gabal /zaraf, Bahr-Ghazal and sobat machar system in addition to the main –Nile and the atbara system.

Ground water:

The potential renewable groundwater suitable for agriculture is estimated at 6-milliard m³. the main aquifer is Nubian sandstone covering about 28 percent of the surface water country.

The ground water quality is suitable for animal and human consumption as well as for agriculture and other uses in many part of Sudan.

However in some places such as the White Nile rejoin saline water is recorded and is not used by animals or human beings . (Salame, 1997)

Drinking water supplies have been provided for people and animals in most of the urban and rural areas, but stile more than 40% percent of rural areas and more than 25% percent in the urban are in need of safe drinking water supplies. Water use for industry and sanitation is still very limited. (Conference Khartoum, 1994)

3. 3. Guli Region: -

Guli region is considered to be one of the most important parts of the white Nile State, because of it's potential economic capacities and adequate human and natural resources. The development of this region will certainly contribute positively to the welfare of the targeted communities, in particular, and to the Guli program unit (This naming exclusively used by Plan Sudan) in general. Any developmental activities will definitely require adequate safe drinking water supply to be provided.

Safe drinking water and adequate sanitation system - as one package - will therefore contribute to most of the problems that have appeared in the last decade e.g. drought desertification, water related diseases... etc.

The occurrence of safe drinking water facilities within the communities peripheries will also improve the health conditions, keep the environment clean and reduce work load on children whom responsible for fetching drinking water from the nearby resources.

The variable characteristics of west Nile terrain geomorphology and climate geology necessitates that any study of water recourses assessment will require proper, geomorphologic hydro geologic, hydrological, geological and geophysical studies. In addition, awareness of the communities is essential for proper use of the recourses as regarding water protection, water management and community training in related matters such as relationship between water and sanitation. For these reason, a combination of socio-economic and technical study is adopted to assess the water resources system. These findings came from the frequent geophysical underground water studies, which implemented during the last few years. **(Plan – International, 2005)**

3. 4. Historical Background of the Village: -

Population and Settlement:

ELTaweela is one of the oldest villages on the west bank of the White Nile 15 kilometers North of kosti town. During the 1940s, the village had been used by the Mahadia administration circle as a river harbor for animals and agricultural crops transportation to Abba Island. The shape and the settlement pattern of the village have been significantly determined by the presence of the White Nile to the east and the irrigated scheme to the west. cultivation, whether irrigated or rain-fed represents the basic economic activity for the inhabitants of the village .After the establishment of the

irrigated scheme, the village become an attractive place for the inland villages west of ELTaweela as well as far the as far people from north kordofan. Inhabitants belong to a different tribal backgrounds mainly awlad shan, gedeat, majaneen, rezigat ,barti, malia and Fulani their exist some degree of ethic amalgamation, through marriage and good neighboring. Acceptable housing conditions exist in altawela as houses are built of mud bricks or red brick. Eltaweela village with present population of 5360 persons, has recently been upgraded to be the capital of guli rural council, and is expected to grow in to urban center. It forms along strop (2.7Km) close to the White Nile.

Water supply and demand:

Although no geographical survey were carried out. The ground water quality area is expected to be poor.

The White Nile River is the only perennial surface water source in the area and is characterized by wide and flat bed. The River water is used, directly or through irrigation canals, to meet domestic and live stock water needs of the village. The inhabitant of the village made tow attempts for access to safe clean water, one in 1960 and the second in 1990 when they deep open surface wells. Since that time, the safe drinking water becomes an obsession for the local community.

In 1997, the community starts of it own to implement the village water plant. Firstly they installed the water tank and established the slow sand filter in 1999 when plan Sudan came in to the village the community has pin-point the problem of poor access to clean drinking water as their first problem. Then the environmental sanitation and water supply study done by plan organization has specified a river water treatment plant with capacity of 200m³/d to solve the water problem of ELTawiela village, the project was

selected, designed and constructed during two phases within the period between Oct,2000 to Feb,2002.

The project is composed of permanent intake, slow sand filter, water tank, water net (main water lines + secondary water lines +home private tapes) , Plan Sudan paid for all main lines(4000m) , the community dug and buried all secondly water lines, and families have paid for their home tabs. (**Plan – International, 2003**)

Chapter four
Discussion and Result

4. 1. Frequency tables:

Table (1): Age distribution

Age	Frequency	Percentage
26-40	30	28.6
40-above	75	71.6
Total	105	100.0

Table (1) indicated that 75 % of the total age was above 40 years, while only 30 % was between 26- 40 ages. This means that the majority of the selected respondent's age was above 40 year.

Table (2): Family size distribution

Family size	Frequency	Percentage
Small	6	5.7
medium	40	38.1
Large	59	56.2
Total	105	100.0

Table (2) show that the family size distribution, we found that 59 % of the total families was large family , 40 % of the families medium and only 6 % was small.

Table (3): source of family water

Source of water	Frequency	Percentage
River Nile	5	4.8
Tape net system	100	95.2
Total	105	100.0

Table (3) indicated that 95.2 % of families whose source of water from the water tap net, while 4.8 % of families whose source of water was river Nile. This means that the majority of the communities people get their water from the water tape which means that the water netting has cover most of the community household (village).

Table (4): Do you think that the water tape is clean

Is tape water clean	Frequency	Percentage
Yes	14	13.3
No	91	86.7
Total	105	100.0

Table (4) indicated that 86.7 % of the total families said that tape water was not clean, and 13.3 responded by yes. This is due to the fact that, the water is not treated with chloride and even after taking samples from the water tank, it was found out that water is really dirty and even the design of the water tank was not appropriate (Water Cooperation). In the interview from our inquiry about any water treatment from bacteriological and chemical treatment, the Water Public Corporation responded by no and the filtration system is out of use. The process of water siphoning is

directly from the Nile to the families, and that is evidence for the prevalence of disease. And that is was clear from my observation.

The role of Public Water Corporation can be summarized as follows:

Functioning, maintenance and taxation. In this project the corporation has no role which is represented in administration, maintenance, (rehabilitation) because they think that the project has no revenue and it might be a burden to the corporation.

Table (5): is water available throughout the day.

water available throughout the day	Frequency	Percentage
Yes	7	6.7
No	98	93.3
Total	105	100.0

Table (5) the respondents when asked about is the water available throughout the day, 6.7 of them said yes while 93.3 % said no. it was due the fact that water functioning was not allocate enough time .Through interview with technical engineer from public water corporation said the technical design of this project; it is favorable because it is one of the favorite (good) designs for the White Nile. The agree on this design through all stakeholders. The technical engineer from public water corporation said that technical design of this project; is favorable because it is one of the favorite (good) designs for the White Nile. The agree on this design through all stakeholders. The design was not implemented according to what was planned, because another unplanned water pipe line was added and even connection of the water tap was not done

gradually to help in water pressure. The amount of water is not enough because there is an increase in the number of families and secondly because of the poor netting system.

Table (6): who is responsible for bringing the house hold water before the project?

Responsible	Frequency	Percentage
Children	6	5.7
Mother	27	25.7
Girls only	19	18.1
Bought	53	50.5
Total	105	100

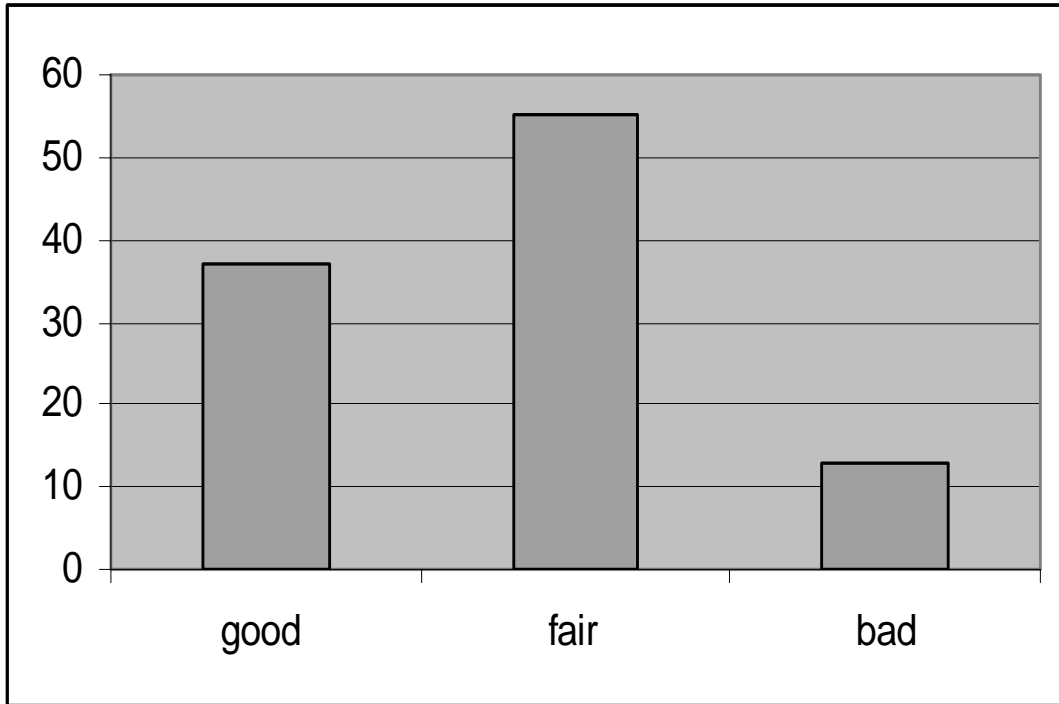
Table (6) it is clear from the table that 5.7 % of the children brought of water, 25.7 % by mothers, 18.1 by girls and 50.5 was bought. That means large number of the community people buys water before the project.

Table (7): how you view the family health situation before the project

Health situation before project	Frequency	Percentage
Good	37	35.2
Fair	55	52.4
Bad	13	12.4
Total	105	100.0

Table (7) Showed that 35.2 % viewed the family health situation as good, 52.4 % as fair and 12.4 % as bad. This means that most of families said that the health situation before the implementation of the project not bad.

Family health situation before the project



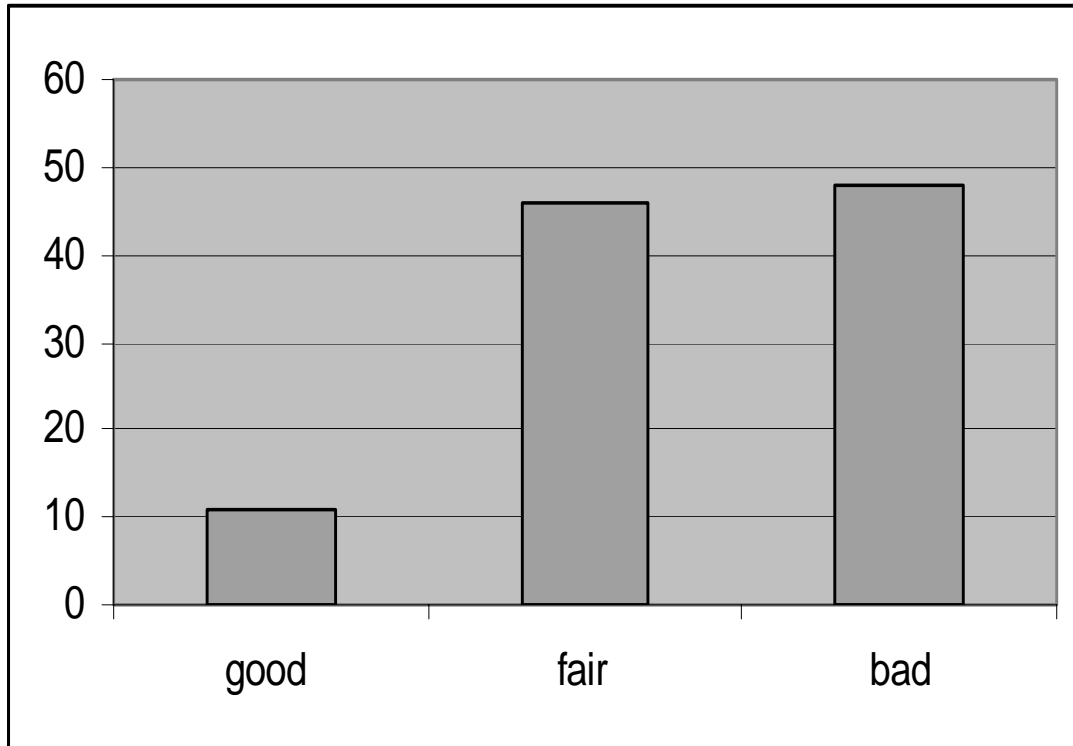
This diagram showed that 35.2 % viewed the family health situation as good, 52.4 % as fair and 12.4 % as bad. This means that most of families said that the health situation before the implementation of the project not bad .

Table (8): how you view the family Health situation after water project

Health situation after project	Frequency	Percentage
Good	11	10.5
Fair	46	43.8
Bad	48	45.7
Total	105	100.0

Table (8) Showed that 10.5 % viewed the family heath situation as good, 43.7 % as fair and 45.7 % as bad. That main the project increasing diseases .the following diagram show that .

Family health situation after the project



This means that 48 families said health situation was bad, and this can be justified by the prevalence of water related diseases showed), this is due to the water has been poured on the roads and boreholes, and some families have family gardens in addition to reasons about why the health situation of families before the project was fair this due to running water for the river, the health situation was bad after the project because the water tape not treated and stagnant that which was said in group discussion in the village with the families and community leaders .

Table (9): what about Health services situation in the village?

Health services situation	Frequency	Percentage
Good	42	40
Fair	27	25.7
Bad	36	34.3
Total	105	100

Table (9) Showed that 40 % said the health services situation as good, 25.7 % as fair and 34.3 % as bad. This due to medical insurance for the families said the health services are good.

Table (10): did the water project contributed in increase of water related diseases?

Increase of water related disease	Frequency	Percentage
Yes	87	82.9
No	18	17.1
Total	105	100.0

Table (10) Showed that 82.9 % said yes the water project increase the diseases while 17.1 % said no. High percentage of the families responded that the project has contributed to increase diseases that mean there is negative health change.

Table (11) is the water project increase schistosomiasis?

	Frequency	Percentage
yes	98	93.3
No	7	6.7
Total	105	100

Table (11) indicated that 93.3 % of the total respondents said that yes, the water project increase the schistosomiasis, while only 6.7 % said no.

Table (12) Is the water project increase malaria ?

	Frequency	Percentage
Yes	78	74.3
No	27	25.7
Total	105	100

Table (12) indicated that 74.3 % of the total respondents said that yes, the water project increase the malaria, while only 25.7 % said no.

It was observed that some families have water pots are covered but still there is misuse of water , water is poured every where an even some of the taps leak .One of the observations was that some families have gardens, but also the water is not used properly which increase rate of spread of malaria .

Table (13) is the water project increase diarrhea?

	Frequency	Percentage
Yes	59	56.2
No	46	43.8
Total	105	100

Tables (13) indicated that 56.2 % of families said yes the diarrhea increased after the water project, while only 43.8 said no.

Table (14): How to get rid of the water waste?

get rid of the water waste	Frequency	Percentage
Road	83	79
Ponds	15	14.3
in house	7	6.7
Total	105	100.0

Table (14) Showed that 79 said on the road, 14.3 said on ponds while 6.7 said get rid of water waste in their houses. Most of families said their water wastage was power on the road or the ground because there was no water drainage system as in towns.

Table (15): Family expenditure average on health services before project

Family expenditure average on health services before project (SD)	Frequency	Percentage
1000	5	4.8
1500	6	5.7
2000	20	19.0
2500	4	3.8
3000	49	46.7
4000	3	2.9
5000	4	3.8
7500	1	1.0
8000	1	1.0
10000	12	11.4
Total	105	100

Table (15) showed that, the Family expenditure average on health services before project, we found the highest percentage of expenditure was 46.7% in the average 3000 SD per month. This mean that most of the families expend on health services only 3000 SD per month.

Table (16): Family expenditure average on health services after project.

Family expenditure average on health services after project (SD)	Frequency	Percentage
500	2	1.9
1000	10	9.5
1500	7	6.7
2000	6	5.7
2500	8	7.6
3000	10	9.5
4000	7	6.7
5000	22	21.0
6000	5	4.8
7000	2	1.9
8000	5	4.8
9000	5	4.8
10000	9	8.6
15000	4	3.8
25000	3	2.9
Total	105	100

Total (16) indicated that the family expenditure average on health services after project, we found that 21.0 % was the high percent of family expenditure average 5000 SD per month, this mean the families expend on health services after the water project more than before the project.

Table (17): Family income average per month

Family income SD	Frequency	Percent
15000-25000	36	34.3
26000-50000	58	55.2
More than 50000	11	10.5
Total	105	100

In table
(17)

found that 55.2 % was the highest percentage of the families have income between 26000 to 50000 SD , 34.3 % between 15000 – 25000 while the lowest percent 10.5 % for families have income more than 50000 SD .

Table (18): water expenditure average for family per day before the project.

	Frequency	Percent
10.00	2	1.9
30.00	6	5.7
50.00	16	15.2
100.00	58	55.2
150.00	3	2.9
200.00	11	10.5
300.00	4	3.8
1000.00	2	1.9
150.000	3	2.9
Total	105	100

Table (18) indicates that 55.2 % of the total respondents expend 100.00 SD pe

Table (19): water expenditure average for family per day after the project

	Frequency	Percent
16	76	72.4
20	16	15.2
30	13	12.4
Total	105	100

Table (19) indicated that water expenditure for family per day after project implantation, we found that the high percentage was 72.4 of families the expenditure of water per day was 16 SD. This means that before the project the families' expenditure on water was high as illustrated in the table (18) but after the project the families expenditure on water is low. Through focus group discussion some people said, the positive changes of the project represented on water available on house and the expenditure money of water decreased.

Table (20): How many average family use of water before the project per day?

Average use per day by barrels	Frequency	Percentage
00	5	4.8
.50	14	13.3
1.00	60	57.1
2.00	17	16.2
3.00	9	8.6
Total	105	100

The high percentage of families in the table (20) which represented by 57.1% before the project said the average usage of water per day per family was 1 barrel per day.

Table (21): How many average family use of water after the project per day?

Average use per day by barrels	Frequency	Percentage
00	1	1.0
.50	5	4.8
1.00	36	34.3
2.00	53	50.5
3.00	7	6.7
4.00	1	1.0
5.00	2	1.9
Total	105	100

The high percentage of families in the table (21) which represented by 50.5% after the project said the average usage of water per day per family was 2 barrel per day. it obvious that the usage of water after the water project implementation has increased by another 1 more barrel.

Table (22): Is there any vegetables garden?

	Frequency	Percentage
yes	22	21.0
No	83	79.0
Total	105	100

Table (22) showed that 79.0 of families said no while 21.0% said yes. it is evident that there is no vegetables gardening and gardening in the village, which means that the families are not earning any income from vegetables that means Water is not considered as a source of income as indicated by high percentage(74.3%)of the families in table (24}.

Table (23): Are there any house gardens?

	Frequency	Percentage
yes	28	26.7
No	77	73.3
Total	105	100

Table (23) showed that 73.3 of families said no while 26.7% said yes.

Table (24): is the water considered as a source of family income?

	Frequency	Percentage
yes	11	10.5
No	94	89.5
Total	105	100

Table (24) illustrated that 89.5% of families responded by no while 10.5 responded by yes.

Table (25): did the project contributed in the continuity and stability of Children in schools?

Did the project contributed in the continuity and stability of children in schools?	Frequency	Percentage
yes	94	89.5
No	11	10.5
Total	105	100

Table (25) showed that 89.5% of families said that the project has contributed in the continuity and stability of the children in the school Responded by yes, while 10.5 responded by no.

Table (26): do you thing the project has contributed in the stability of the family in the village.

Do you thing the project has contributed in the stability of the family in the village?	Frequency	Percentage
yes	102	97.1
No	3	2.9
Total	105	100

Table (26) showed that 97.1% of families said that the project has contributed in the stability of the family in the village 97.1 responded by yes while 2.9 responded by no. This means that the project has contributed in the stability and continuity of both the families and children in school as showed at tables (25) and (26) which represented by 97.1 for the families and 90.5 for the children in school. The discussion with members of village found out that some families from villages Abarik, Asala, Tendelti and other from Kosti came and resettled in the village.

4. 2. Chi – square Test

Table (1): health situation after water project and family size

Health situation after the water project	Family Size			Sig
	Small	Middle	Large	
Good	0	7	4	0.003
Fair	0	12	34	
Bad	6	21	21	

0.003 < 0.05 (significant)

Table (1) shows the health situation after the project implementation and family size, we found that 34 of the large families said that the health situation after the water project was fair. This means that the relationship between the health and family size after the project implementation was highly significant as indicated at above table. This means the family size had great impact of the health situation after the project implementation and thus we have assumed that it is due to the abundance of water, which resulted in its misuse.

Table (2): health situation after the water project and water source

Health situation after the water project	Water source		Sig
	River Nile	Tape net	
Good	0	37	0.09
Fair	5	13	
Bad	0	50	

0.09 < .05 (significant)

Table (2) illustrated that the health situation after the water project and water source, we found that 50 of families use tape net said that the situation after the water project was bad. This means that there is relationship between health situation after the project and water source.

Table (3): health situation before the water project and water Source

Heath situation before the water project	Water source		Sig
	River Nile	Tape net	
Good	2	11	.670
Fair	3	45	
Bad	5	44	

.670 > .05 (not significant)

Table (3) illustrated that the health situation before the water project and water source, we found that 45 of families use tape net said that the situation before the water project was fair. This means there was no relationship between the health situation before the project and water source.

Table (4): is the water tape clean and how is the health situation after the project?

Is the tape water clean	Health Situation after project			Sig
	good	Normal	Bad	
Yes	7	4	3	.000
No	4	42	45	

.000 < .05 (significant)

Table (4) showed that 45 families responded by (No) which means that the tape water was not clean which contributed to the bad health situation and the high significances between the tape water and the health situation after the project.

This means that 45 families said no for the cleanness of water and that the health situation was bad, and this can be justified by the prevalence of water related diseases showed in table(6), this is due to the water has been poured on the roads and boreholes, and some families have family gardens in addition to reasons about why the health situation of families before the project was fair this due to running water for the river, the health situation was bad after the project because the water tape not treated and stagnant that which was said in group discussion the village with the families and community leaders .

Table (5): did the project increase the stability of children in the school and who was responsible to bring water before the project?

Did the project increase the stability of children in the school?	Who is responsible to bring water before the project?				Sig
	Children	Mother	Girls only	Bought	
Yes	6	24	17	47	.860
No	0	3	2	6	

.860 > .05 (not significant)

Table (5) indicated that 47 of families said yes the project has increased children stability in the school. According to the above table, there is no significantly relationship between increase in the children stability at school and the bringing of water, this due to the most of families payee water before the project implementation.

Table (6): Is water tape clean, and did the water project contributed in increase of water related diseases

Is tape water clean	Did the water project contributed in increase of water related diseases		Sig
	Yes	No	
Yes	5	9	.066
No	82	9	

.066 < .05 (significant)

Table (6) indicated that 82 families responded by no that the tape water was not clean and was the causes of water related diseases, and there is significant relationship between the tape water and the infection by water related diseases. This is due to the water has been poured on the roads and boreholes, and some families have family gardens in addition to reasons about why the health situation of families before the project was fair this due to running water for the river, the health situation was bad after the project because the water tape not treated and stagnant that which was said in group discussion the village with the families and community leaders. When we interviewed the medical assistance about patient attendance to the clinic, he said that previously it was eight patients per day but now after the project it has increased to 14 patients. Concerning diseases; the medical assistant said malaria before the project a minor case but now it has become a major case in addition to Shistosomisis, diarrhea, dysenteric and gardiasis.

Also, one of observation given by the medical assistant is that there is no treatment of water and the slow sand filters have no good covering. And

even through focus group discussion some people said the project has attained both negative and positive change in the village, they said after the project implementation some diseases increased in the village due to unclean of water tape.

Table (7): is tape water clean. And is schistosomisis one of the diseases caused by project?

Is water tape clean (pure)?	Schistosomisis one of the diseases caused by project		Sig
	Yes	No	
Yes	11	3	.017
No	87	4	

.017 < .05 (significant)

Table (7) indicated that 87 families responded by no that the tape water was not clean and was the causes of Schistosomisis disease, and there is significant relationship between the tape water and the infection by Schistosomisis disease. This can justified to us that the project implementation was the cause of the Schistosomisis prevalence and this information was justified by focus group discussion as well as the medical assistant.

Table (8): source of family water. And is malaria one of the diseases caused by project?

Source of family water	do you think malaria was caused by water project		Sig
	Yes	No	
River Nile	2	3	.072
Tape net	76	24	

.072 < 0. 05 (significant)

Table (8) indicated that 76 families who use tape water responded that the cause of malaria disease was due to the tape water, and there is significant relationship between the sources of water and malaria infection. This also has led to the prevalence of other water related diseases.

Table (9): do you think that malaria was cause by water project? And how to get rid of the water waste?

Do you think malaria was caused by water project	How to get rid of the wastewater?			Sig
	Road	Bore Hole	In house	
Yes	68	9	1	.000
No	15	6	6	

.000 < 0.5 (significant)

Table (9) indicated that 68 families responded by yes that the malaria was caused by water project and that they get rid of water by pouring on the road is it also clear from the table that there is significant relationship between the cause of malaria and the getting rid of the wastewater. Some families have family gardens, all these have created suitable situation for the presents of diseases malaria. Also another factor which worsen the health situation in the presence of the stagnant water of the canal which has contributed to the presence

Table (10): Family income average per month and do you think the project has contributed in the stability of family in the village.

Family income	Stability of family in the village		Sig
	Yes	No	
15000.00	24	0	.000
20000.00	4	0	
23500.00	2	0	
25000.00	3	3	
30000.00	16	0	
40000.00	22	0	
50000.00	20	0	
60000.00	1	0	
80000.00	2	0	
90000.00	3	0	
100000.00	2	0	
150000	3	0	
Total	102	3	

.000 < 0.5(significant)

Table (10) shows that family income average per month and the stability of families in the village, we found 24 of families said yes; there is stability of families in the village, the income of these families 15000 SD per month. and this is because many of the families said that there average monthly income was 15000 SD ,while only small number of families said their average monthly in come was 6000.even though there was diseases cases such as Schistosomisis and some other water related diseases still there is stability in the area, people are not any move going to search water from some distance . From the focus group discussion, no family has left the

village because of lack of water instead; some new families have come to the village.

4. 4. Results

Water project in ElTawila:

The objectives of the project are as follows:

- 1- provide clean water in homes (houses)
- 2- Provide families and children stability from the studies that where conducted the project, it was found out that the project has got a negative and healthy situation on the families. from the healthy perspective (point of view) through questionnaire , interviews , observations and focus group discussion with some of the families , medical assistance , community leaders and water cooperation , it was found out that :

(1) the water was unclean and untreated

(2) the percentage of water related diseases has increased for example malaria, schistosomiasis, diarrhea etc

The researcher has found out that the water project has got a healthy negative impact on the village and this is due to the improper use of water. Through observation it is found out that the water is unnecessarily being poured on the ground which assisted in the breeding of mosquitoes resulted in malaria cases.

Also as the water is not treated, it is found out that the families are prone to diseases such diarrhea. The project has a pump station with a channel which accumulated stagnant water and has got no protection where children swim in; consequently they are affected with Bilharzias. From the economical point of view, the project has a negative impact on family expenditure for treatment and also a positive impact on minimizing the expenditure on water. The researcher has seen that though the project has got a negative

impact on the village families, it also has a positive impact on the families in saving money through expenditure on water.

From the social perspective it is clear from the study that the project has provided stability to some families and also even contributed in the return of some families who left the village before. The researcher has seen that stability of children in schools and families is one of the projects main findings (objectives) even though there are problems which are due to project but still the project has helped in bringing water near to the families, and this is one of the positive indicators of the project.

Test Research Hypotheses:

1- Unclean water has negatives health impact in ELTawila village.

2- Unclean water has negatives socio-economic impact in ELTawila village.

As the former discussion of the research results and according to the above-mentioned research hypotheses the researcher can concluded that the study satisfied its hypotheses with a remarkable degree estimated to more than 95 %.

Chapter five

Conclusion

5. 1. Summary: -

This study has attempted to investigate the impacts of water supply in socio-economic and health situation in the ELTawila village north of Kosti town in the west of White Nile River.

The study was run by surveys used the questionnaires, interviews with medical assistance in ELTawila health center, community leaders and the focus group discussion.

As for the questionnaire, it was to see the type of water source, health situation after project implemented the project compare with health situation before the project, water expenditure before and after the project was implemented and family average income.

However, the interviews and focus group discussion were of general situation mainly concerned with expiration about the health and socio-economic situation after and before the water supply project implementation.

The sample size of this homogeneous population was 105 respondents. The questionnaire was filled by asking the respondent and filling in his answer as many of them could not manage the questionnaire by themselves.

From the questionnaire, it was clear that the health situation was very bad after water project implantation as than were before the project implementation.

The other observation the project increases the stability of families in the village and children in the school.

The average of water expenditure were affected by the project and we observed that average of water expenditure was increase after the project implementation and utilizes of water in washing, drinking, grow trees and etcwith low money expenditure compare with money expenditure for water before the project, also the families expenditure on the health services was increase because for the increasing of water related diseases. There were some problems mainly about the attitude of the families this was affected on the water use, knowledge about the critical of unclean water and diseases which related to water stagnant and polluted, and some children are swimming in it that which increased the schistosomiasis within the children.

From this study it was observed that the water after project is available for families but it's not clean.

Comparing the socio- economic and health after the project with the situation before the project there was differences, which can be summarized in the following:

- 1- The health situation was bad after the project (45.7 %), compared with the situation before the project (12.4 %)
- 2- The stability of children in the school and families in the village was increased compare with that before the project.
- 3- The family saving income increase after the project, that is because the families expenditure for water after the project was decrease compare with expenditure before the project.

5. 2. Recommendations:

Before any water pump station construction there should be a thorough study, which comprises economical, social, and health status or situation of the village.

1. Awareness campaign on water management and benefits of water.
2. Rehabilitation of the existing water pumps and programming of water so that every family can get a share of water.
3. The water corporation should treat water before use.
4. NGOs should adopt and develop an effective monitoring and follow-up system for its developmental activities, especially in water projects.
5. Governmental authorities relates to water issues should reform its policies, strategic direction – ownership of water projects, involvement of all stakeholders and good delivery mechanism...etc – and being interactive/ proactive with the people in rural/ remote areas.
6. NGOs and concerned parties should advocate for those whom having suffering from shortage and lack of drinking water.

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