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**Assessment of Malaria Control Program in Shendi  
locality - River Nile State (2015– 2017).**

**A Thesis Submitted for Requirements of Master Degree in Public Health**

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# الآية

بسم الله الرحمن الرحيم

قَالَ تَعَالَى:

﴿ يَتَأْتِيهَا النَّاسُ إِنْ كُنْتُمْ فِي رَيْبٍ مِّنَ الْبَعْثِ فَإِنَّا خَلَقْنَاكُمْ مِّنْ تُرَابٍ ثُمَّ

مِن نُّطْفَةٍ ثُمَّ مِّنْ عَلَقَةٍ ثُمَّ مِّنْ مُّضْغَةٍ مُّخَلَّقَةٍ وَغَيْرِ مُّخَلَّقَةٍ لِّنُبَيِّنَ لَكُمْ

وَنُقَرِّ فِي الْأَرْحَامِ مَا نَشَاءُ إِلَىٰ أَجَلٍ مُّسَمًّى ثُمَّ نُخْرِجُكُمْ طِفْلًا ثُمَّ

لِتَبْلُغُوا أَشَدَّكُمْ وَمِنْكُمْ مَّن يُوَفِّي وَيَمْنَعُ وَمِنْكُمْ مَّن يَرُدُّ إِلَىٰ أَرْضِهِ

الْعُمُرِ لِكَيْلَا يَعْلَمَ مِنْ بَعْدِ عِلْمٍ شَيْئًا وَتَرَى الْأَرْضَ هَامِدَةً فَإِذَا

أَنْزَلْنَا عَلَيْهَا الْمَاءَ اهْتَزَّتْ وَرَبَتْ وَأَنْبَتَتْ مِنْ كُلِّ زَوْجٍ بَهِيجٍ ﴿٥﴾

سورة الحج - الآية {5}



# Dedeication

To my family,

My father,

My mother'

My Brothers,

My friends,

My teachers.

# Acknowledgment

*All thanks to Allah from the start to the end.....*

*And pray for Prophet Mohammed peace be upon him*

*I would like to acknowledge the contribution of my*

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*Who guide me throughout my way and helped me to make this  
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*And I'm grateful to my friends and all those who contributed their  
time and helped me.*

*My thanks also extend to my college and my teachers in public  
health (Shendi University).*

## LIST OF ABBRVIATIONS

<b>ABBREVIOIN</b>	<b>THE MEANING</b>
<b>WHO</b>	World Health Organization
<b>GDP</b>	Good Domestic Product
<b>FPC</b>	Full Pest Control
<b>SSA</b>	Space Spray Application.
<b>LLINs</b>	Long Lasting Insecticidal Nets
<b>UNICEF</b>	United Nation International Children's Fund.
<b>ITNs</b>	Insecticide Treated bed Nets
<b>MDA</b>	Mass Drug Administration.
<b>IRS</b>	Indoor Residual Spraying
<b>IVM</b>	Integrated Vector Management.
<b>RBM</b>	Roll Back Malaria.
<b>ITMs</b>	Impregnated Treated Materials.
<b>ITMNs</b>	Insecticide Treated Mosquito Net
<b>IPM</b>	Integrated Pest Management.
<b>CDC</b>	Communicable Disease Center

## Abstract:

This descriptive cross-sectional community and institution based study was carried out in Shendi locality, River Nile State 2015-2017, to assess malaria control program, to identify activities and sections', and identify the main obstacles the program from 2000 to 2015.

The data were collected by using - questionnaires for population in Shendi locality and health staff - records and reports –and observations.

A simple random sample was used for sampling 400 samples; the study area was divided into 5 sectors according to the population census, and 60 samples of health staff were selected.

A statistical package of social sciences (SPSS) and Microsoft Excel program was used to analyze the data, and display it by tables and graphs.

**The study concluded that:** -Malaria incidence rates more than 83.7, and the presence of breeding sites of mosquito is 78.7%.

- The community participation in vector control activity is very low (28.3%).
- The programs and training courses towards population is low (35.6%).
- The effectiveness of integrated vector control activities is high (65.7%).
- The obstacles of malaria control program in Shendi locality is very high.

### **And the study recommended to:**

- Intensify of health education program for population by shendi locality.
- Activate community participation programs in malaria control activities by shendi locality and ministry of health.
- Take care ministry of health its evaluation and follow-up programs.
- Rise attention to routine and active training programs by ministry of health.

## ملخص الدراسة:

أجريت هذه الدراسة الوصفية المقطعية بمحلية شندي – ولاية نهر النيل 2015 – 2017 بغرض تقييم برنامج مكافحة الملاريا وتحديد الأهداف والأنشطة والأقسام المتعلقة به وتحديد أهم المعوقات التي تواجه البرنامج في الفترة من 2000 – 2015.

تم جمع البيانات عن طريق إستخدام إستبيانات للمواطنين في محلية شندي وللعاملين في القطاع الصحي – السجلات والتقارير- الزيارات الإشرافية للمراكز الصحية والمستشفيات- الملاحظة الشخصية.

تم إستخدام العينة العشوائية البسيطة المنتظمة في أخذ العينات (400 عينة) حيث تم توزيع منطقة الدراسة إلى 5 قطاعات مختلفة حسب تعداد السكان وتم أخذ (60 عينة) من العاملين بالقطاع الصحي.

أستخدم برنامج تحليل البيانات وعرضها بواسطة الجداول والأشكال البيانية، وخلصت الدراسة إلي أهم النتائج الآتية من ضمنها:

- ارتفاع نسبة الإصابة بالملاريا بلغت 83.7% وزيادة في كثافة البعوض الناقل بمنطقة الدراسة بنسبة بلغت 78.7%.

- إنخفاض نسبة المشاركة الجماهيرية في عمليات مكافحة الناقل 28.3%.

- ضعف البرامج والدورات التدريبية تجاه المواطنين بنسبة 35.6%.

- إنخفاض فعالية أنشطة المكافحة المتكاملة للطور اليرقي والناقل بنسبة 65.7%.

- وجود أكثر من 75% من المعوقات التي تواجه برنامج مكافحة الملاريا الحالي بمحلية شندي.

وبناء على النتائج أوصت الدراسة بالآتي:

- الإهتمام ببرامج التثقيف الصحي من قبل محلية شندي فيما يختص بالملاريا ومكافحتها.

- تفعيل برامج المشاركة الجماهيرية في أنشطة مكافحة الملاريا.

- الإهتمام ببرامج التقييم والمتابعة في أنشطة مكافحة الملاريا المختلفة.

- الإهتمام بأنشطة مكافحة الناقل في منطقة الدراسة من قبل قسم مكافحة الناقل بالمحلية والوزارة.

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# **CHAPTER ONE**

**INTRODUCTION**

**OBJECTIVS**

**AND**

**JUSTEFICATIONS**

## **1- Introduction:**

Malaria is a common and life-threatening disease in many tropical and subtropical areas. There are currently over 100 countries and territories where there is a risk of malaria transmission, and these are visited by more than 125 million international travelers every year<sup>(1)</sup>.

Malaria is one of the most important health problems in the world, and take the rank after the third after respiratory diseases and tuberculosis. Malaria it is first health problem in Sudan in terms for hospitals deaths<sup>(2)</sup>

The WHO African Region continues to bear the brunt of the global burden of malaria. In 2015, 88% of global cases and 90% of global deaths occurred in the African Region. Between 2000 and 2015, the number of malaria cases declined by 42% while the malaria death rate declined by 66% in the African Region <sup>(4)</sup>.

Malaria continues to have a severe socioeconomic impact on our populations. It is one of the causes of household poverty because it results in absenteeism from the daily activities of productive living and income generation <sup>(4)</sup> .

The problem size in Sudan is estimated annually about 1.5 million cases, and 30 thousand deaths, 20% - 40% of Incomes to health units, and 15% - 20% mortality and the face of it leads to a loss of 2% of the working days, also caused malaria deaths by 37.2% of the deaths of mothers and their children, the proportion of malaria 18.8% of the birth of children underweight and in turn caused the high infant mortality rates in Sudan.

Malaria in River Nile State is one of the most important health problems and the most a continuation of the state in general, 'so that the estimated number of cases annually is more than 28 thousand cases and 22% of deaths also represents

obsession economical for families, society and the state, through its impact on the loss of working days <sup>(50)</sup>.

In Shendi locality it estimated the number of cases each year about 5 thousand cases , 25% of the total mortality in Kposhiah administrative unit of the most malaria areas, followed by administrative units Hajar alasal 'The child mortality and maternal mortality is about 10% of total deaths <sup>(50)</sup>.



## **1-1 Justification of the study:**

- ❖ Increasing malaria mortality rates.
- ❖ Increasing malaria morbidity rates.
- ❖ Absence of coordination between the Ministry of health and shendi locality.
- ❖ Weakness of community participation by citizens in the malaria control program activities.
- ❖ Deterioration of health and environmental situation in study area.
- ❖ Lack of studies and scientific research in the field of malaria control and assessment of malaria control program in Shendi locality.

## **1-2 Objectives of the study:**

### **❖ 1.2.1 General objective :**

To assess the malaria control program in Shendi locality – River Nile State from 2015 – 2017.

### **❖ 1.2.2 Specifics objectives :**

- To determine effectiveness of malaria control program in the Shendi locality.
- To assess knowledge, Attitude, and practices towards malaria control.
- To measure mortality, and morbidity rates of malaria.
- To determine the level of community participation.
- To identify constrains of applying malaria control program in shendi locality.

## **2- Literature Review:**

### **2.1 Definition:**

Malaria is a disease that is transmitted by the bite of a particular kind of mosquito. There are four main strains of malaria. The most serious of these is the falciparum. This form can be fatal. The other three forms, vivax, ovale and malariae are usually less serious, but still need to be prevented and treated promptly<sup>(3)</sup>.

### **2.2 Occurrence:**

In many malaria-endemic countries, malaria transmission does not occur in all parts of the country. Even within tropical and subtropical areas, transmission will not occur

At very high altitudes

- During colder seasons in some areas
- In deserts (excluding the oases)
- In some countries where transmission has been interrupted through successful control/elimination programs<sup>(4)</sup>.

### **2.3Epidemiology:**

Around the world,the malaria situation is serious and getting worse. Malaria threatens the lives of 40% of the world's population – over 2 200 million people. Each year, there are an estimated 300-500 million clinical cases. Malaria is estimated to kill more than 1 million people annually, the majority of whom are young children. Ninety per cent of malaria cases in

the world occur in Africa south of the Sahara. Children under 5 years of age and pregnant women are the worst affected by malaria. It is one of the leading causes of death among young children. Together with pneumonia, diarrhea, measles and malnutrition, malaria is responsible for over 70% of deaths in young children especially in developing countries. Malaria during pregnancy causes severe maternal illness and anemia, and is also associated with low birth weight among newborn infants, a leading risk factor for infant mortality<sup>(5)</sup>.

The economic loss from malaria was estimated at US\$2 billion in Africa alone in 1997. Malaria is a major cause of poverty, and poverty exacerbates the malaria situation. Taken together, the effects of malaria on lives and livelihoods are devastating for economic progress in hard-hit countries<sup>(6)</sup>.

## **2.4 Geographical distribution & Prevalence:**

The current distribution of malaria in the world is shown on the map in this chapter; affected countries and territories are listed both at the end of this chapter and in the Country list. The risk for travelers of contracting malaria is highly variable from country to country and even between areas within a country and this must be considered in any discussion of appropriate preventive measures<sup>(7&8)</sup>.

## **2.5 Causes or Etiology:**

Malaria is caused by the protozoan parasite Plasmodium. Human malaria is caused by four different species of Plasmodium: *P.falciparum*, *P. malariae*, *P.ovale* and *P.vivax*<sup>(9)</sup>.

Humans occasionally become infected with Plasmodium species that normally infect animals, such as *P. knowlesi*. As yet, there are no reports of human–mosquito–human transmission of such “zoonotic” forms of malaria<sup>(10)</sup>.

## **2.6 Biology & Ecology:**

Malaria is a disease caused by a family of macro parasites that infect humans. There are in fact four species of Plasmodium parasites that cause malaria in people. These four species have similar life cycles; all are transmitted to humans by a mosquito vector (various species of *Anopheles* mosquitoes) and live a portion of their life cycle in the mosquito host<sup>(11)</sup>.

## **2.7 Types of malaria:**

There are main types, namely: -

1. Malignant malaria, caused by (*Plasmodium falciparum*) It is more dangerous to the human species and caused more species in death.
2. Malaria triple benign and caused (*Plasmodium Vivax*) which is more prevalent in the continent of Asia from the continent of Africa.
3. Malaria caused by the Quartet (*Plasmodium malariae*) which is considered less prevalent types of malaria may be milder symptoms of the species<sup>(12)</sup>.

## **2.8 Lifecycles:**

In the life cycle of Plasmodium, a female *Anopheles* mosquito (the definitive host) transmits a motile infective form (called the sporozoite) to a vertebrate host such as a human (the secondary host), thus acting as a transmission vector. A sporozoite travels through the blood vessels to liver cells (hepatocytes), where it reproduces asexually (tissue schizogony), producing thousands of merozoites. These infect new

red blood cells and initiate a series of asexual multiplication cycles (blood schizogony) that produce 8 to 24 new infective merozoites, at which point the cells burst and the infective cycle begins anew <sup>(13)</sup>.

Other merozoites develop into immature gametocytes, which are the precursors of male and female gametes. When a fertilized mosquito bites an infected person, gametocytes are taken up with the blood and mature in the mosquito gut. The male and female gametocytes fuse and form an Ookinetea fertilized, motile zygote. Ookinetes develop into new sporozoites that migrate to the insect's salivary glands, ready to infect a new vertebrate host. The sporozoites are injected into the skin, in the saliva, when the mosquito takes a subsequent blood meal <sup>(14)</sup>.

Only female mosquitoes feed on blood; male mosquitoes feed on plant nectar, and do not transmit the disease. The females of the Anopheles genus of mosquito prefer to feed at night. They usually start searching for a meal at dusk, and will continue throughout the night until taking a meal. Malaria parasites can also be transmitted by blood transfusions, although this is rare <sup>(15 & 11)</sup>.

The sexual stages: The action now moves to Canada in 1897 and to the United States a year later where a medical student, William McCollum, and his colleague, Eugene Opie, while examining the blood of crows infected with Haemoproteus Columba, a haematozoan closely related to the malaria parasites, observed flagellated structures which they described in detail and also recorded how the flagellated bodies fused with non-motile bodies to form a vermicular (now called an ookinete) <sup>(16)</sup>.

## **The life cycle of the malaria parasites, Plasmodium spp:**

In order to understand the historical events it is necessary to summaries briefly our current state of knowledge. Malaria is caused by infection with four species of Plasmodium the life cycles of which are very similar. Infection begins when (1) sporozoites, the infective stages, are injected by a mosquito and are carried around the body until they invade liver hepatocytes where (2) they undergo a phase of asexual multiplication (exoerythrocytic schizogony) resulting in the production of many uninculcate merozoites. These merozoites flood out into the blood and invade red blood cells where (3) they initiate a second phase of asexual multiplication (erythrocytic schizogony) resulting in the production of about 8-16 merozoites which invade new red blood cells. This process is repeated almost indefinitely and is responsible for the disease, malaria. As the infection progresses, some young merozoites develop into male and female gametocytes that circulate in the peripheral blood until they are (4) taken up by a female anopheline mosquito when it feeds. Within the mosquito (5) the gametocytes mature into male and female gametes, fertilization occurs and a motile zygote (ookinete) is formed within the lumen of the mosquito gut, the beginning of a process known as sporogony. The ookinete penetrates the gut wall and becomes a conspicuous oocyst within which another phase of multiplication occurs resulting in the formation of sporozoites that migrate to the salivary glands of a mosquito and are injected when the mosquito feeds on a new host<sup>(17)</sup>

## **2.9 Vectors and Reservoirs:**

Humans are the only important reservoir of human malaria. Non-human primates are naturally infected by many malarial species that can potentially infect humans, but natural transmission from non-human primates to humans is extremely rare and seldom results in serious disease. The vector for human malaria is the *Anopheles* mosquito, which transmits the parasite from infected human to uninfected human<sup>(11)</sup>.

## **2.10 Modes of Transmission:**

Malaria is transmitted by the bite of an infective female *Anopheles* mosquito. Rarely, transmission can be congenital (via the placenta) or can occur through transfusions or the use of contaminated needles. Mosquitoes, which bite mainly between dusk and dawn<sup>(18)</sup>.

## **2.11 Incubation Period:**

The incubation period is approximately 7–14 days for *P. falciparum*; 8–14 days for *P. vivax* and *P. ovale*; and 7–30 days for *P. malariae*. With some strains of *P. vivax*, mostly from temperate areas, there may be a prolonged incubation period of 8–10 months until clinical illness; incubation periods for *P. ovale* may be even longer. With infections acquired by blood transfusion, the incubation period depends on the number of parasites infused; it is usually short but may be up to two months<sup>(19)</sup>.



## 2.12 Signs' and symptoms:

Include cyclical fever and shivering, pain in the joints, headache, weakness, and repeated vomiting. In severe cases, convulsions and kidney failure can result<sup>(20)</sup>.

The classic symptom of malaria is paroxysma cyclical occurrence of sudden coldness followed by shivering and then fever and sweating, occurring every two days (tertian fever) in *P. vivax* and *P. ovale* infections, and every three days (quartan fever) for *P. malariae*. *P. falciparum* infection can cause recurrent fever every 36–48 hours, or a less pronounced and almost continuous fever.<sup>(21)</sup>

## 2.13 Complications:

acute include anemia and cerebral malaria; In some patients who seemingly recover, another bout of malaria may occur if the treatment does not completely clear the parasite from the blood and liver .

*P. falciparum*: Cerebral ,coma ,Anemia ,Pulmonary edema ,Renal Failure ,Shock ,Lactic acidosis ,Hypoglycemia.

*P. vivax*(*P. ovale*): Splenic rupture ,Anemia (mild) Debilitating fevers ,Higher TNF- $\alpha$  per parasite .

*P. malariae* : Immune complex ,Glomerulonephritis, leading to nephritic syndrome<sup>(22)</sup>.

## 2.14 Diagnosis:

Malaria presents a diagnostic challenge to laboratories in most countries. Endemic malaria, population movements, and travelers all contribute to presenting the laboratory with diagnostic problems for which it may have little expertise available <sup>(23)</sup>.

-Stained Blood Film.

-Thick blood film .

-Thin blood film <sup>(22)</sup>.

## 2.15 Treatment:

**The aims of malaria cases management are:**

- To provide prompt and complete treatment to all suspected/ confirmed cases of malaria
- To prevent progression of mild cases of malaria in to severe or complicated from of malaria
- To prevent deaths from severe and complicated malaria.
- To prevent transmission of malaria
- To minimize risk of spread of drug resistant parasites by use of effective drugs in appropriate dosage by everyone<sup>(24)</sup>.

## 2.16 Chemoprophylaxis:

Chemoprophylaxis should be administered only in selective grips in high P.falciparum endemic areas. Use of personal protection measures

including Insecticide Treated bed Nets (ITN) / Long Lasting Insecticidal Nets (LLIN) should be encouraged for pregnant women and other vulnerable population including travelers for longer stay<sup>(25)</sup>.

Daily for children (contraindicated in children below 8 years). The drug should be started 2 days before travel and continued for 4 weeks after leaving the malarious area, it is not recommended for pregnant women and children less than 8 years<sup>(26)</sup>.

## **2.17 Prevention and early response to confirmed malaria epidemics:**

**1.** The most important cost-effective measures to control malaria epidemic are as follows.

**I.** Early diagnosis and effective treatment to all non-immune people severely or not affected by the disease in communities.

**II.** Early vector control measures targeting adult mosquitoes transmitting malaria parasites.

**III.** Mass drug administration (MDA) to all the (well controlled / relatively small) population considered to be at risk<sup>(27)</sup>.

**2. Most important control interventions:** for operational and biological reasons vector control options may or may not be applicable in cases of epidemics.

**a)** Vector control options mainly target adult mosquitoes, to have a direct impact on malaria transmission and hence on the malaria burden.

b) Indoor residual spraying (IRS) is feasible when well planned and conducted

c) Use of (ITNs) or re-impregnation of existing bed nets is feasible when the coverage rate is above 85%.

d) In complex emergency situations, where

A set up of refugee camps is possible, the use of pre-impregnated tents or prefabricated impregnated plastic sheets have great impact. <sup>(27&28)</sup>.

### **Impregnated treated materials (ITMs)**

Another vector control strategy relates to the use of Impregnated Treated Materials (ITMs) such as impregnated treated bed nets

### **Space spray application (SSA)**

Aerial spraying of insecticides could also be useful in emergency

Situations when a large number of displaced non-immune populations are forced to live in malaria-endemic areas under poor housing conditions <sup>(28)</sup>

## **2.18 malaria control:**

### **2.18.1 Strategies for Control Malaria:**

Control is too complex to be addressed by a single approach, and any attempt to do so is fraught with danger. It is important to tailor the strategy to the prevailing ecological and epidemiological conditions. To illustrate this, definitions of the four main patterns of epidemiology are based on indicators which can be measured in the community. Of significance, the immune status of the population and the patterns of malaria seen will be

different in these four situations and will also affect the strategy for control. Therefore, these will be dictated by the prevailing transmission patterns and will be orientated to the following outcomes:

(I) Mortality control.

(II) Transmission control.

(III) Eradication <sup>(29)</sup>.

### **Eradication of malaria:**

Eradication can be considered only in certain areas, e.g., in places where malaria has been eradicated and where it has been reintroduced and in areas of hypo endemic malaria where there are sufficient resources to undertake the process and where there is little likelihood of future introduction. The advantage of an eradication program is that it is time limited and, once it has achieved its objective, can be terminated with little further oversight. In the relative successes of the various malaria control activities commenced in the mid-20th century period are outlined. Clearly, eradication programs were extremely successful, but eradication could not be achieved in many places and the technique must be considered not appropriate in most areas of endemic infection <sup>(30&15)</sup>.

### **2.18.2 Tools to carry out malaria control:**

#### **(A) Personnel and Strategy Development:**

Malaria control is a scientific, technical activity that requires skilled and dedicated staff with training in epidemiology, entomology, mapping and planning, and manpower management. Since much work is in the field, it requires personnel to undertake fieldwork. This is not an arena for pure

clinicians or laboratory scientists, and although all play a role in the fight against malaria control, the control operations are the realm of malariaologists.

The most important tools to control malaria consist of properly trained personnel with authority to coordinate and carry out their scientific work.

### **(B) Environmental Management:**

In a variety of texts, environmental management is proposed to reduce the number of breeding sites and over all populations of vector species. As mentioned above, there have been some situations where source reduction was effective. However, on the whole, anopheline mosquitoes are opportunistic breeders that favor open sunlit pools or small streams and rivulets. In most cases it is impractical to suggest source reduction as an effective control effort for anophelines. Since anophelines are opportunists, their populations expand during rainy spells and they breed in such a variety of situations that any attempts to limit the extent of suitable habitat will not be very successful. Importantly, it is not the number of mosquitoes that is critical in the cycle but, rather, the length of mosquito survival which contributes to the efficient transmission of malaria<sup>(30)</sup>.

### **(C) Insecticide - Treated Mosquito Nets:**

The development of synthetic pyrethroid insecticides which are stable and remain effective for long periods enabled entomologists to test the idea of impregnating mosquito nets of various textures and fabrics as a vehicle for residual insecticide. Much has been written about this technique, which is now well understood and has proven effective. The initial seminal research was carried out in a series of huts

in Tanzania. The well-designed experiments so install. Answered several important questions before the rationale for the use of insecticide-treated mosquito nets (ITNs) could be established<sup>(31)</sup>.

**2.18.3 Techniques for implementation of programs :** (a)- Finance and Subsidy (b)- Sustaining the Intervention (c)- Barrier Spraying (d)- Evaluation of Efficiency<sup>(32)</sup>.

## **2.19 Malaria control:**

### **2.19.1 Chemical control:**

It is characterized as giving quick results against phase carrier as it is an effective way to cope with the emergency, but must be done very carefully and is divided to fight full of insects and anti-larval stage.

#### **(A) Full Pest Control:**

Used as pesticides in the form of aerosols in the form of a hazy shape or alarmist or spray micro preferably here pesticide use SAFE pretty much like barutheroideh compounds and phosphorus compounds membership.

#### **(B) Anti-larval:**

Is one of the effective means mosquito control programs where the use of pesticides in water bodies which contain plants and weeds, as well as the vicinity of the edges of the water about 2-3 meters and the methods used in the fight:

(A) The use of kerosene or diesel oil at a rate of 10 liters per acre of water ponds and marshes surface.

(B) Water sprays chemical pesticides such as pesticide and Alobat Melathione and deltamethrin and Permethrin.

(C) The use of some of the organizations for the growth of insects such as oldosed composite demalin compound.

(D) The use of insect's organizations in the form of simple getaway equipment.

(E) The use of bio-pesticides such as pesticide (Bectbacter)<sup>(34)</sup>.

### **2.19.2 Biological control:**

Intended use of natural enemies of parasites and predators and pathogens:

Predators and parasites, insects full of mosquitoes: -

It is the most important insect full of tremor - ants, frogs, bats, lizards, birds and some types of flies, spiders and larvae dream.

#### **An etiology of the larvae of mosquitoes:**

There are many of them exist in nature. Examples include:

(A) Some types of bacteria such as (Spheroids).

(B) Certain types of fungi such as (Bacillus thuringios).

(C) Some primitives such as (Nosema - slenpelua).

(D) Nematodes.

(E) Predators such as (some aquatic larvae of some beetles and larvae of Culex and some vertebrates such as fish and frogs)<sup>(35)</sup>.

### **2.19.3 Environmental measures:**

Meant some needed to bring about some modifications in the environment in order to create planning activities are not suitable for breeding mosquitoes environmental conditions include: -

**1. Mutations and modifications to the Environment Agency aimed at achieving a temporary or permanent conditions of inappropriate livelihood mosquitoes, including: -**

- Filling potholes, ponds, swamps and pockets of water on the banks of river dredging and digging.



- Strengthen riverbanks create barriers and dams and the use of irrigation canals covered, rather than exposed to transport water
- Proper and rapid water drainage ponds located around villages through the work of a small temporary drainage canals to divert water from the underdeveloped public fountains and taps.
- Must use intermittent irrigation in agriculture <sup>(36)</sup>.

**2. Mutations in the human habitation It aims to reduce the degree of transition between mosquitoes and humans include :**

- Use saturated mosquito and the use of personal protective.
- Selection of new communities sites away from the breeding sites of about 2 kilometers.
- Pay attention to hygiene , sanitation and bridging the ponds.
- The establishment of new towns or villages on the side that comes from the wind.
- Stay stables for livestock on the edges of villages between breeding sites and housing ..
- Fortify homes against mosquitoes and the use of wired nets on the windows <sup>(37)</sup>.

**2.20 Malaria Vaccine:**

Attempts to develop a malaria vaccine began early in the 20th century, and in spite of advances in biomedical technology and periodic bouts of unsubstantiated optimism in the field, no effective vaccine is available for use.

It is not the purpose of this review to cover the current status of malaria vaccine development. However, mention of the various strategies pursued

by research workers is in order so that we can develop perspective of how vaccines may be utilized in controlling malaria<sup>(38)</sup>.

Research has brought several candidate vaccines through phase 1 and in some cases phase 2 of vaccine development. The only vaccine to reach phase 3 was a multicomponent synthetic peptide, SPf66, which was claimed to have protective effects in trials in Columbia. The vaccine was tested in a series of trials in holoendemic situations in Africa and showed marginal, if any, protection. Finally, no protection was observed in a trial when it was incorporated in an Extended Program of Immunization program and administered to children as part of the initial immunization program<sup>(39)</sup>.

## **2.21 Roll Back Malaria (RBM):**

Malaria control is an increasingly important focus for the international body concerned with public health and disease control. The need for reactivation and revitalization of past control programs, finance to support interventions, and the need to rationalize the concepts of malaria control has been seen by senior administrators such as Gro Brundtland, Director General of WHO. In response, the Roll Back Malaria initiative has arisen with backing from the United Nations Development Program, World Bank, United Nations Children's Fund, and WHO.

There is anteed forth local governments and also universities to offer such personnel the basic elements for career development<sup>(40)</sup>.

## **2.22 The strategies for prevention and control of malaria and its transmission are:**

### **(1) Surveillance and case management:**

- Case detection (passive and active)- Early diagnosis and complete treatment - sentinel surveillance.

### **(2) Integrated vector management(IVM):**

- Indoor residual spray(IRS). - Insecticidal treated bed nets (ITNs) and long lasting insecticidal nets (LLTNs).

### **(3) Epidemic preparedness and early response:**

Anti larval measure including source reduction.

### **(4) Supportive Intervention:**

-Capacity building - Behavioral change communication – Inter sectoral collaboration - monitoring and evaluation.

### **(5) Early diagnosis and treatment of malaria aims at:**

- complete cure  
- prevention of progression of uncomplicated malaria to severe diseases  
- prevention of deaths - interruption of transmission<sup>(41)</sup>

## **Malaria Control Program:**

Sudan has a long history of malaria control activities, dating as far back as the beginning of the 20th century, when very successful interventions based on trained volunteers (the “mosquito men”) and simple vector control strategies led to the near elimination of malaria from many parts of northern Sudan. In contrast, the attempt at malaria eradication in the 1950-60s had very limited success due to managerial, technical and financial constraints. In 1998, Sudan endorsed the international Roll Back Malaria initiative as the organizing principle for its own activities, placing more attention on early diagnosis and prompt treatment and multiple prevention measures.

The National Malaria Control Program is under the department of the preventive medicine in the organogram of the FMOH and it consist from five main departments Headed by the National malaria control program coordinator. The NMCP has developed state malaria control program in 15 states and each SMCP consist from three departments.

The responsibilities of the national and the states program are as follows:

- Setting national policies and strategies and plans for malaria control.
- Setting standards develop guidelines, and quality assurance.
- Establishing states malaria control units.
- Conduct human resource needs assessment and develop capacity building plans for all levels.
- Overall supervision & monitoring and evaluating malaria control activities and preparation of national reports.
- Resource mobilization, partnership and intersectoral collaboration.

- Control of epidemics.
- Develop and implement research activities.

### **Current malaria control interventions:**

#### **Malaria vector control and prevention:**

Malaria vector control in Sudan has a long history. The main vector control interventions include indoor residual house spraying, the use of insecticide-treated bed nets (now long lasting insecticidal nets), chemical larviciding, environmental management and limited biological control. The implementation of these interventions is in line with the epidemiological stratification of the disease in the country. Moreover, they are implemented in the context of the integrated vector management (IVM) approach which is based on strengthened inter and intra-sectoral coordination as well as capitalizing on the synergy of the different interventions. A national IVM plan is in place and is being implemented.

#### **Indoor residual spraying:**

This intervention is targeted in the following areas of Sudan (Gezira. elrahad, New halfa, Suki, Zeidab, Sugar cane projects,) for both control of irrigated shemes and epidemic malaria. Although this strategy has been in place for many years, the need for regular training/re-training of spray teams and the need for improved supervision is necessary.

#### **Insecticide-treated nets (ITNs)-including long lasting insecticidal nets (LLINs):**

Following the demonstration that ITNs are both for personal protection as well as for community-wide protection, Sudan developed a national strategic plan on ITNs to be implemented in the following stratum (Seasonal malaria, irrigated scheme and emergency and complex situation).. Various financing and distribution channels were tested only to result in low coverage of the targeted populations. Currently the approach has shifted towards free distribution – targeting full 17 population coverage in targeted areas to achieve

transmission control. Long lasting insecticidal nets are recommended as it has not been possible to set up viable retreatment strategies for conventional nets. Because polyethylene LLINs is being used, these need to be replaced after 5 years.

### **Larval control:**

The main method of larval control is the use of chemicals – usually Temephos EC 50%. Areas targeted are mostly in urban areas in the in the big cities and riverine areas as appropriate. Environmental management is limited to agriculture irrigated areas through drainage as well as intermittent irrigation. Biological control using larvivorous fish is also implemented on a small scale in the irrigated agricultural areas.

### **Fogging:**

Although not a priority method for malaria control, in Sudan this method is being used in urban areas as well as in complex emergency areas. It may not necessarily impact on transmission control but may be useful to advocate for political commitment and for addressing urban biting nuisance.

### **Entomological surveillance:**

Since a lot of the vector control interventions rely on the use of insecticides, entomological monitoring – including monitoring for insecticide resistance is important. Over the years, these activities have been implemented in several states with evidence of resistance to organophosphates, DDT and recently to pyrethroids. The latter report is worrying as this is the group of insecticides used for treating nets as well as for house spraying.

### **Malaria epidemics:**

Most areas of North Sudan are prone to malaria epidemics. Frequent epidemic were reported in Khartoum state, Gazira, Sinnar, White Nile, Blue Nile, AlGadarif, kassala, Red sea, Northern, River Nile, N. Darfour, W. Darfour, N. Kordfan stats. The main determinants of epidemics are : climatic factors, rains,

floods, drought famine, spread of resistance of *P. falciparum* to chloroquine, increasing resistance of vectors to insecticides, migration of population from hypo to hyper endemic, instability in the bordering countries and refugees influx, establishment of large agricultural projects. Serious malaria epidemics affected the Gazira area in 1974 -1975 in the central region.

The out cry of the epidemics lead to establishment of the Blue Nile Health Project (BNHP) in 1975 with contribution of Sudan government and WHO, World Bank, Kuwait, Japan and USA. The project includes malaria control as one of its main component. Malaria was successful controlled for 10 years. The prevalence of the disease was reduce from 25% to < 1% but due to discontinuation of the external fund, control operations were stopped on 1989. Abrupt cessation of control interventions led to malaria 21 epidemic due to reduction of local population immunity, the incidence of the disease built up to appear in dramatic epidemic in 1993 - 1994.

Urban epidemics are well documented in Khartoum State in the years 1981, 1988, 1994,1998. A number of factors played role in them: increased rainfall spread of irrigated agriculture within the city limits, construction of new urban colonies without proper facilities for drainage, influx of refugees, insufficient supply of drugs.

In Al- Gedarif State epidemic years usually follow heavy seasonal rains, 1993, 1998. An epidemic occurred in (1978) in this state following the war in Ethiopia and internally displaced people (IDPs) across the border to Kassala and Al - Gedarif states. Epidemics in River Nile State coincided with the heavy floods in 1974, 1988, 1989,1994. In the western part of the country, N. Kordofan two epidemics had been reported 1999 due to poor storage of water.

### **RBM Partnership, Coordination and Management:**

Sudan as one of the first countries adopted RBM initiative through the NMCP has given much attention to partnership. The NMCP has already lined up with an impressive array of partners. As the scale of RBM activities grows, RBM partners will need to be differentiated into distinct partner communities, which are led and co-ordinated through a top level, board or task force chaired and

convened by NMCP. The list of RBM partners include: **UN agencies:** WHO, UNICEF, UNDP. • **NGOs:** over 40 NGOs were part of malaria control program. Plan Sudan, Malaria Consortium, Development Action Now are NGOs that have a written agreement with the NMCP. • **Private sector:** Saving and Development Bank initiated investment in ITNs early. The idea now is carried over by the Financial and Investment Bank. Recently Canar, a telecommunication company, contributed considerably in malaria control based on agreed-upon 2 years plan of action. Other private 22 sector include: DETASI, Coca Cola, Kenana Sugar Cane, Gazera Scheme Board ... ect. • **Universities:** Blue Nile Research and Training Institutes (Gazera University), Tropical Medicine Institute (Ministry of Science and Technology), Endemic Disease Institute (University of Khartoum) • **Egypt** as part of Gambia Control Project.

### **Malaria control strategies;**

The National Malaria Strategic Plan (2007-2012) is aiming to provide a common platform and description of interventions for all RBM partners. It also encourages all partners to be engaged in malaria control with common strategies and objectives, i.e. one plan, one implementation and coordination mechanism and one M&E plan.

**Vision:** The vision of NMCP is the reduction of malaria–related morbidity and mortality in a way that Malaria is no longer a major cause of working days loss, school absenteeism and not the leading cause of outpatient attendance and hospital admission.

**Mission:** Our mission is to sustain a partnership at all level that enables delivery and use of cost effective and evidence–based malaria control interventions.

**Goal:** To contribute to the improvement of the health status in northern part of Sudan through reduction and prevention of morbidity and mortality associated with malaria.



**Objective:** The objective of RBM Strategic Plan is to reduce the morbidity and mortality of malaria by 50% by 2012 all over the northern Sudan (compared to reported cases in 2008).

Due to the success story in Khartoum this updated Strategic Plan envisages certain areas aiming malaria free status where the overall commitment, financing and health system potential indicate higher potential for significant reduction of local malaria transmission with ultimate goal of malaria elimination: the objective for such selected areas will be:

By 2017 reported malaria incidence, with 100% laboratory confirmation of malaria diagnosis, will be reduced by at least 80% as compared to 2006 and will reach the level of 10 cases per 1000.

### **Strategic Directions:**

- 1/ Prompt and reliable diagnosis and effective treatment:
- 2/ Effective prevention measures in the framework of IVM:
- 3/ Detection and control of malaria epidemics:
- 4/ Strengthening of the malaria control program:
- 5/ Malaria surveillance and M&E and Operational research:
- 6/ Partnership and private sector

### **Program management:**

**1/ Creation of awareness, demand and appropriate use:** Advocacy efforts are needed at national, state and locality levels to ensure: - Financial and programmatic support for RBM interventions. - Appropriate health –seeking behaviors. - Demands for services and products. - Utilization of services.

**2/ Delivery system:** The NMCP will work through the state malaria control program (SMCP) to deliver services to beneficiaries. So delivery of services will be solely the responsibility of the state level.

The case management related activities are and will continue to be part and parcel of the primary health care. The drug will be distributed through the ongoing system. This based on Central Medical Drug Supply and the Revolving Drug Fund. Quality will be ensured through the General Directorate of Pharmacy System. Chargeable drugs will be availed and distributed through the private mechanism.

**3/ Financing:** The annual cost of a package of interventions necessary to achieve the MDGs requires approximately US\$ 34 per capita. The NMCP will work to mobilize adequate financing of malaria control. Sustainable financing requires guaranteed funds from all sources combing local with external financing which include: GFATM, Work Bank, Bilateral agencies, UN, NGOs private companies, Islamic Development Bank, Export Development Bank of Iran through MOF, Sudan ... etc

The overall estimated budget for this strategic plan is US\$ 256,947,142 .The budget is expected to be covered from different sources including GFATM, WHO, UNICEF, Canar Company, MC in addition to government funding.

### **3- Materials and Methods:**

#### **3.1 Study type:**

This descriptive cross-sectional community and institution based study was carried out in Shendi locality, to assess the malaria control program in Shendi locality, River Nile State, in the period from August 2015 to August 2017.

#### **3.2 Study area:**

River Nile State shares borders with number of state: (Red sea state, Gadarif state in the East, Khartoum state in the South, and Northern state in the North), consists of seven localities , (Barbr, Albohira, Abu hamd, Atabra, Aldamr, Almatmma and Shendi) <sup>(50)</sup>.

Shendi locality, River Nile State; which lies in the Northern area of the Sudan, between the latitudes 16 – 22 North, and longitudes 30 – 32 East. And the total area estimated 124.000 km ,The total number of population in shendi about 269,440 ,Shendi has a subtropical desert /low latitude arid hot climate, according to the hold ridge life zone system of bioclimatic classification Shendi is situated in or near the tropical desert biome.

It has five administration unit, Shendi town, north rural of Shendi, south rural of Shendi, kaboushia and hajaralasl <sup>(50)</sup>.

In Shendi locality Its (125) Basic school ,(62) Secondary school ,One university , (10) Colleges ,(4)Factories ,(8) Hospitals ,(18) Market ,(12) Terracing ,(212) Drinking water source , (3) Agricultural projects <sup>(50)</sup> .

Shendi town has three hospitals, ElmakNimer University Hospital, Shendi Teaching Hospital and Military Hospital, (10) health centers <sup>(50)</sup> .

### 3.3 Study population:

Include all population in Shendi locality, and health workstaff.

### 3.4 Sampling technique:

#### 3.4.1 Sample Type:

Stratified proportional random sampling was used to select samples from units of study area in shendi locality it consist of population and health work staff.

#### 3.4.2 Sample size:

##### 3.4.2.1 For population:

Sample size was determined using of the following equation:

$$n = N \times z^2(pq) / Nd^2 + z^2(pq) \quad \text{Where :}$$

n= sample size . N= total population (269.440).

Z=confidence interval = 95% equal 1.96 (constant).

P=success factor equal (0.5).

Q= failure factor = (1-p)equal(0.5).

d= error factor = 5% equal (0.05).

$$n = 269,440 \times (1.96)^2 \times 0.5 \times 0.5 / 269,440 \times (0.05)^2 + (1.96)^2 \times 0.5 \times 0.5.$$

So n = 384. n = 400 .

##### 3.4.2.1 For health staff:

60samples, include all health work staff in study area (shendi locality).

#### 3.4.3 Sample distribution: population distribution:

The sample size was distributed as shown in the following table:

Administrative units	Total Population	Sample Size	Percent
Shendi Town	65,260	100	25.0%
South Rural	66,820	90	24.2%
North Rural	33,410	65	14.0%

Hagar alasal	54,320	75	18.5%
Kaboushia	49,630	70	18.3%
Total	269,440	400	100%

### Health work staff distribution:

Administrative units	health inspector	health officer	Health observant	Pharmacist	observant Assistant
Shendi Town	2	3	5	1	6
South Rural	1	2	2	0	4
North Rural	1	2	2	0	4
Hagar alasal	2	2	4	1	5
Kaboushia	1	2	3	1	4
Total	7	11	16	3	23

### 3.5 Methods of data collection:

#### -Questionnaires:

**For population:** A questionnaire containing 32 closed questions, was designed to identify and assess the knowledge, attitudes, and practice of population in Shendi locality, with regard to malaria and control, and measure the morbidity, and mortality rates of malaria in the study area, and also to determine the role of community participation in malaria control.

**For Health work staff:** A questionnaire containing 25 closed questions, was designed to assess the malaria control program in Shendi locality, which is divided to:

- Manpower (classification - numbers- scientific, and practical experience).

- Training programs (quality, training levels), and health staff participation in malaria control activities .
- Malaria activities and strategies in departments (rapid assessment - reports, plans, and records - vector control - health education - assessment and follow-up - diagnosis and treatment) .
- Malaria control program constraints

### **- Records and Reports.**

Data were collected such as the number of malaria cases, and deaths, malaria control methods, vector control activities, and the various reports, and records of malaria department, and epidemiology department in Shendi locality, that were monitored in the attached questionnaire.

### **-Observations.**

The observations on the practical side, were based on vector control activities from mosquito spraying and preparation, insect surveys, and supervisory visits to hospitals and health units .

### **3.6 Data analysis tools:**

Then data analyzed using Microsoft Excel program only.

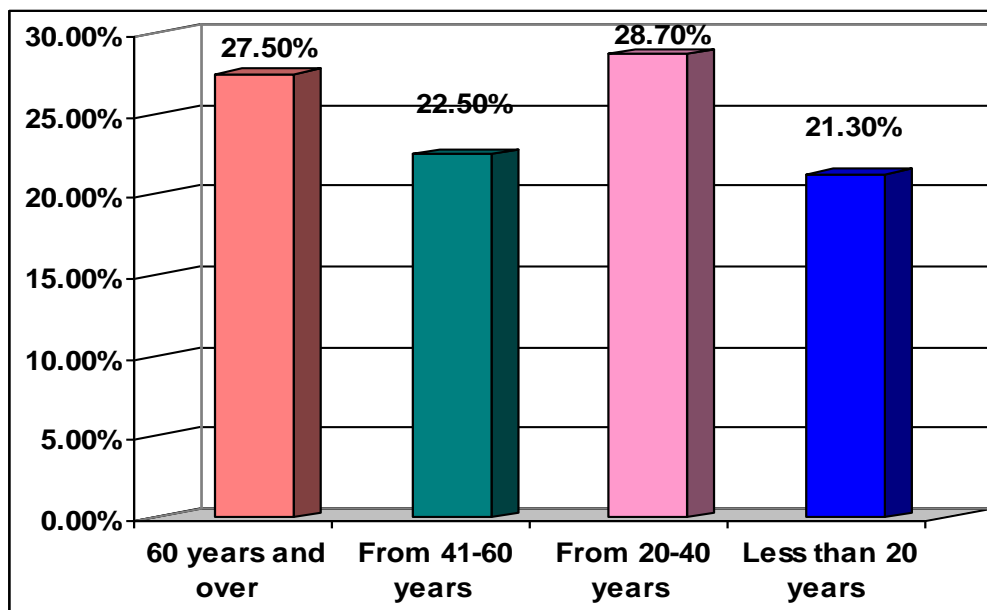
## 4- Results:

**Table (4.1) Gender distribution among study population in shendi locality (N=400):**

Gender	Frequency	Percent
Male	210	52.5%
Female	190	47.5%
Total	400	100 %

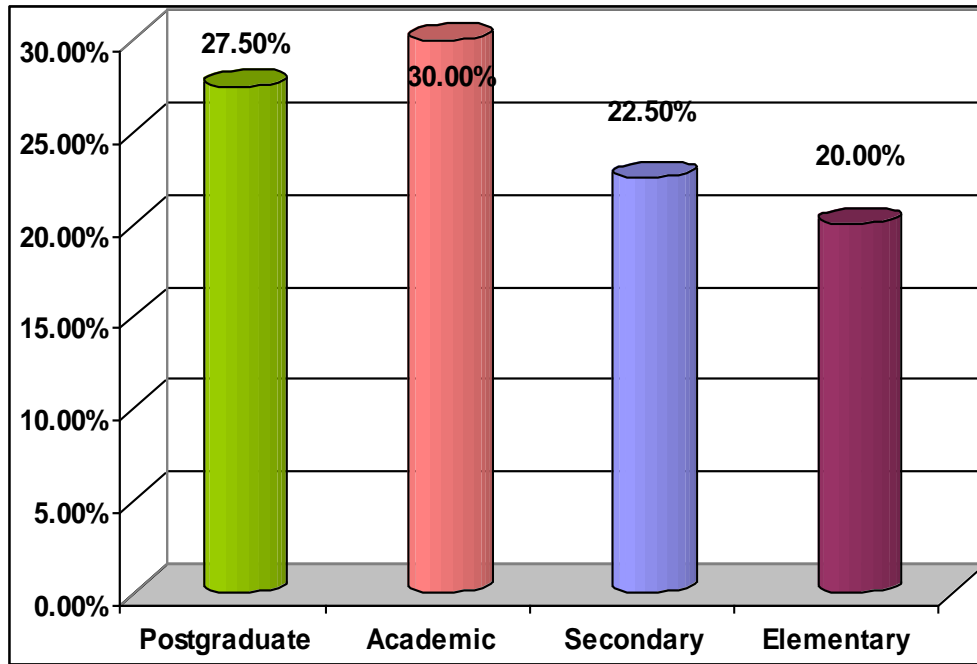
The table pointed that 52.5% of the study population were males 'and that only 47.5% were female.

**Figure (4.1) Age distribution among study population in shendi locality(N=400):**



The figure pointed out that 28.7% of the study population lies in age from the age of 20-40 years', and 27.5% are in the age group of 60 years and older 'and 22.5% are between the ages of 41-60 years', while only 21.3% under the age of 20 year.

**Figure (4.2) Educational level distribution among study population in shendi locality (N=400):**



The figure pointed out that 57.5% of the study population are university educational level or above 'and that only 20% of the study population primary educational level.

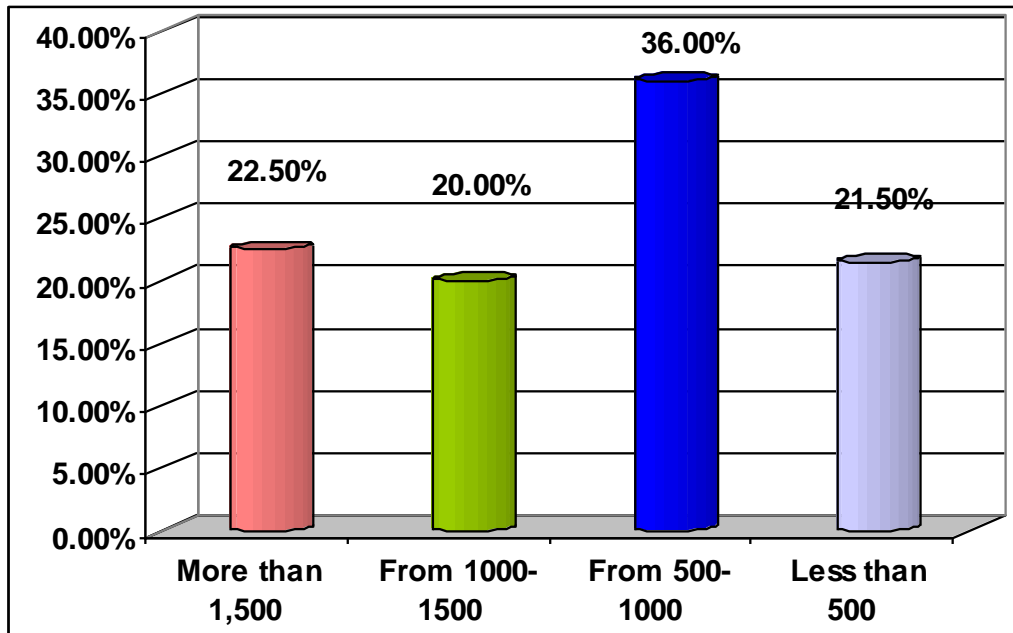


**Table (4.2) Occupations distribution among study population in shendi locality (N=400):**

<b>Occupation</b>	<b>Frequency</b>	<b>Percent</b>
<b>Student</b>	115	28.5%
<b>Employee</b>	95	24.0%
<b>Free works</b>	80	20.0%
<b>House wife</b>	110	27.5%
<b>Total</b>	400	100 %

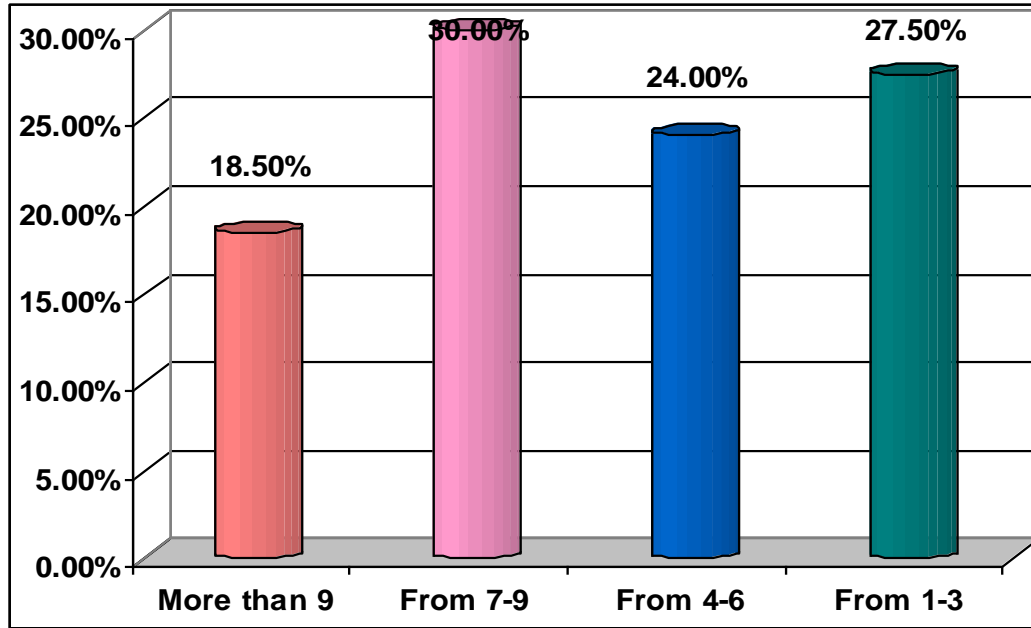
The table pointed out that 28.5% of the study population were students' and 27.5% were from housewives' and that 24% were from employees 'while only 20% are self-employed.

**Figure (4.3) Monthly income distribution among study population in shendi locality (N=400):**



The figure explained that 36% of the study population with incomes (500-1000 SP) 'and 22.5% of income earners (more than 1,500 SP)' and 21.5% of income earners (less than 500 SP), 'while only 20% are low income (1000-1500SP).

**Figure (4.4) Family size distribution in study population in shendi locality (N=400):**



The figure explained that 30% of the study population ranges between (7-9) 'and 27.5% of the number of members ranges between (1-3 people)' and that the 24% estimated to number between (4-6) ' while only 18.5% the number of members wee (10) and above.

**Table (4.3) Population knowledge towards malaria distribution in study population (N=400):**

<b>Knowledge of malaria</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	240	60.0%
<b>No</b>	160	40.0%
<b>Total</b>	400	100 %

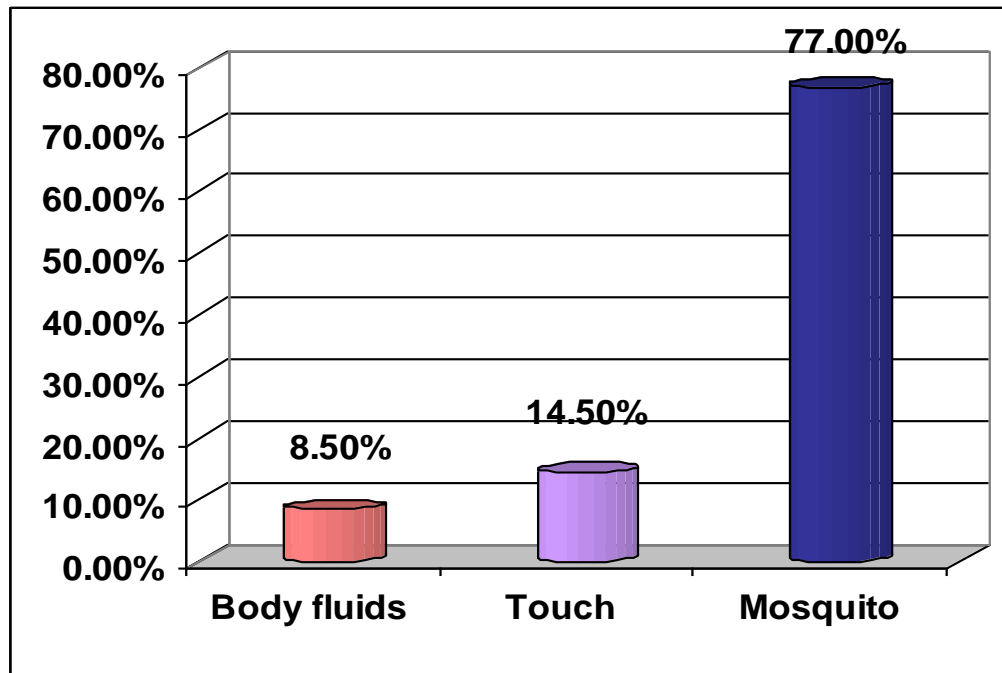
The table explained that 60% of the study population they know malaria ', while only 40% do not have knowledge of malaria.

**Table (4.4) Population knowledge towards malaria modes transmission in study population (N=240):**

<b>Knowledge of Transmission</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	180	75.0%
<b>No</b>	60	25.0%
<b>Total</b>	240	100 %

The table explained that 75% of the study population to know ways of malaria transmission ', while only 25% do not have knowledge in ways that transmission.

**Figure (4.5) Malaria mode transmission among study population (N=180):**



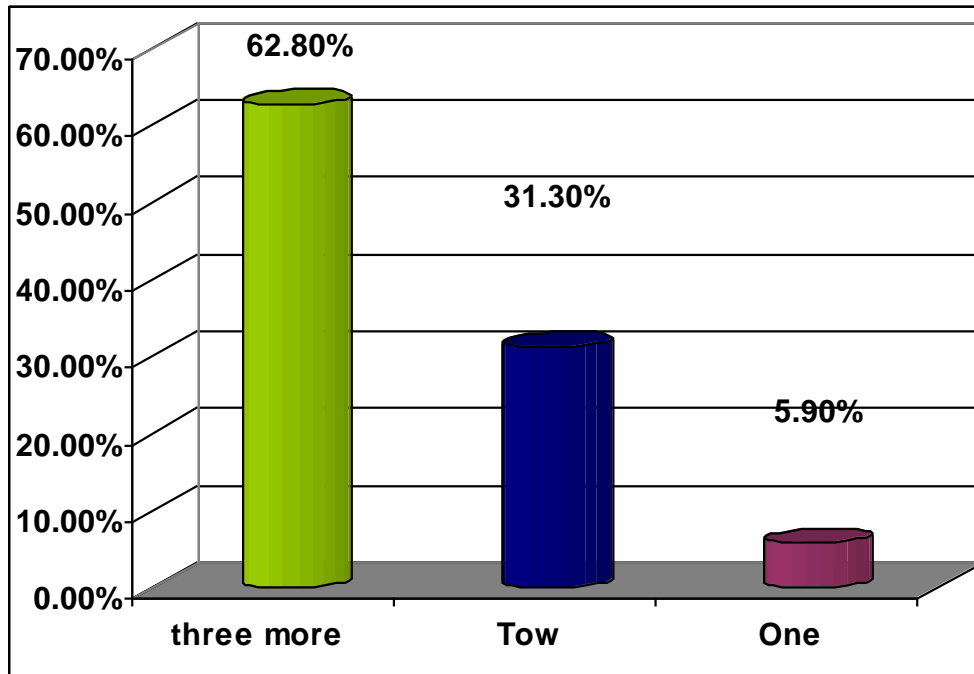
The figure explained that in terms of form 77% of the study population Malaria transmitted by mosquitoes, while 14.5% tactile, and 8.5% through body fluids.

**Table (4.5) Incidence rate of malaria in study area shendi locality (N=400):**

Malaria infection	Frequency	Percent
Yes	335	83.7%
No	65	16.3%
<b>Total</b>	400	100 %

The table pointed out that 83.7% of the study population infected with malaria , while 16.3% did not infected malaria.

**Figure (4.6) Frequency of previous infection per individual in study area shendi locality (N=400):**



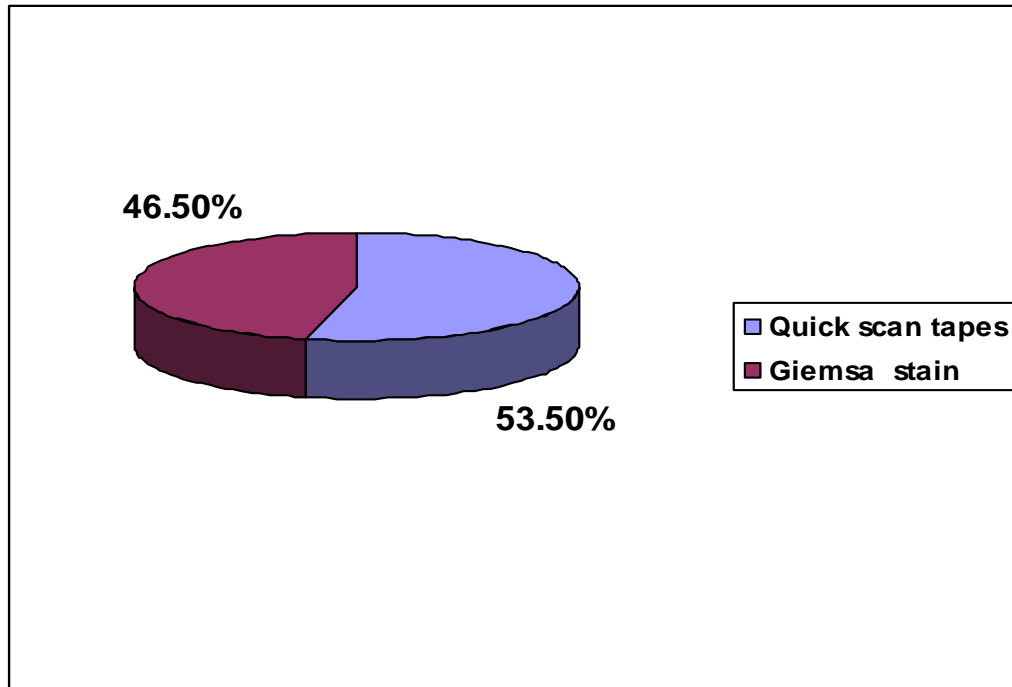
The figure pointed out about 62.8% of the study population of more than three cases of malaria, while 31.3% twice cases, while only about 5.9% once cases.

**Table (4.6) Knowledge of population about diagnosis of malaria in study area shendi locality (N=240):**

<b>Knowledge of diagnosis</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	105	43.5%
<b>No</b>	135	56.5%
<b>Total</b>	240	100 %

The table pointed out that 56.5% of the study population for them to know the diagnosis and various methods have been diagnosed ', while 43.5% do not have knowledge in ways that malaria diagnosis has not been diagnosed as well.

**Figure (4.7) Methods of malaria diagnosis distribution in study area shendi locality (N=105):**



The figure pointed out that 53.5% of the study population were diagnosed with strips quick scan', while 46.5% were diagnosed by Giemsa stain.

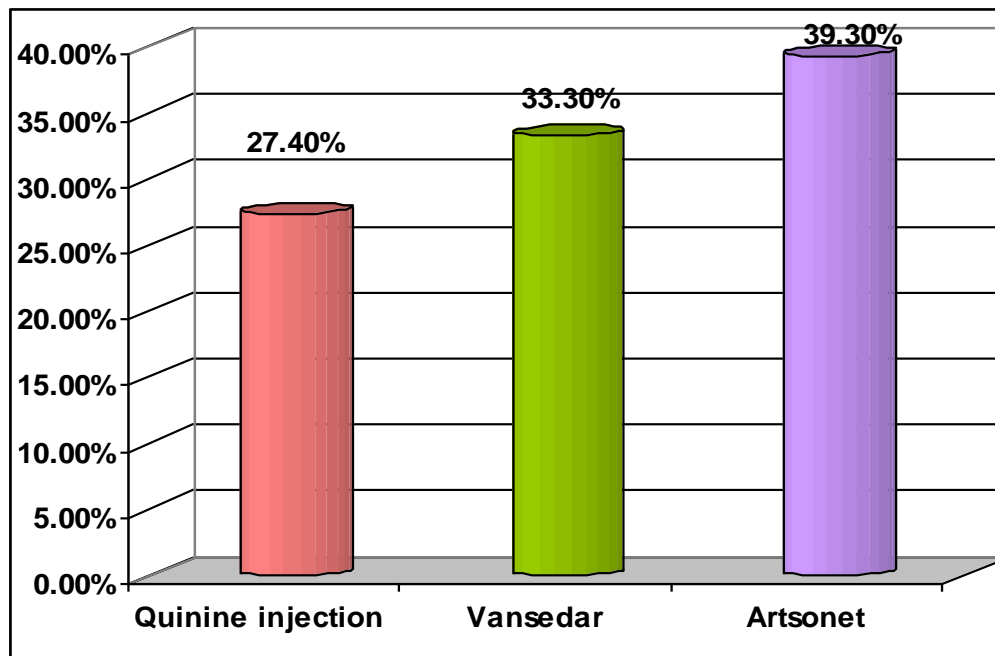
**Table (4.7) Knowledge of malaria treatment with in previously infected individual distribution in study area shendi locality(N=240):**

Knowledge treatment	Frequency	Percent
Yes	165	68.8%
No	75	32.2%
<b>Total</b>	240	100 %

The table pointed out that 68.8% of the study population were treated and have the knowledge of the types of treatment', while only 32.2% have not been treated, not their knowledge of malaria treatment.



**Figure (4.8) Drugs used of malaria treatment within those who have knowledge of treatment distribution in study area shendi locality (N=165):**



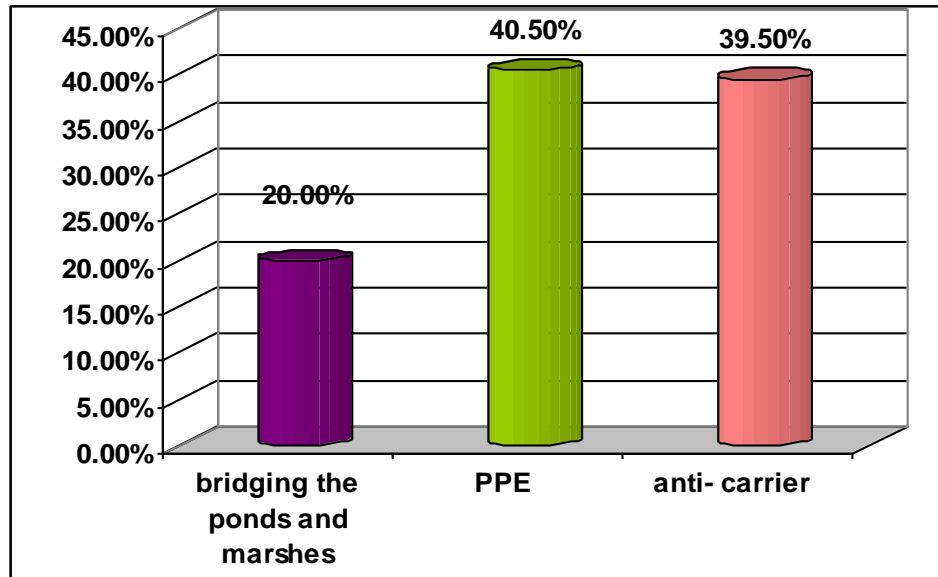
The figure explained that in terms of form 39.3% of the remedies malaria drugs artsonet disease, drugs vansedar 33.3%, while only 27.4% treatment by injecting quinine.

**Table (4.8) Population knowledge towards malaria prevention program in study area shendi locality(N=240):**

Knowledge of prevention methods	Frequency	Percent
Yes	190	79.0%
No	50	21.0%
<b>Total</b>	240	100 %

The table explained that 79% of the study populations for them to know how to prevent malaria were implemented ', while only 21% do not have knowledge of prevention methods has not been carried out.

**Figure (4.9) Methods of malaria prevention distribution in study area shendi locality (N=190):**



The figure explained that in terms of form 40.5% of the means of protection against malaria is the use of PPE, and 39.5% and means of vector control, while only 20% bridging the ponds and marshes.

**Table (4.9) Population knowledge towards methods of integrated pest management for malaria in study area shendi locality (N=240):**

Knowledge means of control	Frequency	Percent
Yes	125	52.2%
No	115	47.8%
<b>Total</b>	<b>240</b>	<b>100 %</b>

The table pointed out that 52.2% of the study population they know IPM methods for malaria in the region ', while 47.8% do not have knowledge in ways that control.

**Table (4.10) Means of integrated mosquito control stated by those how have knowledge of integrated mosquito control in study area shendi locality (N=125):**

<b>Methods of control</b>	<b>Frequency</b>	<b>Percent</b>
<b>Carrier control</b>	37	29.6%
<b>use of PPE</b>	45	36.0%
<b>hygiene and sanitation</b>	27	21.6%
<b>impregnated mosquito</b>	16	12.8%
<b>Total</b>	125	100 %

The table explained the methods used in personal protective 36%, and 29.6% the carrier control, and 21.6% environmental sanitation, while tools only about 12.8% used impregnated mosquito.

**Table (4.11) Presence of mosquito breeding sites in shendi locality (N=400):**

<b>The presence of breeding sites</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	315	78.7%
<b>No</b>	85	21.3%
<b>Total</b>	400	100 %

The table pointed out that 78.7% of the study population Present breeding of mosquitoes near their homes' while 21.3% do not exist breeding sites for mosquitoes near their homes.

**Table (4.12) Presence of integrated mosquito control program in shendi locality (N=165)**

The presence of mosquito control program in the region	Frequency	Percent
Yes	165	41.2%
No	235	58.8%
<b>Total</b>	400	100 %

The table pointed out that 58.2% of the study population do not have an integrated control program for mosquitoes in the region ', while 41.8% of the areas left by the fight against an integrated program and is executed.

**Table (4.13) Presence of campaigns to spray in malaria control program (shendi locality) (N=400):**

The presence of spraying campaigns	Frequency	Percent
Yes	115	28.5%
No	285	71.5%
<b>Total</b>	400	100 %

The table pointed out that 71.5% of the study population No spray for mosquito's homes campaigns' while only 28.5% were sprayed indoors.

**Table (4.14) Presence of impregnated mosquito in malaria control program (shendi locality) (N=400):**

<b>The presence of impregnated mosquito</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	135	33.7%
<b>No</b>	265	66.3%
<b>Total</b>	400	100 %

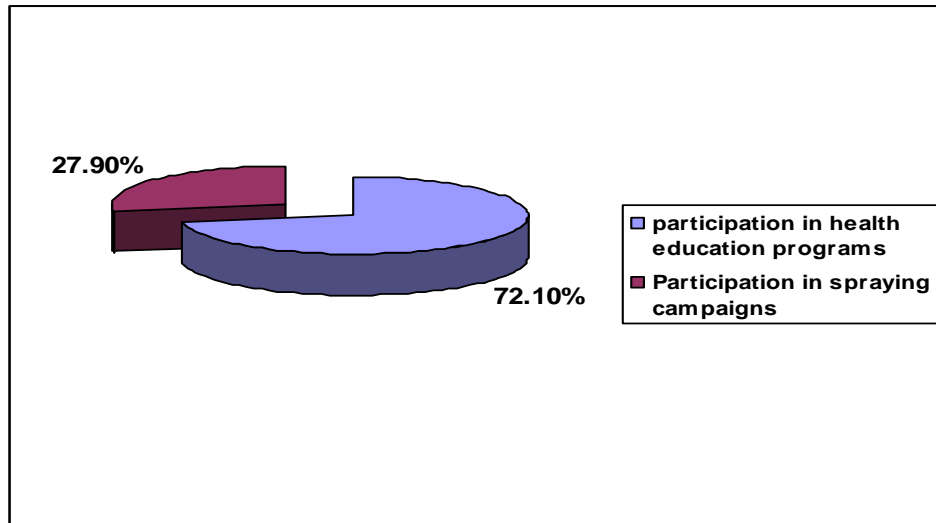
The table pointed out that 66.3% of the study population do not have an integrated control program for mosquitoes in the region ', while only 33.7% have an integrated mosquito control program for their region.

**Table (4.15) Presence of community participation in malaria control program (shendi locality) (N=400):**

<b>The presence of community participation</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	190	47.5%
<b>No</b>	210	52.5%
<b>Total</b>	400	100 %

The table pointed out that 52.5% of the study population do not participate in anti-malaria programs in the region ', while only 47.5% are available to them opportunities to participate in malaria control programs in the region.

**Figure (4.10) Activities of community participation distribution in study area shendi locality (N=190):**



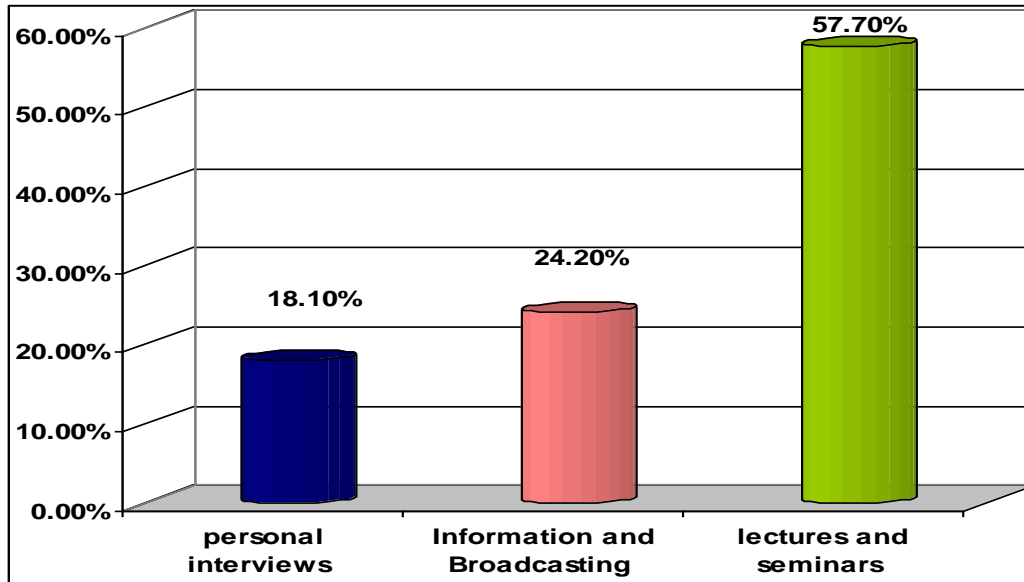
The figure explained that in terms of form about 72% of the study population participating in health education programs', while only 28% are involved in the control campaigns.

**Table (4.16) Presence of health education programs in malaria control program shendi locality (N=400):**

The presence of health education programs	Frequency	Percent
Yes	215	53.7%
No	185	46.3%
<b>Total</b>	<b>400</b>	<b>100 %</b>

The table pointed out that 53.7% of the study population to have available for health education and combat malaria and methods of mosquito control programs', while 46.3% do not have to have a health education programs.

*Figure (4.11) Activities of health education programs distribution -malaria control program in shendi locality (N=400):*



The figure explained that in terms of form 57.7% of the health education programs are through the use of lectures, seminars, and 24.2% using the means of exhibitions, while only 18.1% using mediums interview.

**Table (4.17) Presence of training program for community in shendi locality (N=400):**

<b>The presence of training programs for community</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	145	36.5%
<b>No</b>	255	63.5%
<b>Total</b>	400	100 %

The table pointed out that 63.5% of the community study were trained on malaria control activities', while 36.5% are not trained to do so.

**Table (4.18) Effectiveness of malaria control program in reducing the incidence of malaria in shendi locality (N=400):**

<b>The effectiveness of malaria control program in the aria</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	135	33.7%
<b>No</b>	265	66.3%
<b>Total</b>	400	100 %

The table pointed out that 66.3% of the study population shows the ineffectiveness of the current -malaria control program, while only 33.7% of the study population explain the effectiveness of the control program.



**Table (4.19) Morbidity and mortality rates of malaria from 2015 to 2017 in Shendi locality:**

<b>Year // Administrative units</b>	<b>Number of Cases// Number of Deaths // Total</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
<b>Shendi Town</b>	<b>743</b>	317	223	203
	<b>98</b>	37	39	22
<b>North Rural</b>	<b>938</b>	398	309	231
	<b>109</b>	36	42	31
<b>Kaboushia</b>	<b>751</b>	308	245	198
	<b>88</b>	32	37	19
<b>South Rural</b>	<b>756</b>	287	256	213
	<b>87</b>	31	29	27
<b>Hagar alasal</b>	<b>819</b>	286	299	234
	<b>102</b>	35	38	29

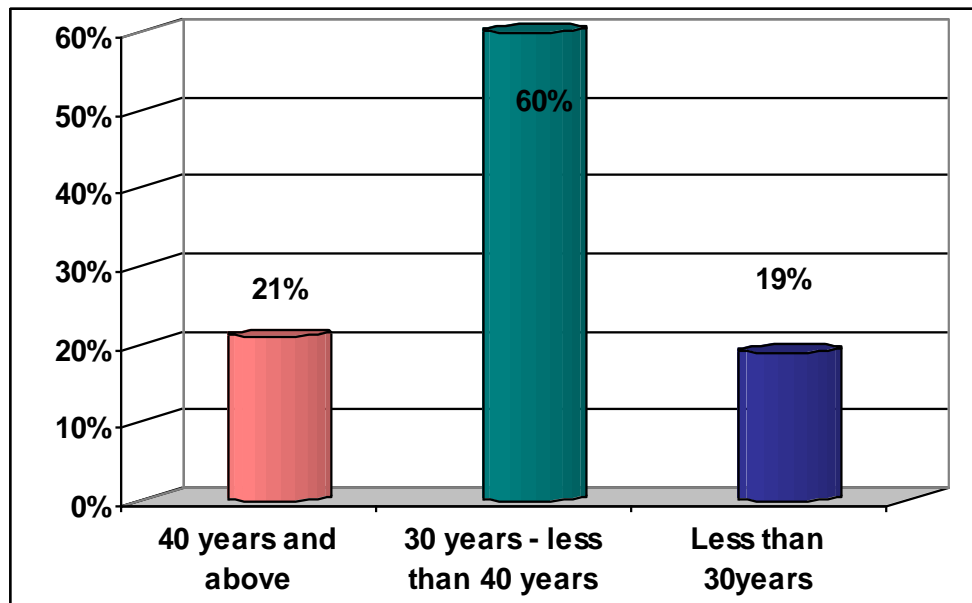
## Data analysis of health staff:

*Table (4.20) Gender distribution of health staff (N=60)*

Gender	Frequency	Percent
Male	33	55%
Female	27	45%
Total	60	100%

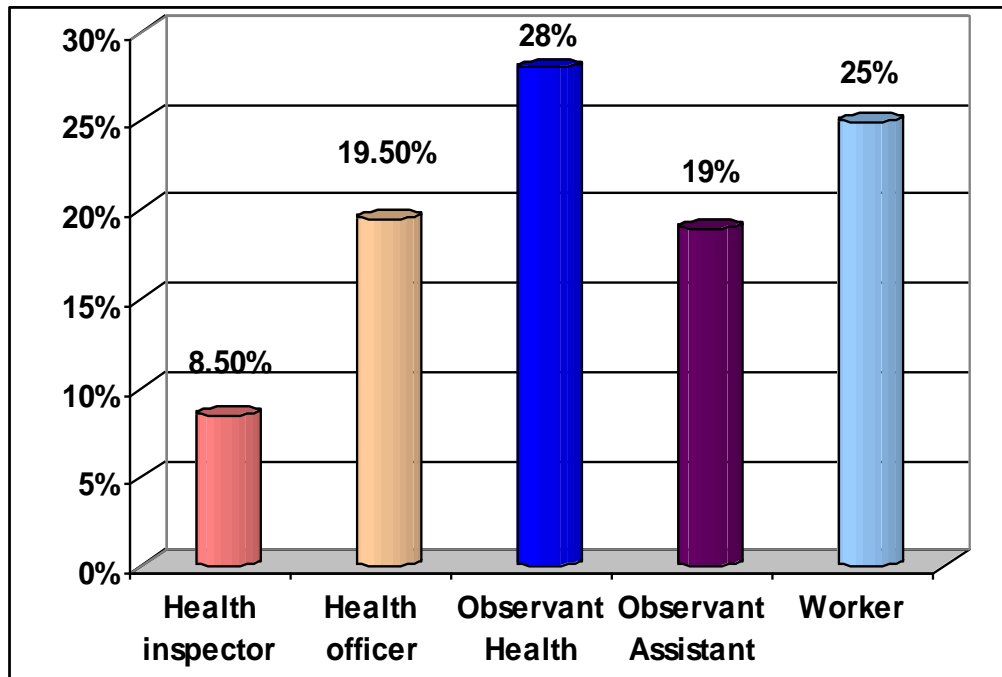
The table explained that 55% of the study population were male 'while only 45% were female.

*Figure(4.12) Age distribution of health staff (N=60):*



The figure explained 60% of the study population age group is between the ages of 30-40 years old.

**Figure (4.13) Specializations distribution of health staff(N=60):**



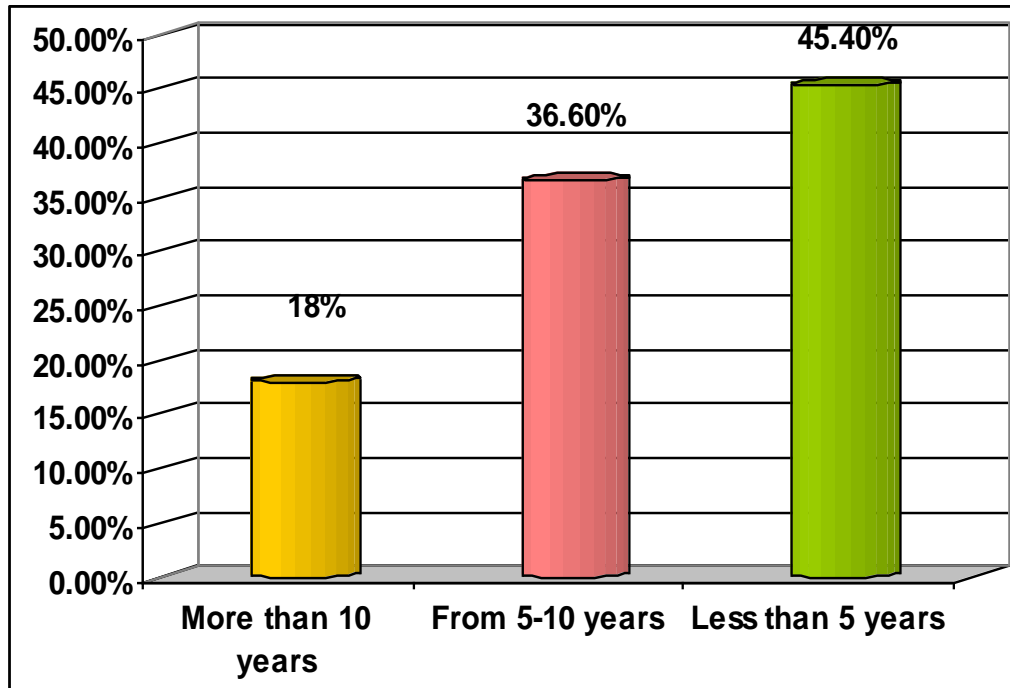
The figure explained that 72% of the study population are workers, observant and their assistants 'and 19.5% health officers' while only 8.5% are health inspectors.

**Table (4.21) Educational level distribution of health staff(N=60):**

Qualification	Frequency	Percent
Primary	14	23%
Secondary	09	15%
Universal	29	49%
Postgraduate	08	13%
<b>Total</b>	<b>60</b>	<b>100%</b>

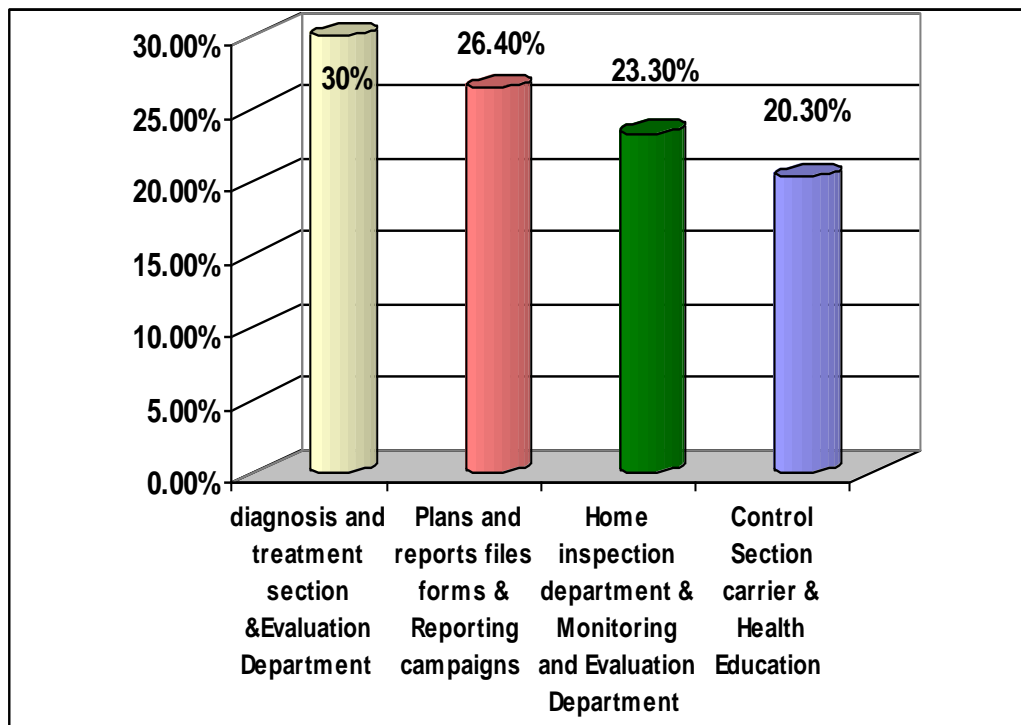
The table explained that 62% of the study community college educational level or above, while only 13% a secondary level of education

**Figure (4.14) experience of health staff in shendi locality(N=60):**



The figure explained that 36.6% of the studypopulation ranging professional experience between 5-10 years', while only 18% exceed 10 years professional experience.

**Figure (4.15) Activities of malaria department in shendi locality (N=60):**



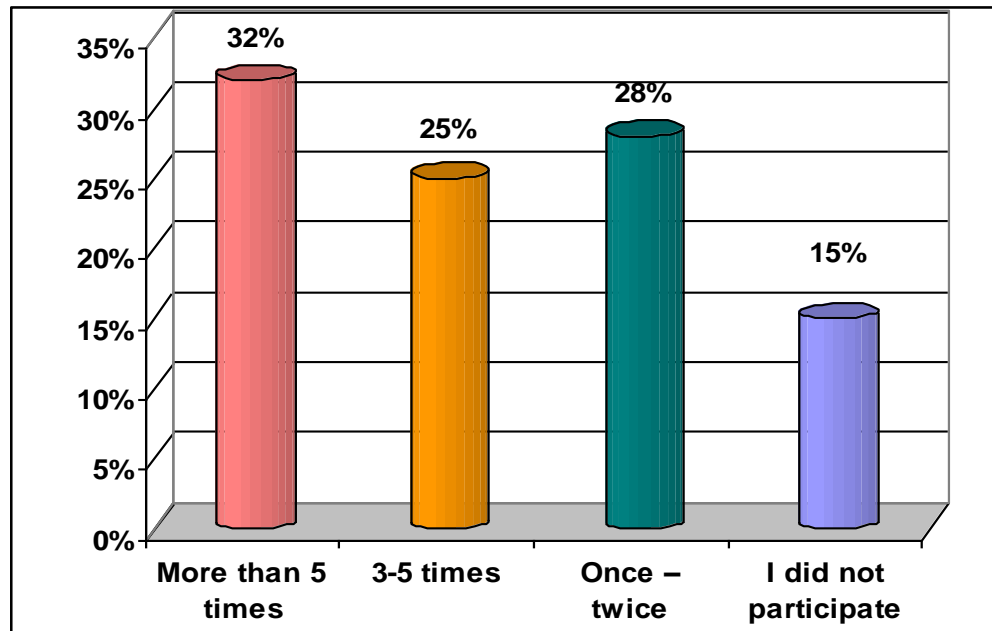
The figure explained that the administration found out all the different departments and activities, and by varying between vector control and health education department, diagnosis and treatment and the development of plans and reports, evaluation and follow-up.

**Table (4.22) Presence of training courses in department of health staff (N=60):**

presence of the training courses	Frequency	Percent
Yes	39	65%
No	21	35%
<b>Total</b>	<b>60</b>	<b>100%</b>

The table explained that 65% of the study population had received training courses in various fields of management', while only 35% did not receive training.

**Figure (4.16) Number of courses attended of malaria activities in department (N=60):**



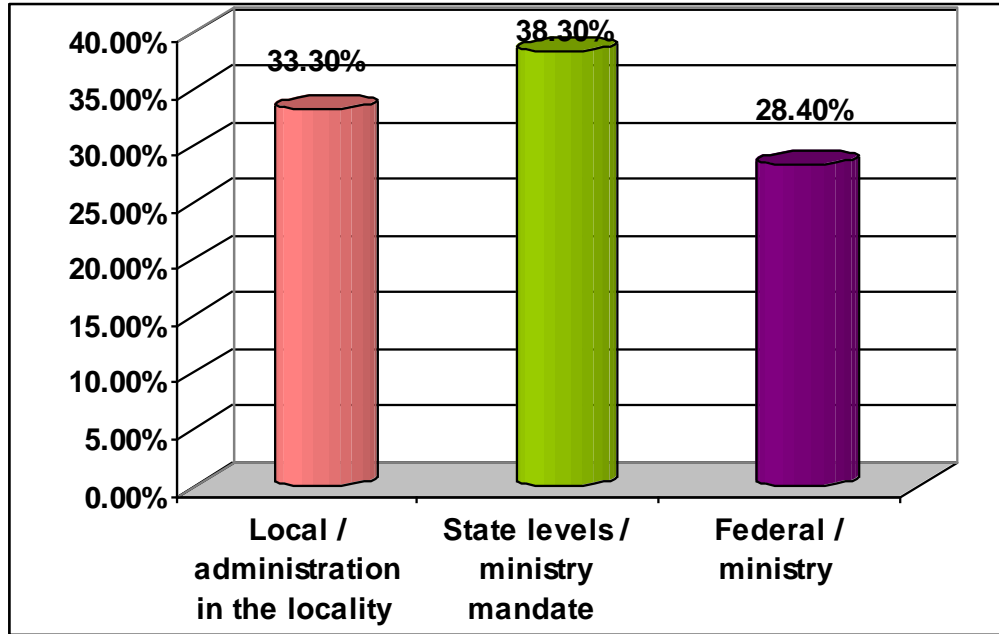
The figure explained that in terms of form 57% of the study population had received more than 5 training courses ', and 28% had one training session', while 15% of them did not receive any training sessions.

**Table (4.23) Specific position health staff in malaria department(N=60):**

Type of Work	Frequency	Percent
Administrative - Managerial	33	55%
Technical- field	27	45%
<b>Total</b>	60	100%

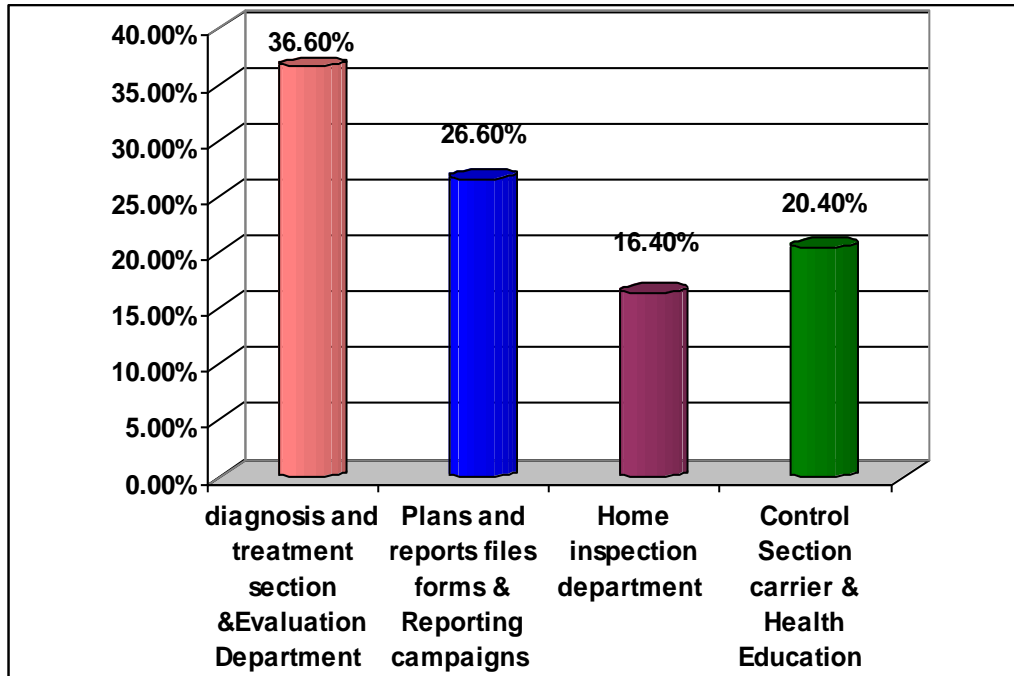
The table explained that 55% of the health staff were administrative management ', while 45% are technicians and in the field.

**Figure (4.17) Training programs levels for health staff of malaria department in shendi locality (N=60):**



The figure explained that 38.3% undergoing training for state level 'and that 33.3% followed by the local level', while 28.4% followed by the Federal level (at the Ministry level).

**Figure (4.18) Health staff participation in malaria departments in shendi locality (N=60):**



The figure explained that 37% of the study population was their participation in the diagnosis, treatment and follow-up and evaluation department', while only about 16% were taking part in the home inspection department' and participate in other management divisions, which were mixed up.

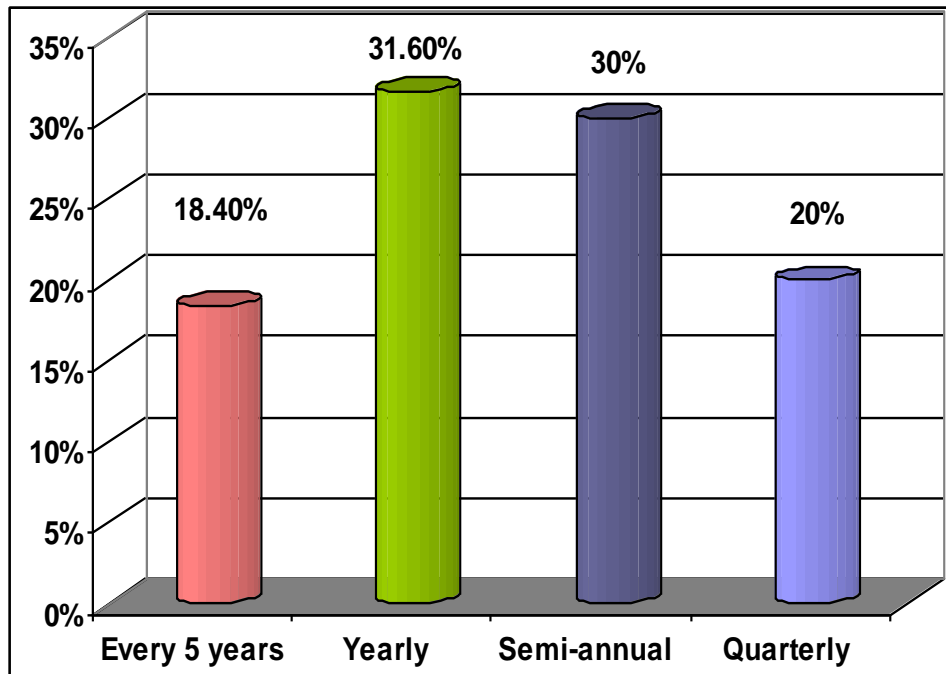


***Table (4.24) Frequency of health staff participation in different programs number distribution of malaria departments in shendi locality (N=60):***

<b>health staff participation</b>	<b>Frequency</b>	<b>Percent</b>
<b>once – twice</b>	17	28.4%
<b>3-5 times</b>	21	35%
<b>more than 5 times</b>	22	36.6%
<b>Total</b>	60	100%

The table pointed out that 71.6% of the health staff participated in the different programs 3 to more than 5 times, while only 28.4% participated once – tow times.

**Figure (4.19) Evaluation period of malaria control programs in shendi locality (N=60):**



The figure explained that malaria control programs Rated annually at a rate of 31.6% 'and semi-annually at a rate of 30% quarterly at a rate of 20%', while only 18.4% are evaluated every five years.

**Table (4.25) Rapid assessment activities of malaria department in shendi locality (N=60):**

Actions that take place in the rapid assessment process	The degree of use		
	Used significantly	Using a low degree.	Not used
Measurements and tests & Conduct surveys to get information	13	26	21
	21.7%	43.3%	35%
Interviews with VIPs & Illustrations to see disease and the population & affected by the carrier	18	22	20
	30%	36.6%	33.4%
Entomological survey & Investigation of the cases in the health units	28	19	13
	47.3%	31%	21.7%
Monitoring and Evaluation	27	22	11
	45%	36.6%	18.4%

**Table (4.26) Monitoring and evaluation activities of malaria department in shendi locality (N=60):**

evaluation and follow-up	The degree of use		
	Used significantly	Using a low degree.	Not used
annual plan & Plans Emergency	33	16	11
	55%	26.6%	18.4%
Forms Weekly Report & Periodic reports	37	14	09
	61.7%	23.3%	15%
Supervision & Training & Free treatment	26	19	15
	43.4%	31.6%	25%
Partnership with local organizations and communities & Health Education Pro...	24	19	17
	40%	31.6%	28.4%

**Table (4.27) Vector control program activities of malaria department in shendi locality (N=60):**

vector control	The degree of use		
	Available very significantly	Available low degree	Not available
Anti- aqueous phase / larvae & Anti- mutant bird	38	14	08
	63.4%	23.3%	13.3%
Entomological survey & Spraying insecticide with the remainder impact	31	19	10
	51.6%	31.4%	17%
Spraying insecticide is temporary / direct impact & Supervising league	26	18	16
	43.4%	30%	26.6%
Hudson pumps & Misty spray pumps mounted on shoulder	32	15	13
	53.3%	25%	21.7%
Misty spray pumps mounted on the vehicle - Warzazi spray pumps mounted on the back	23	19	18
	38.6%	31.4%	30%
Pesticide Permethrin 25% & Insecticide deltamethrin 15% & Pesticide Alobat / Tamvus 50%	28	17	15
	46.7%	28.3%	25%

**Table (4.28) Health education, treatment, diagnosis and follow-up programs activities of malaria department in shendi locality (N=60):**

reports , files and plans	The degree of use		
	Available very significantly	Available low degree	Not available
The monthly report of performance / technical and administrative work & Weekly Report of malaria cases	22	19	19
	36.8%	31.6%	31.6%
Daily Report Form departments work & Monthly work for the carrier in the locality file	26	22	12
	43.4%	36.6%	20%
annual plan & Emergency plans & health education programs	31	17	12
	51.7%	28.3%	20%
Form mutant bird & Form aqueous phase	21	23	16
	35%	38.3%	26.7%
Investigation of pathological cases form & Monitoring and follow-up form	18	23	19
	30%	38.3%	31.7%
The monthly report of the carrier	28	21	11
	46.7%	35%	18.3%
Annual Report to spend on malaria programs & Weekly report from the carrier	16	25	19
	26.6%	41.7%	31.7%
Field supervision form & Monthly report on campaigns	15	29	16
	25%	48.4%	26.6%

<b>Health Education &amp; diagnosis and treatment</b>	<b>The degree of use</b>		
	<b>Available very significantly</b>	<b>Available low degree</b>	<b>Not available</b>
<b>Lectures &amp; Education messages</b>	32	21	07
	53.3%	35%	11.7%
<b>Brochures &amp; Trade shows &amp; Partnerships</b>	22	29	09
	36.7%	48.3%	15%
<b>Quick scan tapes / RDTs &amp; Ortesonat 50 mg Vansdar</b>	27	19	14
	45%	31.7%	23.3%
<b>Artosonet 100 mg – Vansdar</b>	22	25	13
	36.7%	41.7%	21.4%
<b>Quartum ( pills ) Quinine pills</b>	19	24	17
	31.7	40%	28.3%
<b>Quinine injection Driveway salt 9%</b>	28	19	13
	46.9%	31.7%	21.4%
<b>Trail glucose 5% Trail glucose 50%</b>	36	16	08
	60%	26.7%	13.3%
<b>Cannula / butterflies trail / Giemsa stain / slides / optical microscopes</b>	15	29	16
	25%	48.3%	26.7%

**Table (4.29) Activities and strategies of malaria department in shendi locality (N=60):**

activities and strategies in management	The degree of use		
	Effectively extraordinary degree	Effectively a low degree (minimum)	Inactive
control phase aqueous / larval	36	17	07
	60%	28.3%	11.7%
Integrated Pest developed bird / carrier (sprayed with the impact of the rest - misty spray)	39	19	02
	65%	31.7%	3.3%
Diagnosis (RDTs)	20	29	11
	33.4%	48.3%	18.3%
refresher training and rehabilitation of health workers and foreign courses	22	27	11
	36.7%	45%	18.3%
prepping to anticipate epidemics before they occur	17	28	15
	28.3%	46.7%	25%
Free treatment (distribution of health units)	38	17	05
	63.4%	28.3%	8.3%
raising health awareness and health education for citizens and communication (seminars - pamphlets -mahadharat)	19	27	14
	31.7%	45%	23.3%
Drying agricultural projects (irrigation intermittent)	27	23	10
	45%	38.3%	16.7%
build and strengthen social partnerships	21	24	15
	35%	40%	25%

<b>Partnerships with the relevant authorities (Ministry of Irrigation – M of Agriculture)</b>	14	37	09
	23.3%	61.7%	15%
<b>Monitoring of patients and epidemic response system</b>	23	31	06
	38.3%	51.7%	10%
<b>supervision and collection reports</b>	34	17	09
	56.7%	28.3%	15%
<b>HR / workforce</b>	20	27	13
	33.3%	45%	21.7%
<b>surveys and research</b>	16	26	18
	26.7%	43.3%	30%

**Table (4:30) Obstacles of malaria control program in shendi locality (N=60):**

<b>Obstacles</b>	<b>The degree of use</b>		
	<b>Effectively extraordinary degree</b>	<b>low degree</b>	<b>Inact ive</b>
<b>Lack of technical and administrative staff</b>	11	17	32
	18.4%	28.3%	53.3%
<b>Lack of personal protection for workers Tools</b>	09	29	22
	15%	48.3%	36.7%
<b>Lack of spray pumps / breakdowns of pumps</b>	10	19	31
	16.6%	31.7%	51.7%
<b>Lack of pesticides used in the fight</b>	10	19	31
	16.6%	31.7%	51.7%
<b>The difficulty of access to some affected areas</b>	10	19	31
	16.6%	31.7%	51.7%



<b>Lackof training programs and courses in the field of integrated pest management</b>	07	14	39
	11.7%	23.3%	65%
<b>The lack of experience among workers in the field of vector control</b>	32	19	09
	53.3%	31.7%	15%
<b>The difficulty of communication between residents and center when emergencies (increasing the number of cases )</b>	20	28	12
	33.3%	46.7%	20%
<b>Double the participation and cooperation of some of the stakeholders and civil society organizations</b>	14	19	27
	23.3%	31.7%	%45
<b>Lack of trained manpower in the field of control</b>	12	17	31
	20%	28.3%	51.7 %
<b>The difficulty of communication between workers in the field and malaria management</b>	14	26	20
	23.4%	43.3%	33.3 %
<b>The difficulty of movement during emergency / transportation occurrence</b>	09	17	34
	15%	28.3%	56.7 %
<b>Lack of necessary for the conduct of control programs, financial allocations</b>	12	27	21
	20%	45%	35%
<b>Risks arising during work</b>	11	28	21
	18.3%	46.7%	35%

## **5- Discussion:**

The study showed that the incidence of malaria is very high (83.7%) in the study population and that is due to because of the intensive presence of mosquito, and availability of favorable environmental conditions for the reproduction of mosquito

The study showed that the level of knowledge among the population in the study area, regarding malaria and transmission is high (60%-75%), due to the high density of mosquitoes, and the increase of breeding sites in study area (78.7%).

The study confirmed that the average rate of infection per person is between one to three (93%), and that show of the density of the vector, this may be due to deferent reasons, and may indicate the weak awareness of individuals previously infected towards use personal prevention.

The study found that the activities of the control program are weakness; there are irregular spraying activities against the infected stage, which amounted to (27.9%), This is due to the lack of material and human resources for malaria management, and the large area of the region, also and community participation is low(47.5%).

The study found that the community participation in the vector control activity was (47.5%) that was due to the customs, traditions, the misconceptions of population, control activities are the responsibility of the government's, and they have no role in control activity. and lack of time of the household who pay more attention to increase the monthly income for the individuals of the family, in the study showed average family size between 4-10 persons, (72.5%), also more over the weakness of family income.

The study showed that methods of Prevention and integrated vector control is low (41.2%), and the distribution of saturated mosquito nets is low (33.7%) the larvae spraying is low (35%), the vector control is very low (29.6%), this due that activities towards control of vector and personal prevention is more than that of biological control.

(Saturated mosquito nets have an important role in reducing morbidity and mortality rates, because they prevent mosquito access to humans, vector control operations should be focused primarily on them as they are the main focus of control activities) (33).

The study pointed out the availability of health education activities is high (53.7%) (Education programs have a direct impact on raising health awareness about malaria control, and behavior change activities and misconceptions about malaria) (18).

The study confirmed that weakness of the programs and training courses towards the population is low (35.6%), and the study confirmed that the community participation in vector control activities and spraying campaigns is very low (27.9%), this mainly due to financial shortage in the program for specific Pons for courses and training.

(Routine and continuous training programs, and participation processes in various malaria activities, increase the quality of performance and health work staff, which positively reflects the improvement of the activities of the program of control, and reduction of morbidity and mortality) (22).

The study showed that most of the malaria cases and deaths are in years between (2015 and 2017), most of which were found in the hajar alasal and northern sectors of the study area, and that the areas on the banks of the Nile in the study area of the most areas affected by malaria and increasing the density of the vector.

The study found that most of health staff their age is between 30 and 40 years. The study confirmed that nature of the work in the administration was (55%) administrative staff, and were (45%) technical staff and the study showed that most of study population were postgraduate levels.

The study found that more than (82%) of the staff in study area ranged from 5 to 10 years of experience; from quality point of review the health staff recourse is good, due to suitable education levels, active age, and well experience.

(The practical and scientific experience in the field of malaria control, the greater the efficiency and quality of work performance) <sup>(51)</sup> .

The study confirmed that more than (15%) only of the staff in study area did not receive any of the various training courses during their work in the department, and (57%) received more than 5 courses Training, this indicate that there are from staff of who are need for training courses.

The study showed that more than (36.6%) of health staff participation in the department was in the health education, diagnosis and treatment sections. Participation in the activities of the department of combating carriage and domestic visits is (16.4%), participation towards activity of vector control should be increased to suitable level.

(Participation in malaria control activities on a continuous basis increases performance, increases experience and improves work, especially if participation involves all control activities in department) <sup>(25)</sup> .

As for the rapid assessment of malaria management, the study showed that getting the information is (34%), the follow-up, evaluation and treatment activities is

(54%), surveys were is (47.3%), surveys provides more information about the magnitude of the real problems.

(Rapid assessment of malaria control from the revised procedure, and study of the health and environmental situation, and helps in the proper planning process, the development of appropriate plans and the prevention of emergencies and epidemics) <sup>(52)</sup> .

The study shows that the activities of the monitoring and evaluation Section are implemented is very high (90%), the annual and emergency plans used is high, the weekly reporting forms and the periodic reports is high, the supervision and training activities is very high (75%), and the health education programs is very high (71.6%), but is not reflecting real positive effectiveness of control activities.

(Evaluation of the malaria control program aims to follow up the activities of the control program and how to deal with the epidemics of malaria at the local level, and the most important indicators of monitoring and follow-up to malaria, and activate the system of early preparedness in anticipation of the epidemic) <sup>(51)</sup>.

Evaluation of the malaria control program is routine for all malaria program activities.

The study confirmed that the control of the larvae and in the flied is high (63.4%), the insecticide surveys is high, and the spraying with the direct effect and the spraying of the pesticide with the remaining effect is low. the use of pesticide temphos, pyrimethrin, deltamethrin is low (47,6%), is due to that they are not of enough avalabale. the physical control and used of saturated mosquito nets is (67.2%), and biological control is very low (22.9%).

(Chemical control of the vector is one of the most common types of control used recently in Sudan, but it is the most risks to workers) <sup>(42)</sup>.

(Environmental and biological control is compared to chemical, which is considered better, more quality, less expensive and less risks to workers, and helps improve the health and environmental situation in the region) (42). .

The study pointed out that the health education programs such as lectures, exhibitions, applications and educational messages using were very high (76.5%), quantum tablets, artosonite, and injections quinine availability is low, that due to is not availability.

The study showed the effectiveness of integrated control activities and the vector (62.5%). Other activities of the plan strategic provide collection of information, surveys, statistics, research, monitoring system and epidemiology is (43.3%), also lack of monitoring and evaluation, and program effectiveness in strengthening social relations and partnerships relevancies is (23.3%).

The study found that 90% of obstacles facing the malaria control program in Shendi locality, such as lack of technical staff, shortage of trained workforce in the field of control was, lack of training programs, lack of pesticides used in control program, lack of the health education programs, the difficulty of communication between the center and the population at the time of emergency, weakness of participation and cooperation of some who related to the malaria control program.

## **Conclusion:**

- Knowledge population about malaria, method of transmission, diagnosis and prevention was (60%, 75% , 43.5% and 79%, respectively).
- Malaria infection rate is very high (83.7%), and malaria recurrence rate also very high (94.1%).
- The weakness of spraying campaigns was (28.5%).
- Community participation in the malaria control activities is low (48.5%).
- More than 55% of the vector control activity are available in the Department.
- (97.5%) the presence of health education programs.
- (59%) The effectiveness of monitoring and evaluation activities for the malaria control program.
- More than 90% of the obstacles of malaria control program in shendi locality, include the lack of financial, the low labor force, weakness of training courses.

## **Recommendations:**

- Shendi locality should increase the manpower, and attention to routine and active training programs by all levels of health, especially in the vector control activities.
- To take care of training programs, and distributing them in varying proportions among the health work staff, and linking the training side in the field of control.
- Ministry of health should provide the necessary financial allocations for malaria control program.
- To take care of evaluation and follow-up programs, and to intensify supervision visits from international organizations, and the Federal Ministry.
- Ministry of health should strengthening malaria surveillance and response system.
- To take care Shendi locality of vector control activities, through the optimal use of integrated mosquito control methods, conducting insect surveys.
- Shendi locality should activate community participation programs, and intensify health education and awareness programs for population with regard to malaria control program in the study area.
- To take care Shendi locality of environmental health programs, and sanitation campaigns, spraying campaigns, pond and swamp irrigation, and distribution of saturated mosquito nets.



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**A) one ( )      b) Two ( )      c) three and above ( )**

13) Do you know the diagnosis of malaria ?

**A) Yes ( )      b) No ( )**

14) If yes : Select the diagnostic methods ?

**A) rapid test strips ( )      b) Giemsa stain ( )**

15) Do you know the treatment of malaria ?

**A) Yes ( )      b) No ( )**

16) If yes , select the drugs used currently ?

**A) Artsonet ( )      b) Vansdar ( )      c) quinine injection ( )**

17) Do you know the methods of prevention from malaria ?

**A) Yes ( )      b) No ( )**

18) If yes : which methods of prevention more peachiest?

**A) anti- carrier ( )      b) PPE ( )      c)bridging the ponds and marshes( )**

19) Do you know the means of integrated mosquito control ?

**A) Yes ( )      b) No ( )**

20) If yes : what does mean ?

**A) anti- phase carrier ( )      b) the use of PPE ( )**

**C) hygiene and sanitation ( )      d) of impregnated mosquito ( )**

21) Is there an anti- mosquito program in the area ?

**A) Yes ( )      b) No ( )**

22) Are there breeding sites of mosquitoes near home?

**A) Yes ( )      b) No ( )**

- 23) Are there any campaigns for malaria control ?  
**A) Yes ( )** **b) No ( )**
- 24) Have there been any distribution of mosquito nets in the area ?  
**A) Yes ( )** **b) No ( )**
- 25) Do you participate in malaria control program?  
**A) Yes ( )** **b) No ( )**
- 26) If yes : Select the type of collective participation by family members in the control operations:  
**A) participation in health education programs ( )**  
**b) Participation in spraying campaigns ( )**
- 27) Is there awareness programs for this disease?  
**A) Yes ( )** **b) No ( )**
- 28) If yes: what the type of programs?  
**A) lectures and seminars ( )** **b) Information and Broadcasting ( )**  
**C) personal interviews ( )**
- 29) Is there training programs for malaria control ?  
**A) Yes ( )** **b) No ( )**
- 30) If yes: does it have impact on the citizens ?  
**A) Yes ( )** **b) No ( )**
- 31) Is the current malaria control program appropriate for roll back of malaria?  
**A) Yes ( )** **b) No ( )**
- 32) Is there a follow-up and evaluation of the control program operations?  
**A) Yes ( )** **b) No ( )**



University of Shendi

Faculty of Post Graduate Studies & Scientific Research

Questionnaire to assess malaria control program in Shendi locality for the period from 2000 - 2015 for health staff

- 
- 
- 1.Age:** 1) less than 30 years ( ) 2) of 30 - less than 40 years ( )  
3) 40 years and older ( )
- 2. Profession / type:** 1) health inspector( ) 2) health officer ( ) 3) Health  
observant ( ) 4) observant Assistant ( ) 5) storekeeper( ) 6) m . Medical( ) 7)  
Pharmacist( ) 8) Health Guide ( )
- 3.Educational levels :** 1) above the university ( ) 2) university ( ) 3)  
secondary( ) 4)primary ( )
- 4. Years of Experience:** 1) less than 5 years( ) 2) 5-10 years ( ) 3) more than  
10 years ( )
- 5- which departments and activities are involve ?**  
1) Control Section carrier ( ) 2) Health Education Division( ) 3) diagnosis and treatment  
section ( ) 4) home inspection department( ) 5) Monitoring and Evaluation Department  
( ) 6) plans and reports ( ) 7) files( ) 8) forms and reporting ( ) 9) campaigns ( )
- 6. Do you any training courses in the field of work?**  
1) Yes ( ) 2) No ( )
- 7- If yes : How many courses that you received ?**  
1) one cycle( ) 2) 2-3 courses( ) 3) 4-5 courses( ) 4) more than 5 cycles ( )
- 8. Which by of work practicing by now currently occupied by the administration?**  
1) administrative ( ) 2) technical ( )
- 9. in any of the departments received training your courses If yes to question No. 6?**  
1) Control Section carrier( ) 2) Health Education Division( ) 3) diagnosis and treatment  
section ( ) 4)home inspection department( ) 5) Monitoring and Evaluation Division ( )
- 10. Is there refresher training programs and ongoing management?**  
1) Yes ( ) 2) No ( )
- 11.If yes : the / level is responsible for training if the answer is yes?**  
1) Federal / ministry( ) 2) state levels / ministry mandate ( ) 3)  
local / administration in the locality ( )
- 12. Who targeted training programs in management?**  
1) technical cadres / workers( ) 2) administrative staff ( )
- 13 - Have you ever been involved in external management programs / environment  
and sanitation programs .....?**  
1) Yes ( ) 2) No ( )
- 14.If yes : How many times of participation it?**  
1) once – twice( ) 2) 3-5 times( ) 3) more than 5 times ( )

**15. Which of the following fields are participated in at administration?**

- 1) evaluation of the program operations( )      2) vector ( )      3) the organization of activities( )  
 4)environmental health measures( )      5)Personnel and personnel administration( )  
 6) equipment and devices ( )      7)Transportation and Finance storage

**16. Is there any evaluation of the control program?**

- 1) Yes ( )      2) No ( )

**17. If yes : time of the evaluation of the control program?**

- 1) Quarterly( )      2) semi-annual ( )      3) Yearly( )      4) every 5 years ( )

**18. How to use the following in the continuous evaluation of the program actions**

number	Actions that take place in the rapid assessment process	Using a low degree	Used very much	NO USED
1	Measurements and tests			
2	Conduct surveys to get information			
3	Interviews with VIPs			
4	Illustrations to see disease and the population affected by the carrier			
5	Entomological survey			
6	Investigation of the cases in the health units			
7	Monitoring and Evaluation			
8	Follow-up free treatment for the injured			

**19. reports , plans and forms ?**

- 1) weekly( )      2) monthly( )      3) Quarterly( )      4) semi-annual ( )  
 5) annual( )      6)every 5 years and above ( )

**20. availability of the following items in Management ( evaluation and follow-up)**

Number	Item	Used significantly	NO USED	Used very much
1	annual plan			
2	Plans Emergency			
3	Forms Weekly Report			
4	Periodic reports			
5	Supervision			
6	Training			
7	Free treatment			
8	Partnership with local organizations and communities			
9	Health Education program			

**21. To what extent in the following section provides a vector control ?**

number	Item	Not available	Available low degree	Available very significantly
1	Anti- aqueous phase / larvae			
2	Anti- mutant bird			
3	Entomological survey			
4	Spraying insecticide with the remainder impact			
5	Spraying insecticide is temporary / direct impact			
6	Supervising league			
7	Hudson pumps			
8	Misty spray pumps mounted on shoulder			
9	Misty spray pumps mounted on the vehicle			
10	Warzazi spray pumps mounted on the back			
11	Pesticide Alobat / Tamvus 50%			
12	Pesticide Permethrin 25%			
13	Insecticide deltamethrin 15%			
14	Natural or physical control ( of impregnated mosquito - Almnfrat - alhamaih personal - environmental measures ..... )			

**22. What is the availability of the following for the reports , files and plans ?**

number	Item	Not available	Available low degree	Available very significantl
1	The monthly report of performance / technical and administrative work			
2	Weekly Report of malaria cases			
3	Daily Report Form			

	departments work			
4	Monthly work for the carrier in the locality file			
5	annual plan			
6	Emergency plans			
7	health education programs			
8	Form mutant bird			
9	Form aqueous phase			
10	Investigation of pathological cases form			
11	Monitoring and follow-up form			
12	The monthly report of the carrier			
13	Annual Report to spend on malaria programs			
14	Weekly report form the carrier			
15	Field supervision form			
16	Monthly report on campaigns			
17	Annual Report on supervision for malaria programs			

**23. What is the availability of the following at the Department of Health Education and the Department of diagnosis and treatment ?**

NO	Item	Not available	Available low degree	Available very significant
1	Lectures			
2	Education messages			
3	Brochures			
4	Trade shows			
5	Partnerships			
6	Quick scan tapes / RDTs			
7	Ortesonat 50 mg – Vansdar			
8	Ortsonet 100 mg – Vansdar			
9	Quartm ( pills )			
10	Quinine pills			
11	Quinine injection			
12	Driveway salt 9%			

13	Trail glucose 5%			
14	Trail glucose 50%			
15	Cannula / butterflies trail / Giemsa stain / sliced / optical microscopes			
16	Ortimther ( pill / injection )			

**24. Over the existence and effectiveness of the following activities and strategies in management ?**

NO	Item	Inactive	Effectively a low degree( minimum)	Effectively extraordinary degree
1	control Altalh phase aqueous / larval			
2	Integrated Pest developed bird / carrier (sprayed with the impact of the rest - misty spray)			
3	raising health awareness and health education for citizens and communication (seminars - pamphlets -mahadharat)			
4	Diagnosis (RDTs)			
5	free treatment (distribution of health units)			
6	drying agricultural projects (irrigation intermittent)			
7	refresher training and rehabilitation of health workers and foreign courses			
8	build and strengthen social partnerships			
9	prepping to anticipate epidemics before they occur			
10	Monitoring of patients and epidemic response system			
11	surveys and research			
12	HR / workforce			
13	supervision and collection reports			
14	Partnerships with the relevant authorities (Ministry of Irrigation – M of Agriculture)			

25 - What is the degree of consent to the obstacles facing the anti- malaria program in the locality ?

<b>The degree of approval of the obstacles</b>				
<b>NO</b>	<b>Obstacles</b>	<b>Strongly Disagree</b>	<b>Oppose</b>	<b>Agree</b>
<b>1</b>	Lack of technical and administrative staff			
<b>2</b>	Lack of personal protection for workers Tools			
<b>3</b>	Lack of spray pumps / breakdowns of pumps			
<b>4</b>	Lack of pesticides used in the fight			
<b>5</b>	A lack of health education programs			
<b>6</b>	The difficulty of communication between residents and center when emergencies (increasing the number of cases )			
<b>7</b>	The difficulty of access to some affected areas			
<b>8</b>	Lack of trained manpower in the field of control			
<b>9</b>	Lack of training programs and courses in the field of integrated pest management			
<b>10</b>	The difficulty of communication between workers in the field and malaria management			
<b>11</b>	The lack of experience among workers in the field of vector control			
<b>12</b>	The difficulty of movement during emergency / transportation occurrence			
<b>13</b>	Lack of necessary for the conduct of control programs, financial allocations			
<b>14</b>	Double the participation and cooperation of some of the stakeholders and civil society organizations			
<b>15</b>	Lack of supervision of the federal and state levels for the program			
<b>16</b>	Risks arising during work			