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*Study of the Epidemiological Factors of Pulmonary
Tuberculosis Among Patients in Wad Madani &
Almanagil TB Centers _ Gezira State_ Sudan_ From
2016 to 2018*

*A thesis Submitted in accordance with the requirements of the
University of Shendi for PHD of Epidemiology*

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DEDICATION

*“To the soul of my dear father, may he rest in peace,,
To my beloved mother for her care and support,,
To my wife, my sons, my brothers and sisters for their help.*

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Firstly, I would like to thank ALLAH for helping and guide me to complete this work, and I would like to thank my first supervisor:

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LIST OF ABBREVIATIONS

AIDS:	Acquired Immunodeficiency Syndrome
BCG:	Bacilli Calmette Guerin
CBOs:	Community-based organizations
CDC:	Centers For Disease Control And Prevention
CT:	Computed Tomography
DNA:	Deoxyribo Nucleic Acid
DOT:	Directly Observed Therapy
G+C:	Guanine Plus Cytosine
HBCs:	High-burden country of which there are 22 that account for approximately 80% of all new TB cases arising each year
HIV:	Human Immunodeficiency Virus
HPPA:	Health Protection &Promotion Act
IGRAs:	Interferon Gamma Release Immuneo Assays
LTBI:	Latent Tuberculosis Infection
M.TB:	Mycobacterium Tuberculosis
MDR:	Multi Drug Resistant
NTP:	National Tuberculosis Program
PHC:	Primary Health Care
SNTP:	Sudanese National Tuberculosis Program
SPSS:	Statistical Package for the Social Sciences software
TB	Tuberculosis Bacilli
TCP:	Tuberculosis Control Program/ Gezira State
TST:	Tuberculin Skin Test
UVGI:	Ultra Violet Germicidal Irradiation
WHO	World Health Organization
XDR:	Extensively Drug Resistant

ABSTRACT:

This descriptive study was conducted in Gezira State – Wad Madani & Al Managil Hospitals – Gezira State-Sudan- from 2016 to 2018. With an aim to study the epidemiological factors of new positive cases among TB patients in Wad Madani and ELmanagil centers in Gezira State. The sample size was Total coverage of all new positive smear TB patients transferred to Wad madani and Elmanagil centers in Gezira state. About 221 samples. The data were collected by using the following methods, observation (check list) while managing to patients, structure questionnaire which distributed for each patient infected with tuberculosis disease for the first time, The data were analyzed manually using master sheets, and using statistical package for social science (SPSS), and data were depicted in tables and figures.

The main results in this study showed the following:

The study indicated that the incidence rate in Wad Madani center about (22 cases per 100.000 population). While the incidence rate in Al managil center estimate (11 cases per 100.000 population), 60.1% of the patients know about infectious TB disease, 38.5% no infectious and 1.4% did not know, (69%) of the patients were male, while female were (31%).

Young people are the most affected by TB disease about (61%) of total patients, (30.3%) of the patients use of stimulants and (69.7%) didn't use, (78.3%) of the patients had low level education ,while (14.5%) medium and (7.2%) high level. The study confirmed about (51.6%) of the targets have low income that means these patients living below poverty line. (According to World Bank about 1.25 USD/day).

The important recommendations in this study is that Improvement of work environment for T.B centers in Gezira state by maintenance of clinics and laboratories, training of staffs. Raising of health education in community for contributing to detect and treatment cases of T.B disease.

المستخلص :

أجريت هذه الدراسة الوصفية بكل من مركزي مستشفى ود مدني، ومستشفى المناقل، لتشخيص وعلاج مرض الدرن بولاية الجزيرة بالسودان بين عامي 2016م الي 2018م، وذلك بهدف دراسة العوامل الوبائية لمرضي الدرن (موجبي التفاف، والذين اصابوا به لأول مرة). تم إختيار حجم العينات لهذه الدراسة بواسطة التغطية الكلية لكل المرضى موجبي التفاف لبكتريا الدرن و الذين تم تحويلهم (لأول مره) لمركزي مدني والمناقل في تلك الفترة. وكان حجم العينات 221 مريض.

تم جمع البيانات بالطرق الآتية: أولاً: الملاحظة بواسطة قائمة ضبط إشرافيه للمراكز والملاحظة من إدارة المراكز، ثانياً: الإستبيانات حيث تم ملئها لكل مريض أصيب بمرض الدرن لأول مرة وكان موجب التفاف.

وقد تم تحليل بيانات هذه الدراسة يدوياً، وبواسطة برنامج الحزم الاحصائية، وعرضت في هيئة جداول وأشكال توضيحية.

خلصت الدراسة إلي عدة نتائج أهمها:

الدراسة اشارت الي ان معدل الاصابه في مركز ودمدني حوالي 22 حاله لكل 100.000 نسمة من السكان. بينما معدل الاصابه في مركز المناقل يساوي 11 حاله لكل 100.000 من السكان. نسبة (61.1%) من المرضي يعلم ان مرض الدرن مرض معدى، و نسبة (38.5%) من المرضي يعتقدون أنه غير معدى، و(1.4%) منهم لا يعلم إذا كان المرض معدى أم لا. نسبة (69%) من عينة الدراسة (المرضى) كانوا ذكورا، بينما نسبة الإناث بلغت (31%) من عينة الدراسة الكلية. وكان الشباب داخل عينة الدراسة أكثر الفئات إصابة بالمرض، حيث بلغت نسبتهم حوالي (61%) من جملة المرضي. نسبة (30.3%) من المرضي يتعاطون المكيفات و(69.7%) منهم لا يشربها. وكان (78.3%) من المرضي ذوى تعليم منخفض، بينما (14.5%) منهم متوسطي التعليم، ونسبة (7.2%) من عينة الدراسة من ذوي التعليم العالي. أثبتت الدرسة أن حوالي (51.6%) من المرضي من ذوي الدخل المنخفض (الأمر الذى يعني أنهم يعيشون تحت خط الفقر حسب تقديرات البنك الدولي للدخل اليومي، والذى يبلغ 1.25 دولار لكل شخص في اليوم). وأهم توصيات الدراسة انه يجب تحسين بيئة العمل بمراكز الدرن بولاية الجزيرة من صيانة للعيادات، والمعامل، وتدريب الكوادر العاملة بها. وكذلك يجب رفع الوعي الصحي داخل المجتمع، وذلك للمساهمه في إكتشاف وعلاج حالات الدرن.

TABLE OF CONTENTS

Contents	Pages
Dedication	I
Acknowledgement	II
List of Abbreviation	III
Abstract(English)	IV
Abstract(Arabic)	V
List of Contents	VI- VII
List of tables	VIII- IX
List of figures	X
Chapter 1	
Introduction	1-4
Objectives of the study	5
Chapter 2	
Literature Review	6-45
Chapter 3	
Methodology	46
Study Design	46
Study Area	46
Study Population	47
Sample size & Sample Procedure	47
Data Collection	47
Data Analysis	47
Ethical Considerations	48
Chapter 4	
Results	49-75
Chapter 5	
Discussion	76-80

Chapter 6	
Conclusion	81
Recommendations	82
References	83-86
Appendices	87-95

LIST OF TABLES

Table No	Table Name	Page
Table (1)	Marital status	49
Table (2)	TB patients with children	49
Table (3)	Hear of newly discovered patients about TB disease	49
Table (4)	Knowledge of new positive TB patients about Tuberculosis disease infection	50
Table (5)	New positive TB patients with Other family members infected of TB disease	50
Table (6)	Family members of new positive TB patients- with TB positive received Treatment	50
Table (7)	Infection among contacts with TB disease	51
Table (8)	Treatment of contacts infection	51
Table (9)	Income coverage	51
Table (10)	Additional Income	52
Table (11)	How long the overtime	52
Table (12)	Regularity of daily meals	52
Table (13)	Total of rooms	53
Table (14)	Space of rooms	53
Table (15)	Stimulants type	53
Table (16)	Number of cigarettes smoked by patients	54
Table (17)	Stimulant methods of use	54
Table (18)	Pair and mass Contacts used stimulants with patients has been infected with TB	54
Table (19)	Treatment of contacts those who had tuberculosis and were taking stimulants	55
Table (20)	Known chronic diseases	55

Table (21)	TB patient sent out from house	55
Table (22)	Relationship between age and occupation	56
Table (23)	Relationship between age and Use of stimulants	57
Table (24)	Relationship between age and patients sent out from their house due to TB positive infection	58
Table (25)	The relationship between localities and Use of stimulants	59
Table (26)	Relationship between Education level and Use of stimulants	60
Table (27)	Relationship between Education level and stigma sense in society	61

LIST OF FIGURES

Figure No	Figure Name	Page
Figure (1)	Gender distribution	64
Figure (2)	Age distribution	65
Figure (3)	Distribution per locality	66
Figure (4)	Education level	67
Figure (5)	Occupation for new positive TB patients	68
Figure (6)	Meals number per day	69
Figure (7)	Type of daily meals	70
Figure (8)	Monthly income	71
Figure (9)	Type of ventilation	72
Figure (10)	Use of stimulants	73
Figure (11)	The stigma sense in society	74
Figure (12)	TB patient sent out from work	75

CHAPTER ONE

1-1-Introduction:

Tuberculosis (TB), one of the most widespread infectious diseases, is the leading cause of death due to a single infectious agent among adults in the world (**O. Cosivi et al, 1998**).

The words “tuberculosis (TB)” and “*M. tuberculosis*,” the bacterium that causes TB, are used in different ways. This document uses “TB” to describe clinical events, such as TB infection, TB transmission, and TB disease; *M. tuberculosis* is used when describing potentially infectious germs that a person with TB disease of the lungs or larynx expels when coughing. “TB suspect” refers to a person who presents with symptoms or signs suggestive of TB disease, in particular a cough of long duration (**WHO, 1999**).

The first known case of recorded pulmonary TB occurred between 668-626 BC. This record was found in the library of King Assurbanipal of Assyria the following is an extract: “The patient coughs frequently, his sputum is thick and sometimes contains blood. His breathing is like a flute. His skin is cold, but his feet are hot. He sweats greatly and his heart is much disturbed. When the disease is extremely grave, he suffers from diarrhea” (**Harms, 1997**).

There are two states of Tuberculosis (TB). The latent TB infection occurs when the TB bacteria are inhaled but the body is able to stop the bacteria from growing. People with the latent form have no symptoms, can't spread the bacteria to others, but can develop the disease if they do not receive treatment (**CDC, 2005**).

The second state of tuberculosis is the active TB disease, which will be the focus of this research. Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*. Bacteria of the genus *Mycobacterium* are non-motile and non-sporulated rods.

They are grouped in the suprageneric rank of actinomycetes that, unusually, have a high content (61-71 %) of guanine plus cytosine (G+C) in the genomic desoxyribonucleic acid (DNA), and a high lipid content in the wall, probably the highest among all bacteria (**Palomino et al, 2007**).

Transmission of *M. tuberculosis* depends on the length of time and frequency of the exposure, the degree of contagiousness of the infected person, the environment and airflow in which the exposure occurred, and the intensity of the contact with the TB organism itself.

(Clinical Practice Guidelines-2010)

Tuberculosis typically attacks the lungs, but can also affect other parts of the body .The disease has become rare in high-income countries , but is still major public health problem in low –and middle-income countries .It is estimated that between the years 2000 and 2010 ,eight to nine million new cases emerged each year . Approximately 1.5 million people die from the disease each year .In adults ,tuberculosis is the second leading cause of the death due to infectious disease (after AIDS), with 95% of death occurring in low-income countries . Tuberculosis is a major problem of children in poor countries where it kill over 100,000 children each year.

(Medicines San Frontiers et al ,2014).

TB is mainly a disease of adults, and affects more men than women. It is an important cause of death among young adults who are raising families and in their most productive working years. In regions where the transmission of *M. tuberculosis* has been stable or increasing for many years, the incidence rate is relatively high among infants and young adults, and most cases are due to recent infection or reinfection (**Chiang C.Y et al, 2005**).

In the past, when tuberculosis was Widespread in industrialized countries, it was possible to show by skin-testing with tuberculin that most young adults had become infected. But only a small proportion (about 10%) developed the disease.

This is still what happens in most countries where tuberculosis is a problem and HIV is not a major problem. In some cases, infection may rapidly go on to disease. In others, TB may remain 'dormant', with a few 'sleeping' bacilli kept under control by the defences, but some later lowering of the patient's defences (e.g. by malnutrition, by another disease (such as HIV infection) or just old age) may allow the dormant TB to multiply and cause disease. In most people, their host defences either kill off all the bacilli or, perhaps more often, keep them suppressed and under long-term control (**Hans L. R et al, 2009**).

Persons with pulmonary or laryngeal TB can transmit M.tuberculosis through aerosolization of the bacilli in infectious droplet nuclei that are produced by coughing or sneezing (or speaking or singing in the case of laryngeal TB (**C. Robert Horsburgh et al , 2000**).

Worldwide, TB incidence (new cases per 100 000 population per year) is falling at about 2% per year. The fastest regional declines from 2013 to 2017 were in the WHO European Region (5% per year) and WHO African Region (4% per year). In the same 5 years, particularly impressive reductions (4–8% per year) occurred in southern Africa (e.g. Eswatini [formerly Swaziland], Lesotho, Namibia, South Africa, Zambia, Zimbabwe) following a peak in the HIV epidemic, and the expansion of TB and HIV prevention and care, and in the Russian Federation (5% per year) following intensified efforts to reduce the burden of TB (**WHO- 2018**) .

1-2-Rationale for the study:

More than 125 years later, tuberculosis (TB) is surging, leading to more deaths in 2006 than any previous year in the last few decades. Damage from this disease continues to grow despite effective therapies for drug-susceptible TB that keep the incidence of TB in Western countries at record lows (**Sanjay K. Jain et al, 2008**).

Tuberculosis mostly affects adults in their most productive years. However, all age groups are at risk. Over 95% of cases and deaths are in developing countries (WHO- 2017).

In Gezira state (SUDAN) the estimated number of cases is about 645 for new positive smear tuberculosis in 2014.

Wad-Madani and Elmanagil centers about 435 cases, approximately 67% for total percentage of new cases detection in Gezira state ,(Wad-Madani 226 cases and Elmanagil 122 cases). According to report (2014) of Tuberculosis Control Program (TCP) in Gezira state).

This study highlights the importance of some of the reasons that will be spelled out in the point below:

- TB ,disease that are accompanied by stigma and discrimination within the community.
- TB ,affected the community in many economic factors ,notably the decrease national income.
- Destroys the immune system of human and thus not susceptible to many diseases opportunistic.

1-3-Objectives of the study:

1-3-1-General objective:

To study the epidemiological factors of new positive smear among TB patients in wad madani & al managil center at the Gezira state..

1-3-2-Specific objectives:

1. To measure the incidence rate of new positive cases among TB patients in Wad madani and ELmanagil centers- Gezira state.
2. To study epidemiological factors associated with the occurrence of tuberculosis disease.
3. Determine the most affected groups (age, sex occupation and place).
4. Evaluation of two centers(madani & almanagil)based on:(infrastructure ,staff and work environment).

2. LITERATURE REVIEW

2-1-History of Tuberculosis

Tuberculosis (TB) is a disease that humans have lived with and died from for thousands of years. It has been present throughout recorded history, and there is evidence of tuberculosis infections in ancient Egyptian mummies, in ancient India and China, in classic greek texts, and in Native American peoples centuries before contact with Europeans. Tuberculosis was widespread in Europe throughout the 18th and 19th centuries, and at various times the cause was attributed to witches, fairies, poor diet, and poor air quality (**Kiple et al, 2009**). Medical doctors began to better understand TB in the 19th century, however, linking TB of the lungs, scrofula, and skin lesions to the same disease. In 1882 Robert Koch isolated and identified the TB bacillus. Koch established that the disease was spread by exposure to the TB germ. This changed the medical community's understanding of how to prevent and treat the disease (**Kiple et al, 2009**). Koch's contributions to bacteriology were legion, and he was awarded the Noble Prize in Medicine or Physiology in 1905 for his elucidation of the etiology of tuberculosis (**Thomas M. Daniel- 2006**). Usually caused by the bacteria Mycobacterium Tuberculosis. TB is often a latent infection with no symptoms and no adverse effects on the sufferer's health. However, about one case in ten progresses to active TB, typically affecting the lungs (pulmonary TB) causing chest pain and severe coughing. The sufferer coughs up sputum and often blood. Fevers, night sweats, chills, and weight loss are also symptoms. Although TB usually attacks the lungs, it can also attack the bones and joints (especially the spine), the lymphatic system, the membranes of the brain and nervous system, and other body parts. Pulmonary TB causes lesions and cavities in the lungs, and the damage to body tissues from all

types of TB is fatal in about 50 percent of cases if left untreated (**Kiple et al, 2009**).

2-1-2-Definition:

Tuberculosis (TB) is a common and often deadly infectious disease caused by mycobacteria, usually” *Mycobacterium tuberculosis*” in humans. Tuberculosis usually attacks the lungs but can also affect other parts of the body. It is spread through the air, when people ho have the disease cough, sneeze, or spit. Most infections in humans result in an asymptomatic, latent infection and about one in ten latent infections eventually progresses to active disease (**Christine et al, 2011**).

2-1-3- Magnitude of problem:

The World Health Organization declared TB to be a global health emergency in 1993. One-third of the world population is currently infected with the latent form of TB, and 5–10 per cent of these can be expected to develop active illness at some time in their lives (**Michael J. Selgelid: 2008**).

In 2017, 10 million people fell ill with TB, and 1.6 million died, from the disease (including 0.3 million among people with HIV). In 2017, an estimated 1 million children became ill with TB and 230 000 children died of TB (including children with HIV associated TB) (**WHO, 2017**).

Approximately 2 billion people globally are infected with *M. tuberculosis*, and about 9 million people develop TB disease each year.(global fund 2008) . in 2006 a global Plan to Stop TB 2006-2015 was introduced (CDC 2008).

Tuberculosis (TB) remains a major global health problem, responsible for ill health among millions of people each year. TB ranks as the second leading cause of death from an infectious disease worldwide, after the human immunodeficiency virus (HIV). The latest estimates i TB deaths (1.1

million among HIV-negative people and 0.4 million among HIV-positive people) (**WHO, 2014**).

Compared with an individual who is not infected with HIV, a person infected with HIV has a 10 times increased risk of developing TB disease (**EDMA- 2007**) These because of upward revisions to estimates of the number of TB cases and deaths in Nigeria following the finalization of results from the country's first-ever national TB prevalence survey (completed in 2012). Given the size of the population and the high TB burden in Nigeria, these revisions have affected global estimates. Though most TB cases and deaths occur among men, the burden of disease among women is also high. In 2013, there were an estimated 3.3 million cases and 510 000 TB deaths among women, as well as an estimated 550 000 cases and 80 000 deaths among children.¹ TB mortality is unacceptably high given that most deaths are preventable if people can access health care for a diagnosis and the correct treatment is provided. Short-course regimens of first-line drugs that can cure around 90% of cases have been available for decades. These large numbers of TB cases and deaths notwithstanding, 21 years on from the 1993 World Health Organization (WHO) declaration of TB as a global public health emergency, major progress has been made. Globally, the TB mortality rate (deaths per 100 000 population per year) has fallen by 45% since 1990 and TB incidence rates (new cases per 100 000 population per year) are decreasing in most parts of the world. Between 2000 and 2013, an estimated 37 million lives were saved through effective diagnosis and treatment (**WHO, 2014**).

NTP budgets in the 22 HBCs amount to US\$ 2.5 billion in 2009, almost three times their level in 2002. The Russian Federation has the highest budget (US\$ 1.2 billion), followed by South Africa (US\$ 352 million), China (US\$ 225 million), India (US\$ 100 million) and Brazil (US\$ 64 million). These five countries account for 80% of the NTP budgets

reported for 2009 by the 22 HBCs. The eight HBCs in the African Region (excluding South Africa) had a combined budget of US\$ 225 million in 2009, only 10% of the total for all 22 HBCs (WHO- 2009).

2-1-4-Burden of TB in Sudan:

Sudan is shouldering 8% of the TB burden in the Eastern Mediterranean Region, the estimated incidence of new smear-positive cases of 60 per 100,000 populations, That gives a total of 21698 estimated new smear-positive cases for a 36,163,778 population in Sudan.

4. Progress: January 2013 – December 2013 case finding In 2013, 20181 people were notified to the program of these, 7586 (38%) were smear negative cases, 1713 (6%) were previously treated cases, 5908(31%) were smear positive and 4902 (24%) were Extra-pulmonary.

2-1-4-1-TB case notification2

Comparing the data of 2012 with 2013, found that there is decreasing in the number of new smear positive cases and retreatment cases from 6587 to 6035 and from 1735 to 1279 respectively, but the number of notified cases increased from 19831 to 20181 cases. This increasing mostly due to the sharp increase in smear negative cases from 6948 to 7586 and increase number of Extra pulmonary from 4561 to 4902. The overall case notification among 36,163,778 populations was 20181 cases of all forms of TB. Children under 5 years represent 2 % from 5-14 represent about 22 % of all new smear-positive cases. Only 9 out of 17 states (Khartoum, Gezira, Kassala, White Nile, South Darfur, Sinnar, North kordofan, North Darfur and Gedarif) account for 78% of the total population of the Sudan (36,163,778) and 84% of the total new smear positive case notification and 83 % of total case notification in Sudan. Khartoum and Gezira States (population of 10820203 which represent (38 %) from the population of the 9 states) shoulder 46% of total case notification in Sudan and achieved 44 % detection of new smear-positive cases in 2013, although this might be

attributed to population densities and stability of TB control efforts and services compared to other states, but in fact might reflect also an inequity bias in the distribution of health services between different states.

The program can achieved the target of notification rate if could increase the notification rate in south Darfur and North kordofan which have high population (4574748 – 3046326 respectively) and low notification.

In contrast, found that the lowest number of notified cases were from Northernstate (0.5%) and center Darfur (1 %). (**Annual report SNTP, 2014**).

2-2-Cause of tuberculosis

Tuberculosis is caused by the infectious agent known as *mycobacterium tuberculosis (MTB)*. This rod-shaped bacterium, also called Koch's bacillus, was discovered by Dr. Robert Koch in 1882. *MTB* is a small slow-growing bacterium that can live only in people. It is not found in other animals, insects, soil, or other nonliving things. *MTB* is an aerobic bacterium, meaning it needs oxygen to survive for this reason, during active TB disease, *MTB* complexes are always found in the upper air sacs of the lungs (**Christine et al, 2011**).

Characteristics of TB Bacteria:

TB bacteria are:

- Rod-shaped
- 1-5 microns in size
- Aerobic
- Slow-growing (divide once every 15 to 20 hours)

The cell walls of TB bacteria also have a high lipid content. This means that specific laboratory methods are required to identify TB bacteria in smear examinations (acid-fast staining) and in culture (mycobacterial culture versus routine bacterial culture) (**Yukon Communicable Disease Control- 2016**)

2-3-Incubation period of tuberculosis

Tuberculosis is caused due to slow dividing bacteria. As a result, it takes the infection several months to years to develop active symptoms for the disease. However, within 2 to 12 weeks of exposure to the bacteria, a person may develop a primary infection to lungs. Incidentally, this infection is asymptomatic, meaning it does not produce not produce any symptom at all. A chest X-ray at this time shows no infection to lungs (**Christine et al, 2011**).

2-4-Types of Tuberculosis

2-4-1-Pulmonary (lungs)

The vast majority of people suffering from TB have a chronic infection of the lungs and this is called pulmonary tuberculosis. Once the germs have established themselves in the lungs and start multiplying, they begin to destroy the living tissues. Sores begin to develop and without treatment these sores will become cavities (**Christine et al, 2011**).

2-4-2-TB Meningitis

When the membranes round the brain are infected, we speak of TB meningitis. Headache, stiff neck, drowsiness and intermittent vomiting characterize this. This form of the disease usually affects children and is often fatal unless treated immediately. More than half of the patients who survive this form TB will suffer permanent brain damage (**Christine et al, 2011**).

2-4-3-TB of the Bone

This form of TB can cripple the child for life. It presents itself in the spine, knees and other bones. The joints swell and the person finds it difficult to walk and bend (**Christine et al, 2011**).

2-4-4-TB of the Lymph glands

The person develops painless swelling of the lymph glands. These are usually in the neck area (**Christine et al, 2011**).

2-4-5-TB of the Abdomen

The stomach or abdomen is less commonly affected but there may be abdominal swelling the abdominal lymph glands may also be swollen (Christine et al, 2011).

2-5-Transmission of tuberculosis

Tuberculosis (TB) is a communicable disease caused by bacteria of the 'tuberculosis complex group' (mainly *Mycobacterium tuberculosis* [MTB] and rarely *M bovis*, *M africanum* and *M microti*).

The infection is transmitted from one person to another through invisible droplet nuclei which are generated when someone with active TB of the lungs or larynx coughs, sneezes, spits, laughs or talks. Active TB may also occur in sites outside the airways but transmission does not occur from these sites or is very uncommon (eg. discharging wounds or abscesses). Transmission is relatively insufficient (in comparison to highly contagious diseases such as measles and chickenpox) and depends on the infectivity of the source case, as well as the amount of time spent in contact with others and the environment in which contact occurs. Conditions such as overcrowding in poorly ventilated enclosed spaces that are not exposed to sunlight (which kills MTB bacilli) greatly enhance the risk of transmission. *M bovis* (acquired directly or indirectly from cattle) has historically been a significant cause of TB. When ingested in milk containing large numbers of organisms, *M bovis* may penetrate the gastrointestinal mucosa or invade the lymphatic tissue of the oropharynx. Human infection with *M bovis* has been largely eliminated in developed countries as a result of milk pasteurisation and bovine TB control programs

2-6-Latent TB infection (LTBI) and active disease:

Following inhalation of a sufficient number of organisms, MTB bacilli can multiply in the lungs.

Spread from the small airways of the lungs through local lymphatic channels to regional lymph nodes and then through the bloodstream to distant sites can also occur. In most people, MTB triggers an immune response that contains the infection at this stage without evidence of active disease though live but dormant bacilli may persist for many years known as latent TB infection (LTBI). This immune response can be detected by the Mantoux test (also referred to as a tuberculin skin test (TST) or Interferon-gamma Release Immunoassays (IGRAs). In some people, especially young children or those with underlying diseases that decrease immunity, the infection may overcome this initial immune response and progress immediately to active TB (progressive primary disease). The risk of reactivation of LTBI into active disease is highest in the first 2 years and averages about 10% over a lifetime (thus up to 90% of infected people may live with LTBI throughout their lives without symptoms and without risking transmission of MTB to others). The risk of reactivation is increased if other diseases or conditions develop which decrease immunity (such as diabetes, chronic renal failure, HIV infection, malnutrition or alcoholism) **(CDC-2008).**

TB is primarily an airborne disease. The bacteria are spread from person to person in tiny microscopic droplets when a TB sufferer coughs, sneezes, speaks, sings, or laughs. Only people with active TB can spread the disease to others **(Christine et al, 2011).**

2-7- Sites of TB Disease:

The Centers for Disease Control and Prevention recommends that people who have an increased risk of tuberculosis be screened for latent TB infection. This recommendation includes:

- People with HIV/AIDS
- IV drug users
- Those in contact with infected individuals
- Health care workers who treat people with a high risk of TB (**Mayo, 2018**).

TB disease can occur in different places in the body:

2-7-1-Pulmonary TB:

TB that occurs in the lungs, most TB cases are pulmonary. Patients with pulmonary TB usually have a cough and an abnormal chest x-ray, and they should be considered infectious until they meet certain criteria.

2-7-2-Extrapulmonary TB :

Occurs in places other than the lungs, such as the larynx, the lymph nodes, the pleura (the membrane surrounding each lung), the brain, the kidneys, or the bones and joints. Extra pulmonary TB occurs more often in HIV-infected or other immunosuppressed persons, or young children. In HIV-infected people, pulmonary TB often accompanies extra pulmonary TB. Most types of extra pulmonary TB are not considered infectious.

2-7-3-Miliary TB:

Occurs when tubercle bacilli enter the bloodstream and are carried to all parts of the body, where they grow and cause disease in multiple sites. This condition, which is rare but very serious, is called miliary TB because the chest x-ray has the appearance of millet seeds scattered throughout the lung (**CDC, 2008**).

2-8-Signs and Symptoms of tuberculosis:

Symptoms may be vague, however, and go unnoticed by the affected person. For some, the disease either goes into remission (halts) or becomes chronic and more debilitating with cough, chest pain, and bloody sputum (saliva). Symptoms of TB involving areas other than the lungs vary depending upon the organ or area affected (**Christine et al, 2011**).

Cough with sputum for more than 2-3 weeks +/-haemoptysis, fevers, night sweat, weight loss, lethargy and tiredness, chest pain, localised chest signs in upper/mid zones and enlarged matted lymph nodes, usually non-tender and most commonly around head and neck (CDC, 2008).

2-9-Diagnosis of tuberculosis:

2-9-1-Microscopy:

The most reliable way of making the diagnosis is to find TB in a direct smear of the sputum. Examination is by the Ziehl-Neelsen staining method or, in a busy and well-equipped centre, by using fluorescence microscopy. Remember the following points when collecting sputum for examination, the container should be rigid to avoid crushing when carried or sent. It should be wide-mouthed and be made of material that can be burnt. It should have a tight-fitting screw top to prevent drying out or leakage. Examine at least two specimens if possible, a first spot specimen when the patient first presents and an early morning specimen consisting of all the sputum raised in the first 1-2 hours. Instructions to the technician for collection of sputum, if possible do the procedure in the open air. If not, use a well-ventilated room set aside for this purpose.

Explain why the test is important. Explain how to cough to produce sputum from deep in the chest. Label the bottom part of the container (not the lid) with the name and number of the patient and give the bottom part to the patient to provide the specimen. Keep the lid. Ask the patient to hold the container close to the lips, then cough and spit into it. Check that the specimen has solid or purulent particles in it. If not, get the patient to try again. Close the container securely, put it in a special box for the laboratory, wash your hands thoroughly with soap and water. Keep a full and accurate register of sputum examinations. Make sure the specimens are properly labelled, with the patient's name clearly marked.

2-9-2-Culture:

Culture of sputum slightly improves the number of positives, but it may take 4-8 weeks before you get the result. With milder disease and fewer TB, the smears may be negative but culture positive. But culture requires skilled laboratory facilities which you may not have. While waiting for the culture result(s) you will have to decide on the basis of clinical evidence, and X-ray if available, whether or not to start treatment . The most ill patients and most severe cases (who most need treatment and who are most infectious) are usually smear positive.

2-9-3-Drug resistance tests:

Drug resistance tests can only be done in specialized laboratories. In most developing countries the specialized laboratory is best used to look at the pattern of drug resistance in the community. It should not usually be used to help in the management of individual patients. Find out whether the pattern has been worked out for your own area. In countries with a DOTS-Plus programme, it may be used to identify multidrug-resistant tuberculosis among patients who are at a high risk (such as treatment failure in retreatment cases). These patients can then be offered the more complex and expensive treatment for this type of disease in the centre that provides this care.

2-9-4-Special examinations:

The following investigations are possible only in well-equipped specialist centres.

2-9-4-1-Laryngeal swabs:

In patients who do not have sputum, a laboratory that can do cultures may be able to provide you with these special swabs. The operator should wear a mask and gown when taking a swab. The patient's tongue is held using a piece of lint, and the swab pushed down behind the tongue towards the

larynx. The patient will cough and the swab will catch some mucus. Put the swab back into the sterile bottle and send to the laboratory for culture.

2-9-4-2-Gastric aspiration:

Gastric aspiration is often called 'gastric lavage' or 'washings'. This may be used when a patient has no sputum. It is only necessary if you have some difficult problem in diagnosis and if you have the facilities. It is sometimes used in children, who seldom produce sputum . In adults, do gastric aspiration soon after the patient wakes and before he has taken anything by mouth. Pass a welllubricated fine rubber nasogastric tube through the nose to the back of the mouth. Then ask the patient to suck water through a 'straw' or fine tube. While the patient does this, push the nasal tube gently in and it will pass easily into the stomach. Attach a syringe containing 20 ml of sterile normal saline through the nasogastric tube. Inject it slowly down the tube. Wait about a minute and then aspirate as much as possible back into the syringe. Transfer the contents into a sterile bottle and send to the laboratory. There it can be examined by smear and culture.

2-9-4-3-Bronchoscopy:

When other methods have failed to help you make a diagnosis you may be able to collect bronchial material by a trap specimen through a bronchoscope. Biopsy of the lining of the bronchi may sometimes show typical changes of tuberculosis when examined by histology. If you do bronchoscopy for diagnosis of tuberculosis, take extreme caution to avoid becoming infected with TB.

2-9-4-4-Pleural fluid:

TB may occasionally be seen in centrifuged fluid but usually are only found on culture. The larger the amount of fluid cultured, the more likely it is that you will get a positive.

2-9-4-5-Pleural biopsy

Pleural biopsy can be useful when there is pleural effusion. But it needs a special biopsy needle (such as Abrams punch), facilities for histology and training in the technique. If available, pleural biopsy specimens should be sent for culture, in which case the diagnostic yield is very high. To do this will require that you submit the specimens separately for histology and for culture. In many places none of these is available.

2-9-5-Pulmonary tuberculosis:

2-9-5-1-Lung biopsy:

Only experienced operators should use this method. A diagnosis may be made by histology or by finding TB in the sections .

2-9-5-2-X-ray (radiological) examination:

You cannot diagnose tuberculosis with certainty from an X-ray, as other diseases often look very similar. For practical purposes, a normal chest X-ray excludes tuberculosis. Very rarely, however, endobronchial tuberculosis or disease hidden by the mediastinum or diaphragm may look like a normal chest X-ray. Furthermore, HIV-infected patients with tuberculosis are more likely to have a normal chest X-ray. The following X-ray shadows are strongly suggest of tuberculosis, upper zone patchy or nodular shadows (on one or both sides), and Calcified shadows may cause difficulties in diagnosis. Remember that pneumonia and lung tumours can occur in areas of previous healed and calcified tuberculosis.

Some benign tumors contain calcification.

Other shadows that may be due to tuberculosis are oval or round solitary shadow (tuberculoma), hilar and mediastinal shadows due to enlarged lymph nodes (persisting primary complex - diffuse small nodular shadows (miliary tuberculosis). The correct reading of chest X-rays needs a lot of experience. If you suspect tuberculosis from the X-ray but the sputum is negative, give a non-tuberculosis antibiotic (e.g. ampicillin, oxytetracycline)

for 7-10 days then obtain another X-ray. Shadows of an acute pneumonia will show improvement. But beware of shadows that look smaller after 10 days but are in fact due to collapse of part of the lung resulting from obstruction of a bronchus.

2-9-6-Tuberculin test:

Although, with proper attention to careful technique, tuberculin testing is very useful in measuring the prevalence of tuberculous infection in a community, it is of limited value in diagnosing active tuberculosis in adults. This is because the test may be negative because of malnutrition or other diseases, even though the patient has active tuberculosis. A positive test simply indicates tuberculous infection, which is very frequent in many countries and does not indicate the presence of disease.

(Remember a strongly positive test is only a point in favour; many people without active tuberculosis have positive tests. In general the test is of little use for adults). There are two other problems in using the tuberculin test.

False positive: In many countries, infection by other, often non-pathogenic, environmental mycobacteria can result in a positive tuberculin test, but usually a weak positive. A positive can also be due to previous BCG.

False negative: problems of improper storage, improper dilution, absorption of tuberculin onto glass, contamination etc. may make the test unreliable in your area. We suggest you consult a local tuberculosis specialist, who should be able to tell you whether the test will be valuable in your area.

On the other hand, a positive test, even a strongly positive test, shows only that the patient has previously been infected. It does not prove that he or she has active tuberculosis disease. It is merely a point in favour. The frequency of positive tests increases with age. A positive test is therefore more meaningful the younger the child is, particularly if not vaccinated with BCG (L. Rieder et al, 2009).

Until recently, only Mantoux tests were available to give evidence of exposure. These tuberculin tests had the advantage of being cheap and relatively easy to perform, but suffered from a number of problems. The test results have to be interpreted within a certain timescale, and patients who do not return, or delay returning, will have either no result or a possibly inaccurate one. False positive results can occur because of the sensitising effect on the immune system of either prior BCG vaccination or opportunist environmental mycobacteria. False negative results can occur due to anything reducing immunity, particularly co-infection with HIV but also treatments such as TNF- α antagonists. Extensive tuberculosis (pulmonary or miliary) can itself also temporarily depress the immunity, and can lead to a paradoxically negative Mantoux tests (**Internal Clinical Guidelines Team- 2016**).

2-9-7-Blood examination:

Marked anaemia is rarely caused by pulmonary tuberculosis but it is sometimes seen in obscure ('cryptic') disseminated tuberculosis. Anaemia is more likely to be due to other causes such as worms or malnutrition.

The white blood cell count is raised in some patients but can be normal or low normal (It is often raised in pneumonia).

The erythrocyte sedimentation rate may be raised. But a normal result does not exclude active tuberculosis. This is therefore not a useful test and is not worth doing.

Low serum potassium or sodium may occur in severe disease and can cause death. Many centers will not have facilities for these tests. If found, correct the electrolyte balance by intravenous infusion.

Finally, all patients presenting with cough and sputum for 3 or more weeks must have their sputum examined for TB (**Hans L. Rieder et, al -2009**).

2-9-8-Diagnosis of TB in children:

Active TB in children is usually a result of progression of initial infection within weeks to months of contact with an infectious adult rather than reactivation of latent infection. Extra-pulmonary disease is more common than in adults. The most common chest X-ray findings are hilar and mediastinal lymph node enlargement (often best seen on a lateral chest X-ray). These may obstruct air passages resulting in segmental hyperinflation or collapse. Parenchymal changes may occur but cavitation is rare prior to adolescence. CT scanning of the chest may be useful in children to assess hilar lymphadenopathy. The rates of positive cultures for MTB are reduced compared to adults as the bacterial burden is much lower in children and production of sputum may be difficult in childhood. In children with suspected pulmonary TB, 3 properly collected gastric aspirates (which contain sputum swallowed overnight) can produce culture-positive rates of 30-50% (up to 70% in children <2 years of age). Bronchoscopy adds little to the yield from well collected gastric aspirates. A highly positive Mantoux test or interferon-gamma release assay (IGRA) blood test may provide useful information in children when diagnostic specimens are difficult to obtain. This may provide enough evidence to start treatment in a child with a compatible clinical picture and a history of contact with an infectious adult. In this case obtaining the adult case's drug susceptibility results is essential to guide treatment.

2-9-9- Diagnosis of TB in HIV-positive patients:

Patients with HIV may present with early progression of primary infection after a recent contact or with reactivation of LTBI - in which case the risk of disease may be as high as 10% per year rather than the 10% per lifetime commonly quoted in healthy adults. The clinical spectrum is vast and is primarily dependent on the level of immunosuppression. HIV patients without advanced immunosuppression are more likely to present with the

typical features described for adults. Advanced immunosuppression is associated with an increased likelihood of extra-pulmonary (and disseminated) disease and pulmonary disease is more likely to have either a florid (eg. pneumonic) or subtle (eg. normal chest X-ray, negative sputum smear) presentation. Cavitation depends on a robust immune response so is rare in advanced HIV. Blood cultures (3 in total from 3 separate days) should be collected from HIV patients with suspected TB into specialised mycobacterial culture media (MycoF®) and incubated at 37°C as soon as possible after collection and not refrigerated (CDC, 2008).

2-10-Treatment of tuberculosis:

With appropriate antibiotic treatment, TB can be cured in most people. Successful treatment of TB depends on close cooperation between patients and healthcare providers. Treatment usually involves taking several antibiotic drugs for at least 6 months and sometimes for as long as 8 months. The usual course of treatment is two antibiotics- isoniazid and rifampicin-every day for six months and two additional antibiotics- Pyrazinamide and Ethambutol-every day for the first two months (Christine et al, 2011).

2-10-1-Isoniazid:

The advantages of isoniazid are that it is a very powerful bactericidal drug. It has very few side-effects. It is very cheap. Because it is so powerful, the dose is small. It is normally given by mouth. Highly effective concentrations of the drug are obtained in all tissues and the cerebrospinal fluid. There is no cross-resistance with other drugs. The rate of conversion to an inactive form (acetylation) varies in different races but is of no practical importance in standard treatment. However, slow inactivators are more likely to get the complication of tingling and numbness of the hands and feet (peripheral neuropathy).

2-10-2-Rifampicin:

The mouth in a single dose always gives rifampicin. There is no cross-resistance to other anti-tuberculosis drugs. Highly effective concentrations are obtained in all tissues and moderate levels in the cerebrospinal fluid.

2-10-3-Rifampicin and other drugs:

Rifampicin stimulates liver enzymes, which may then break down other drugs more rapidly than normal. This includes the oestrogens in the contraceptive pill. You must advise women receiving rifampicin to use other forms of contraception. You may have to give higher doses of certain drugs if the patient is also receiving rifampicin. But remember to reduce the dose when the patient ceases to take rifampicin. These drugs include oral coumarin anticoagulants, oral diabetic drugs, digoxin, methadone, morphine, phenobarbital (phenobarbitone), dapsone, and, notably, certain classes of antiretroviral drugs.

2-10-4-Pyrazinamide:

Pyrazinamide is a highly effective bactericidal drug. It is particularly effective in killing off TB inside cells. It is very valuable in short -course treatment and in tuberculosis meningitis.

Treatment and dosage

2-10-3-1-Adult dosage:

- Daily: 25 mg/kg
- Intermittent: 35 mg/kg (30-40 mg) three times weekly.

It is administered by mouth in a single dose. Each tablet contains 400 mg Pyrazinamide (much preferred to the old standard of 500 mg tablets, which should not be used any more if possible).

2-10-5-Ethambutol

Ethambutol is a bacteriostatic drug. It is mainly used to prevent the emergence of drug resistance to the main bactericidal drugs (isoniazid, rifampicin and streptomycin). It is given orally.

2-10-6- Streptomycin

Streptomycin is not absorbed from the intestine so you have to give it by intramuscular injection. It diffuses readily into most body tissues. The concentrations are very low in normal cerebrospinal fluid but the levels are higher if there is meningitis. Streptomycin does however cross the placenta. As it is excreted almost entirely through the kidney, the dose has to be lowered in patients with poor renal function and in older age groups. Providing syringes and staff to inject the drug adds to the cost and increases the danger of infection with blood-borne agents such as HIV if there is needle stick injury or if needles are reused but are not sterilized properly.

2-10-7-Second-line drugs:

These are active agents other than essential drugs and drug classes. These drugs are used for patients whose bacilli have been proved to be resistant to all the standard drugs. These are difficult to use and have many side-effects. They are less effective than the first -line drugs, and very expensive.

An experienced specialist must take responsibility for their administration, following the guidelines established by the National Tuberculosis Programme. The WHO recommends that the drugs should only be used in specialist centres. For guidance for these centres see WHO's publication: Guidelines of the programmatic management of drug-resistant tuberculosis . The following drugs are used as second-line drugs. The names are given here for reference only *Aminoglycosides, Amikacin, Kanamycin, Capreomycin, Cycloserine, Para-Aminosalicylic Acid, Fluoroquinolones, other rifamycins, Rifabutin, Rifapentine, Thioamides, Ethionamide and Prothionamide* (Hans L. Rieder et, al -2009)

2-10-8-Treatment of extra-pulmonary TB:

Because there are usually fewer organisms present at extra-pulmonary sites than with pulmonary TB, and standard TB treatment has excellent tissue penetration, 6 months of standard short course treatment is adequate for

most cases. Exceptions include TB meningitis, which requires 12 months of treatment and for patients with TB at any site that is slow to respond to treatment (CDC, 2008).

In the early stages of treatment for tuberculous lymphadenitis, new nodes may appear or existing ones enlarge. This is relatively common and may be associated with the discharge of pus through a sinus to the skin, but this does not usually indicate treatment failure. Corticosteroids are used as adjunctive treatment in certain situations provided the patient is on full dose anti-TB medications at the same time. The data is strongest for meningitis and pericarditis. Corticosteroids may also be used for selected cases with extra-pulmonary disease, including for large pleural effusions (to reduce acute manifestations and possibly reduce scarring and loss of lung volume); extensive mediastinal lymphadenopathy in children (to reduce obstructive manifestations); genito-urinary disease (to reduce ureteric strictures) and in some patients with severe, or disseminated, disease. Because the decision whether or not to use corticosteroids, for other than meningitis and pericarditis, is often a complicated one and the regimens used may be complex and differ in each setting, such treatment should only be prescribed and monitored by specialists in TB management (CDC, 2008).

2-10-9- Treatment of drug-resistant TB:

Drug-resistance (ie. resistance to 1 or more of the first line drugs) may be present prior to initiating treatment or may emerge while on treatment if not on DOT or prior to drug susceptibility testing guidance. The likelihood of pre-existing drug-resistance can be difficult to predict but is increased in the setting of previous, often incomplete, treatment for TB; ie. in migrant groups from high prevalence countries where access to TB treatment is interrupted; and in contacts of a drug-resistant case. It is usually detected through routine drug susceptibility testing (DST), but may also be suspected on clinical grounds because of treatment failure in patients known to be

adherent (eg. no improvement after 2 weeks of treatment or ongoing positive cultures after 2 months).

Stopping 1 or more drugs, especially early in treatment when AFB loads are highest, may in some instances also lead to the emergence of drug resistance. Other causes may include improperly prescribed drug regimens (eg. under dosing), malabsorption or rarely, reinfection with a drugresistant strain while on treatment. Multidrug-resistant TB (MDR-TB) is defined as combined resistance to isoniazid and rifampicin and often involves other first line drugs. The incidence of MDR-TB is increasing worldwide, with the median prevalence being 1.2% and some countries recording levels as high as 23.4%.

Extensively drug resistant TB (XDR-TB) is now described in some parts of the world and is defined as MDR-TB with resistance to second line drugs including all fluoroquinolones and 1 of the injectable agents.

The general principles for management of drug-resistant TB are patients with drug resistance should be under the care of a specialist physician. Patients should receive either hospital based or domiciliary DOT. A single drug should never be added to a failing regimen. At least 2, and preferably, 3 drugs to which the organism is likely to be susceptible should be added in this situation. Intermittent therapy should not be used in treating TB caused by drug resistant organisms. Isolated isoniazid resistance, rifampicin plus pyrazinamide plus ethambutol for 9 months is usually adequate. A fluoroquinolone may be added if disease is extensive. If isoniazid resistance is of an intermediate level, then there may be some benefit in continuing the drug. Rifampicin resistance is frequently combined with resistance to other drugs and treatment options vary - specialist advice should be sought. If isolated rifampicin resistance, isoniazid, ethambutol and a fluoroquinolone should be used for 12-18 months with pyrazinamide used during the first 2 months.

Pyrazinamide resistance is usually associated with *M bovis*. Isoniazid, and rifampicin should be used for the first 2 months (supplemented with ethambutol until susceptibility is known) then a further 7 months of rifampicin and isoniazid given (CDC, 2008).

2-10-10- Multidrug-resistant TB (MDR-TB)

MDR-TB is defined as high level resistance to both rifampicin and isoniazid, with or without additional drug resistances. The general principles involved in treating MDR-TB are the initial regimen should include at least 4 new agents based on DST. The treatment should be given for at least 18 months beyond conversion and up to 24 months beyond conversion if disease is extensive. Drug administration should be for at least 6 days of the week and dosage should be determined by weight. An injectable agent should be used for at least 6 months with this being 4 months beyond sputum conversion, DOT should be used for all patients with MDR-TB. Sputum smears and cultures should be monitored closely throughout treatment. Conversion is defined as 2 consecutive negative smears and cultures taken 30 days apart. Cultures should be continued every 2 months after conversion. Second line drugs have more adverse effects than first line drugs and patients should be evaluated and managed promptly to increase adherence to drug regimens.

2-10-11-Drug side effects and interactions

Patients must be thoroughly educated about the possible side effects of anti-TB medications prior to initiating treatment and this should be reinforced at each follow up visit. The most essential piece of advice is that patients must stop all medications and seek review immediately if they experience any adverse events while on treatment (CDC, 2008).

2-11-Tuberculosis of stigmatization:

Stigma is a process that begins when a particular trait or characteristic of an individual or group is identified as being undesirable or disvalued. The

stigmatized individual often internalizes this sense of disvalue and adopts a set of self-regarding attitudes about the marked characteristic including shame, disgust, and guilt. These attitudes produce a set of behaviors that include hiding the stigmatized trait, withdrawing from interpersonal relationships, or increasing risky behavior (**Collins et al, 2008**).

Stigmatization is conceptually distinct from discrimination – another social determinant of health – in that the primary goal of discrimination is exclusion, not necessarily for the target to feel ashamed or guilty (**Baral et al, 2007**).

2-12-HIV and Tuberculosis:

All people newly diagnosed with HIV should be tested for TB infection as soon as possible. People living with HIV and at ongoing risk for TB exposure should be tested annually. The risk for exposure to TB is the same for everyone: being in close contact with someone with infectious TB disease. This risk increases for people who are homeless or injection drug users, or those living or working in settings such as jails, health care facilities, drug treatment units, or homeless shelters. People with HIV and latent TB infection need treatment as soon as possible to prevent them from developing TB disease. People with HIV who have latent TB infection are much more likely to progress to TB disease than people without HIV. TB outbreaks can rapidly expand in patient groups infected with HIV. Treatment for latent TB infection usually is a single drug (most commonly isoniazid) taken for 9 months. People with HIV and TB disease must take several drugs for 6 to 9 months to treat their TB. Unfortunately, some people with HIV do not know they are infected with TB (**CDC, 2012**)

2-13-The role of public health in TB:-

2-13-1-Case management:

Public Health legislation provides local health units with the authority to ensure that suspected or confirmed cases of active TB receive timely diagnosis and treatment (CTS, 2007). The fundamental purpose of case management is to render and maintain the TB case non-infectious through their course of treatment. A public health professional investigates suspected and confirmed cases of active TB and coordinates diagnostic services and treatment. The treating physician and case manager share responsibility for the case during the prolonged treatment period. An interview is conducted, ideally face to face, with each active case of TB to educate the client about TB treatment including the potential for side effects. Public Health monitors each case for side effects and adherence of medications, provides support and problem-solving for psychosocial issues related to TB and can also supervise therapy with the use of Directly Observed Therapy (CTS, 2007).

2-13-2-Directly observed therapy (DOT):

Before the launch of the Stop TB Strategy in 2006, NTPs reporting to WHO were classified as either DOTS or non-DOTS, To be classified as a country implementing DOTS in a given year, a country must have officially accepted and adopted the DOTS strategy in that year (or earlier), and must have implemented its four technical components in at least part of the country (Global tuberculosis control- 2009).

DOT is also invaluable for the early identification and close management of medication side-effects, in collaboration with the treating physician. All persons with tuberculosis should be assessed for DOT therapy; persons on intermittent regimens must receive DOT (CTS, 2007).

2-13-3-Public health orders:

If a health care professional has concerns of lack of adherence and cooperation from an active respiratory case, Public Health should be notified, who may then place the individual on DOT and notify the treating physician. Other scenarios include an infectious TB patient who is determined to travel by public transport, e.g. airplane, train if measures to achieve compliance have failed and the public's health and safety are at risk, the Medical officer of Health has the legal authority under the Health protection & Promotion Act (HPPA) to act to prevent the spread of TB. As such, a person with TB can be ordered of comply with treatment and/or isolation (CTS, 2007)

2-13-4-Contact follow –up:

Persons who have been in contact with an individual who has active untreated respiratory, laryngeal, military or pleural tuberculosis(the index case) may be at risk of contracting the infection. The more infectious the individual and the longer and closer the exposure, the more likely the contact is to become infected. Persons who have lower immunity such as children less than five years of age persons who are HIV positive; persons who live in congregate settings such as homeless shelters and persons exposed during high risk medical procedures (e.g. bronchoscopy), are at higher risk of contracting tuberculosis infection/disease. Public Health will give priority to these groups during contact investigations (CTS, 2007)

2-14-Prevention and control of Tuberculosis

2-14-1-Administrative control measures

Administrative control measures reduce the amount of TB germs generated into room air by a TB infected patient when she or he coughs. They therefore reduce the exposure of health care workers and other patients to TB germs. Administrative control measures require that people with TB symptoms are promptly identified, separated and treated. Their close

contacts should also be traced and screened for TB and receive appropriate treatment if found to be positive. The physical separation of TB patients or people suspected of having TB requires rational design, construction or renovation, and use of buildings that can provide effective control (**WHO, 2006**).

2-14-2-Environmental control measures

Environmental control measures include methods to reduce the concentration of infectious TB germs in the air, and methods that control the flow direction of infectious air. The choice of environmental controls depends on building design and construction and must be tailored to local climatic and socioeconomic conditions. Natural ventilation, mixed-mode and mechanical ventilation systems can be used and supplemented with ultraviolet germicidal irradiation(UVGI) in areas where adequate ventilation is difficult to achieve. Where feasible, installation of ventilation systems should be a priority, because ventilation reduces the number of infectious TB germs in the air.

(WHO.2006).

2-14-3-Natural Ventilation

Natural ventilation, especially cross –ventilation(windows / doors in opposite site of the rooms) has the best cost-effective ratio. It should be done with the windows and outside doors open (as much as weather conditions permit).(Medecine Sans Frontieres- 2014) .Natural ventilation refers to natural air movement through open windows, ventilators and doors. This leads to free-flow of air that helps to achieve dilution and air exchange in an area (**WHO, 2006**)

2-14-4-Mechanical ventilation

Mechanical ventilation can be used to reduce the concentration of TB germs in the room where natural ventilation is not feasible or is inadequate. Mechanical ventilation is particularly useful in high risk areas such X-ray

rooms and laboratories handling highly infectious material. It is important to use equipment with sufficient power to facilitate air movement into and out of the room. Window fans are a cheap and feasible method of providing mechanical ventilation (**WHO, 2006**).

2-14-5-Monitoring of ventilation and ventilation systems

Ventilation systems should be checked regularly to determine if they are functioning properly. The simplest test is the use of smoke (smoke test) to monitor airflow and ensure that it flows in the desired direction. If window fans are being used to produce negative pressure in a room, they should be checked frequently to ensure that air movement is in one direction and adequate (**WHO, 2006**).

2-14-6-Ultraviolet germicidal irradiation (UVGI)

Is a sterilization method that uses ultraviolet (UV) light at sufficiently short wavelength to break down microorganisms in high-risk areas. Ultraviolet germicidal irradiation (UVGI) may provide a less expensive alternative to more expensive environmental control measure that require structural changes of facility. These measures may be particularly useful in larger wards, TB clinic waiting areas or inpatient areas such as television or recreation rooms where TB patients gather together (**WHO, 2006**).

2-14-7-Personal protective equipment

This involves the use of protective equipment like particulate respirators. Wearing these respirators prevents health care workers from inhaling TB germs in areas where the concentration of TB germs in the air cannot be adequately reduced by administrative and environmental controls. In situations where there is an increased risk of TB transmission, particulate respirators should be used (**WHO, 2006**).

The BCG vaccination is also recommended for children under 16 years of age who:

- were not vaccinated against TB as a baby and who have one or more parents or grandparents born in countries with a high rate of TB.
- Have not been vaccinated and have been in close contact with someone who has pulmonary TB.
- Have not been vaccinated and were born in a country with a high rate of TB, or have lived for at least three months in a country with a high rate of TB (CDC,2012)

2-14-8-Health Education

Health education is learning process through which are individual adapts behavior that is beneficial to health. It is important to mention that one of the obstacles against tuberculosis control is a behavioral problem lack of community awareness leads to delay in diagnosis and spreading infection in health contacts. In addition Poor compliance to treatment has adverse effect on success rate as well as leading to the development of resistant strains of tuberculosis bacilli. Stigmatization of tuberculosis patient increases the fear from the disease. Also the importance of contact examination must be emphasized up on as this will help increasing the case detection. Health education of the community is important so as to understand and play its dual role in tuberculosis control (WHO, 2001).

2-14-9-Lessons for prevention

In prevention, your most important priority as a doctor is therefore to diagnose patients with a direct positive sputum smear and to make sure that they complete a standardized treatment. These sputum-smear-positive patients are also usually the most ill. They need treatment urgently to save their lives.

2-14-10-Sterilization of sputum, bedclothes, etc.

~ Direct sunlight kills TB very quickly. Exposure to sunlight is therefore a convenient method in sunny climates. (But bacilli may survive for years in the dark: much spread of infection probably occurs in dark houses or huts.)

~ Sodium hypochlorite (household bleach) liquefies sputum and kills TB but has to be used in glass jars as it damages metal. It also bleaches dyed material if dropped on it. Add to the sputum twice its volume of 1 % hypochlorite. (Note that TB may resist 5% phenol for several hours.)

~ Heat: TB are destroyed in 20 minutes at 60°C and in 5 minutes at 70°C.

~ Paper handkerchiefs should be burnt as soon as possible after use. (Old newspapers or other similar material can also be used and then burnt.)

~ Exposure to air and sunlight is a good and simple method, particularly in sunny climates, for dealing with blankets, clothes or materials.

Many things affect the way our bodies fight TB.

2-14-11-Age and sex

Up to 2 years of age, infection is particularly liable to result in the most fatal forms, miliary tuberculosis and tuberculous meningitis, due to bloodstream spread. Infants and young children of both sexes have weak defences. After 2 years of age, and before puberty, an infected child may develop disseminated disease or meningitis, or one of the extra-pulmonary forms, particularly lymph node, bone or joint disease. Before puberty, the lung part of the primary lesion usually just affects that local area, though cavities like those in adults may be seen, especially

in children with severe malnutrition and girls aged 10-14 years. The lymph node part of the primary complex may also give rise to lung collapse and other complications. There is little difference between boys and girls up to puberty. When tuberculosis was common in industrialized countries, the peak incidence of pulmonary tuberculosis was usually in young adults. The rate continued fairly high at all ages in men, but in women the rate dropped rapidly after the childbearing years. Women often developed pulmonary tuberculosis following childbirth. As the frequency of disease declined, the age of tuberculosis patients increased. Pulmonary tuberculosis cases occurred more frequently in older age

groups in both sexes but were more common in men than in women, largely due to the fact that older people had a much higher likelihood of having been infected at some point in their lives.

2-14-12-Nutrition

Starvation or malnutrition reduces resistance to the disease. This is a very important factor in poorer communities, in both adults and children.

Drug-induced immunosuppression Immunosuppressant treatments used for treating certain diseases such as cancer also increase the chance of developing tuberculosis.

2-14-13-Poverty

This leads to poor-quality and overcrowded housing or poor work conditions.

These may lower defences as well as making infection more likely. People living in such conditions are often also poorly nourished. The whole complex of poverty makes it easier for the TB to cause disease.

2-14-14-BCG vaccination:

BCG is a vaccine consisting of live bacilli which have lost their power to cause disease (except in persons with profound immunodeficiency). The bacilli originally came from a strain of bovine TB grown for many years in the laboratory.

BCG stimulates immunity, increasing the body's defences without itself causing damage. Following BCG vaccination, in most cases the body's increased defences will control or kill any TB that enter the body.

Some controlled trials have shown that BCG can provide up to 80% protection against tuberculosis for as long as 10 years if administered before first infection (i.e. to tuberculin-negative children). However, other large trials have failed to show benefit in reducing tuberculosis overall. Most trials in infants in poor countries have shown important protection against disseminated tuberculosis and tuberculosis meningitis.

The current recommendation by the WHO and the International Union Against Tuberculosis and Lung Disease (The Union) is that in countries with high prevalence of tuberculosis, BCG should be given routinely to all infants (but with a few exceptions, such as those known to have HIV infection and children of mothers with HIV infection at high risk of TB transmission). The normal dose in neonates and infants is 0.05 ml.

The effect of BCG probably lasts 10-15 years. However, no trial has yet shown any benefit of repeating BCG vaccination. Because the main effect of infant vaccination is to protect children, and because children with primary tuberculosis are not usually infectious, BCG has little effect in reducing the number of infectious cases in the population. To reduce these it is much more important to give good treatment to all sputum-smear-positive patients. Of course we should give BCG routinely to all infants as a protection in child.

(Hans L. Rieder et, al -2009)

The BCG vaccination is also recommended for children under 16 years of age who:

- were not vaccinated against TB as a baby and who have one or more parents or grandparents born in countries with a high rate of TB.
- Have not been vaccinated and have been in close contact with someone who has pulmonary TB.

Have not been vaccinated and were born in a country with a high rate of TB, or have lived for at least three months in a country with a high rate of TB. (CDC, 2012). Vaccination with the Bacillus Calmette-Guerin (BCG) vaccine is unfortunately largely ineffective in interrupting transmission. However a more powerful vaccine will have the potential to cause a major shift in the management of TB.(Dorothee Heemskerk et,al_2015)

2-15-Infection control:

TB is transmitted via invisible airborne droplet nuclei generated when a patient with infectious pulmonary or laryngeal TB coughs, sneezes, spits, laughs or talks. Infectivity is increased in patients who are smear-positive on sputum examination and this often occurs when cavitation is seen on chest X-ray. Spread can be dependent on the length of exposure. Normal air currents can keep infectious particles suspended for prolonged periods of time (eg. up to 4 hours) and spread them throughout a room or building. TB is usually transmitted only through air, not by surface contact. Following basic infection control procedures when a case of pulmonary TB is suspected reduces the spread of MTB to others. Extra-pulmonary TB is not associated with transmission of infection provided that measures are taken to prevent aerosolisation of infected material, such as pus from discharging wounds or abscesses.

2-15-1- Infection control in a community setting

Patients with pulmonary TB are potentially infectious and special care must be taken to prevent transmission of infection to contacts and health personnel.

Because TB is uncommon and the symptoms vary, health care workers in a primary care setting need a high index of suspicion for TB. An important clue is persistent symptoms, especially a cough for longer than 2-3 weeks or that persists after antibiotic therapy.

From the time that pulmonary or laryngeal TB is first suspected, the patient should be educated about the mechanisms of TB transmission and taught to cover their mouth and nose with tissues when coughing or sneezing.

Patients with suspected TB should be given a specimen container and asked to go outside into the fresh air away from other people to produce sputum specimens.

2-15-2-Transport of patients with known or suspected TB

Advice on transport of patients with known or suspected TB from their home to hospital can be obtained from the district medical officer on call for the region (through the local hospital switchboard) or by calling the regional TB Control Unit.

People with suspected active TB should only travel by air on commercial aircraft if known to be smear negative on 3 adequately collected sputum smears .

Patients who are smear-positive or whose sputum smears have not yet been examined should wear a mask during transport and only travel by air with an air medical service, preferably without other patients on board.

Road travel should be undertaken with masks on and windows down to promote maximum ventilation.

2-15-3- Infection control in hospital

All patients with suspected or confirmed infectious TB who are admitted to hospital should immediately have appropriate isolation precautions initiated. They should be managed in an area of the hospital separate from patients with HIV or other forms of immunosuppression.

Immunocompromised

staff should not work on wards where there are cases of TB. Respiratory isolation procedures, as outlined in the hospital's infection control policy, should be strictly followed and any breaches immediately reported to infection control personnel. Patients with non-pulmonary disease who require admission do not require isolation as long as pulmonary infection has already been ruled out.

2-15-4-Emergency department management

The key to limiting transmission of MTB to other patients and staff in the emergency department is the rapid recognition of clinical features that are associated with active pulmonary TB. Pulmonary TB should be suspected when a patient from a high risk group presents with signs and symptoms consistent with the diagnosis or when someone from a lower risk group presents with typical features of TB. A chest X-ray is the most important test in deciding the likelihood that the clinical picture represents active TB and sputum for AFBs should always be collected to confirm the diagnosis.

2-15-5- Patient isolation

Suspected or confirmed pulmonary or laryngeal TB cases should be accommodated in a purpose-built, negative pressure isolation room which provides a minimum of 6 complete air exchanges per hour.

Patients presenting to a hospital without such a facility may require transfer to a hospital where one exists (discuss with TB Control Unit; see Transport of Patients, above).

Isolation may sometimes be required for patients with extra-pulmonary TB in whom aerosol generating procedures such as wound irrigation are required or until pulmonary TB has been reliably excluded.

Patients in isolation should remain in their rooms with the door closed unless in transit, at which times they should wear surgical masks to cover their mouths and noses. Investigative procedures should be scheduled for times when they can be performed rapidly so that patients are not kept waiting out of negative pressure areas for long periods.

Arrangements to spend time outdoors may be made on a case by case basis after discussion with nursing and medical staff, ensuring that staff, other patients or members of the public are not placed at risk.

Children (other than the patient's own children or children living within the same household who have likely already been exposed) and

immunosuppressed friends should be discouraged from visiting the patient until infectious TB has been excluded or treated.

Visitors and staff entering the isolation room should wear particulate filter respirator masks ((N95) “duck bill” masks).

Patients with confirmed or suspected active TB in Intensive Care Units should be treated the same as patients in non-critical care settings, ie. in a single negative pressure room. A suitable particulate filter should be placed in the expiratory circuit of mechanical ventilators.

2-15-6-Discontinuation of isolation

Isolation can be discontinued once the diagnosis of TB is excluded or: Where the diagnosis is confirmed and 3 consecutive clearance sputum smears (of adequate quality) collected over 3 separate days have been smear-negative for AFBs.

If initial diagnostic sputum is trace, 1+ or 2+ smear-positive for AFBs, then repeat sputum samples are collected a minimum of 2 weeks after commencement of treatment. (CDC-2008)

2-16-Social, Economic, & Political Issues:

The social and economic issues of Tuberculosis are vast. The cost of TB is difficult to estimate because 80% of the victims are 15-49 years old which is the most financial productive time of their lives, and a patient that isn't diagnosed or cured loses approximately an entire year of work (www.results.org, 2005). By curing a patient not only is their productivity restored but additional TB deaths are prevented, which leads to a large positive economic impact (WHO: DOTS Experiences So Far, 2005). For example the economic impact in India from tuberculosis is at least a \$372 million yearly loss; but if treatment plans are implemented throughout the country it is estimated to have an economic gain of \$10 billion (WHO: DOTS Experiences So Far, 2005). Whereas lack of treatment or inconsistent treatment leads to the drug resistant form of TB, which is more

difficult and cost prohibitive to treat so is normally a death sentence to impoverished countries (www.results.org, 2005).

In the United States between 1992 and 1996 there was a tuberculosis epidemic that New York City alone spent \$700 million to stop. Yet, people of the United States feel that tuberculosis is a disease of the past and something not to worry about, even though 15 million people in the U.S. are infected with the bacteria (the rates of TB are highest for minorities in the U.S. because of socio-economic issues such as high unemployment, low median income, and poor living conditions (www.results.org,)

2005). In addition, tuberculosis is a major problem in developing countries, and there is no way to seal the borders of the United States from this disease. Yearly there are one million plus refugees and immigrants that enter the United States, large amounts of Americans that are traveling to high-risk countries, in addition to the millions of foreignborn travelers that enter the U.S., exposing the population to tuberculosis (www.results.org, 2005). The only way to effectively control tuberculosis in the United States is to control it worldwide (www.results.org, 2005).

Currently the World Health Organization recommends that the most effective way to combat tuberculosis is by further implementing the Directly Observed Therapy Short Course (DOTS). This strategy works by ensuring that patients are diagnosed and monitored during treatments, which stops TB at the source preventing the spread of the bacteria (WHO: DOTS Strategy, 2005). Another tangible benefit of tuberculosis treatment is that it is a cost-effective way to raise the quality of life for AIDS patients (for example a person with HIV in a developing country that contracts TB has a survival time of 5-6 weeks, but with TB treatment survival rates are 2-5 years (www.results.org, 2005).

There are five main obstacles to overcome for DOTS to expand: shortages of trained staff; lack of political commitment; weak laboratory services; and

lack of management of drug resistance TB. To address these challenges, tuberculosis needs to be a high priority with national policy makers and governments. Practices that would employ DOTS expansion include: providing financing for administrative support of DOTS implementation and to increase the manufacturing of drug treatments; supporting an increase of manpower to supervise and sustain DOTS; enhancing inter-country collaboration to maximize benefits from private donors and grants; and promoting operational research to continually advance strategies. By implementing these strategies it means to take funds, manpower and attention from other diseases; however the benefits of implementing the DOTS program can save millions of lives over the next 20 years in an extremely cost effective manor (WHO: DOTS Strategy, 2005).

2- 17- Community-Based Organizations

Community-based organizations (CBOs) can be particularly effective in providing information and education on TB disease to their constituencies. As part of the communities they serve, CBOs are often highly regarded, and their messages might be accepted more positively than those delivered by the state and/or local health department. Organizations providing services to populations at risk for TB disease should perform the following tasks:

- Partner with the state and local public health TB program and medical care providers from the community to facilitate access to diagnostic, treatment, and prevention services for the target population;
- Become involved in support initiatives, such as state and local TB advisory committees and coalitions; and
- Coordinate with public health agencies and educational institutions to develop education programs that are tailored culturally and linguistically to their populations. (CDC-2013)

2- 18- Previous Similar Study :

A study conducted in in Kampala city (Uganda) - 2013- by researchers (Bruce J Kirenga and others) has indicated to:

- (81%) of targets equal and less than 40 year.
- (39.5%) of the participants income below the poverty line .
- TB risk factors were as follows: HIV 41.4%, diabetes 5.4%, close contact 11.5%, family history 17.5%, smoking 26.37%, overcrowding 57.3% and alcohol use 50.7%. Overcrowding increased smear positive rate.

A study conducted in Kasala hospital –(Sudan)-2011- by researchers Tajeldin M. Abdallah, Abdel Aziem A. Ali , has indicated to :

- (36.8%) of participants were non skill workers , (26.1%) skill workers , (25%) employees and (11.7%) were house keeper .
- (63.7%) of patients male and (36,3%) were female .

A study conducted in Gezira State – Sudan- 2010- by researchers: Suleiman Mohammed and others has indicated to :

- (50%) of the patients were married and(33.1%) were single .
- 20% had no education and 7% had university education.

A study conducted in the Babol –Iran -2009 to 2013- by researchers :

Saber Ghaffari- fam and others has indicated to :

- (58.5%) of patients were male , while female (41.5%).
- Age group 18-40 years with (39%) , group over 60 years (31.5%) , age group below 7 years about (2.5%) and 7-18 years about (3.5%).
- In terms of education level (32.5%) were illiterate , (20%) were elementary and (20.5%) were guidance school.
- Totally (80%) were married .
- In terms of job ,(29%) were a house keeper , (15%) were farmer and (12.5%) were others .

A study conducted in Khartoum state - Sudan – 2013- by researcher :

Rashid Kamal Khalid Osman has indicated to :

- male about (72.8%), while the female were only (27.6%) .
- A total of (74.6%) of the study participants were married , (17.6%)were single , (2.2%) were divorced and (5.5%) were widowed.
- In regards to the monthly income , (23.8%) of the study participants were with monthly income less than 500 SDG, (32.8%) were within 500- 1000 SDG, (30.9%) were within 1001- 2000 SDG and (12.5%) were with an income of more than 2000 SDG per month .
- Out of the 272 participants , (23.9%) stated that they smoked cigarettes of whom (36.9%) were currently smokers ,while (76.1%) had never smoked.
- (17.3%) of participants were chronic comorbidities , diabetes mellitus about (40.4%) , followed by hypertension(23.4%) , HIV and ischemic heart (12.8%) and (1.8%) who had family history of bronchial asthma.

A study conducted in China- 2013-2014- by researchers: Liqun Zhang and others has indicated to :

- (62%) of patients were male and (38%) were female .
- Less than 25years about (16.1%) , 25-44 years (26.6%) , 45-54 years about (40.6%) and above 65 years (21.9%).
- With regard to comorbidity , about (22,9%) no infected , diabetes (40.1%) , liver disease (12%) and (25%) others .

A study conducted in Rewa – India-2016- by researchers : Aashutosh Asati and others has indicated to :

- (62%) of patients were males , and (38%) were females .

- (75%) were married .
- (24.7%) were illiterate ,while (45.2%) were only primary educated among literate .
- Majority of patients (36.7%) were laborers ,followed by unemployed group (35%), (14%) patients were agriculture workers, (4%) were drivers by occupation .
- (61%) patients were below poverty line .
- Among 117 pulmonary T.B patients (7.6%) were HIV infected , (10.2%) had diabetes mellitus , (13.7%) were using corticosteroids for treatment of other chronic illness , (26.4%) were malnourished , (16.2%) had history of contacts with other pulmonary T.B patients ,(3.4%) patients had chronic kidney disease and (1.7%) were malignancy .
- (73%) patients were smoker and (24%) were alcoholics .

A study conducted in Georgia -2011-2013- by researchers Madea Gegia and others has indicated to :

- (45.9%) of the study participants were current smokers ,while (31.8%) were past smokers .

3. Methodology

3-1 Study Design:

This study is a descriptive facility- based / cross_sectional study for all new positive cases among TB patients in Wad madani and Elmanagil T.B centers in Gezira state .

3-2-Study area:

Gezira state _middle of Sudan. Gezira state capital is Wad-Medani, It is aborded by Khartoum state at the north, Sinnar state at the south, Gadarif state at the east and White Nile state at the west .

In Gezira state there are 73 hospitals, 352 health centers and 516 PHC units spreading throughout the state .

In Gezira state there are 41 centers for diagnosis and treatment of tuberculosis disease , distributed at seven localities as the follows :

Madani Al kubra locality 7 centers _ Almanagil locality 8 centers_ Alhasahisa locality 8 centers _ Alkamleen localiy 3 centers _ Um-ALqura locality 4 centers _ Southern Gezira locality 5 centers _ Eastern Gezira 5 centers. And combine two centers of TBHIV, and one MDR treatment center .

Wad madani center consist of :TB clinic , laboratory of investigation , and statistic office .It has 8 medical cadres (3 lab technician , 2 medical assistant and 3 statistician) .

Elmanagil center consist of :TB clinic , laboratory of investigation , and statistic office .It has 4 medical cadres (2 lab technician , 1 medical assistant and 1 statistician) .

3-3-Study Population:

The population of Gezira state is about 26,986,250 of different ethnic groups, most of them are farmers and the others are working in grazing and commerce.

3-4-Sample Size and sampling procedure:

Total coverage of all new positive smear TB patients transferred to Wad madani and Elmanagil T.B centers in Gezira state ,(because these centers approximately 67% for total percentage of new cases detection in Gezira state - In Gezira state the estimated number of cases is about 645 for new positive smear tuberculosis ,Wad-Madani and Elmanagil centers about 435 cases) according of report T.B program- Gezira State (2014) ,in the period from 1/7/2016 to 31/12/2016(about 6 months).and this may elides good outcome.

Including criteria : all those who contracted TB for the first time .

Exclusion criteria : less than five years children who are not subjected to sputum testing .

3-5- Data collection technique:

A-observation (check list) while managing to patients .

B –structured questionnaire which was distributed for each patient infected with tuberculosis disease for the first time. It includes : more at high risk group and describing socioeconomic status for TB patients .

3-6-Data analysis:

The data will be analyzed using statistical package for social science (SPSS).

3-7- Statistical analysis going to :

a- descriptive statistic to describe study variables .

b- cross tabulation “chi squire test “ to test the relationship between socioeconomic factors and tuberculosis disease .

The data will be presented as tables and figures.

3-8-Ethical considerations:

- The study was accepted by University of Shendi .
- Consent of state ministry of health in Gezira state .
- _ Consent of participants in data collection.
- _Consent of patients and strict confidentiality regarding patients information ,such as name, full residential address and ways of transmission, was considered.

4-Results:

***Table (1):Shows marital status for new positive TB patients in wad madani &al managil centers - Gezira state -2016:**

N = 221

Marital Status	Total	Percent%
Single	113	51.1
Married	101	45.7
Divorced	5	2.3
Widow	2	0.9
Total	221	100

***Table (2):Shows new positive TB patients with children in wad madani &al managil centers - Gezira state -2016:**

N = 221

With children	Frequency	Percent%
Yes	74	68.5
No	34	31.5
Total	108	100

***Table (3):Shows whether newly discovered patients hear about TB disease – wad madani & al managil centers Gezira state -2016:**

N = 221

Hear about TB	Frequency	Percent%
Yes	137	62
No	84	38
Total	221	100

***Table (4):Shows knowledge of new positive TB patients about Tuberculosis disease infection in wad madani &al managil centers - Gezira state -2016:**

N = 221

Other infected	Total	Percent%
Yes	133	60.2
No	85	38.5
Didn't know	3	1.4
Total	221	100

***Table (5):Shows New positive TB patients with Other family members infected of TB disease - in wad madani &al managil centers - Gezira state -2016:**

N = 221

Infection members	Total	Percent%
Yes	36	16.3
No	185	83.7
Total	221	100

***Table (6): Shows Family members of new positive TB patients- with TB positive received Treatment - wad madani &al managil centers - Gezira state -2016:**

N =36

Infection treatment	Total	Percent%
Yes	34	94.4
No	2	5.6
Total	36	100

***Table (7):Shows infection TB among contacts of new positive TB patients with TB disease in wad madani &al managil centers - Gezira state -2016:**

N = 221

Contacts	Total	Percent%
Yes	18	8.2
No	203	91.8
Total	221	100

***Table (8): Shows treatment of the infection TB among contacts of new positive TB patients with TB disease - wad madani &al managil centers - Gezira state -2016:**

N = 18

Contacts treatment	Total	Percent%
Yes	18	100
No	0	0
Total	18	100

***Table (9):Shows If monthly income cover the living cost for new positive TB patients in wad madani &al managil centers - Gezira state -2016:**

N =147

Income coverage	Total	Percent%
Yes	84	57
No	63	43
Total	147	100

***Table (10):Shows how the new positive TB patients(they have work but not covering the daily needs) manage to cover income deficit - in wad madani &al managil centers - Gezira state -2016:**

N = 63

Additional Income	Total	Percent%
Additional work	24	38.1
Relatives Help	36	57.1
Zakat Chamber	2	3.2
Organizations	1	1.6
Total	63	100

***Table (11):Shows how long the overtime for new positive TB patients in wad madani &al managil centers - Gezira state -2016:**

N = 24

Overtime	Total	Percent%
2 Hours	10	47.7
4 Hours	13	54.2
Above 4 Hours	1	4.1
Total	24	100

***Table (12): Shows Regularity of daily meals for new positive TB patients in wad madani &al managil centers - Gezira state -2016:**

N = 221

Regularity of Meals	Total	Percent%
Yes	131	59.3
No	90	40.7
Total	221	100

***Table (13): Shows total of rooms for new positive TB patients in wad madani &al managil centers - Gezira state -2016:**

N = 221

Rooms Total	Total	Percent%
One Room	24	10.9
Two Rooms	104	47.1
Three Rooms	61	27.6
Above Three Rooms	32	14.5
Total	221	100

***Table (14): Shows space of rooms for new positive TB patients in wad madani &al managil centers - Gezira state -2016:**

N = 221

Rooms Space/Meters	Total	Percent%
2 × 6	4	1.8
3 × 4	65	29.4
4 × 4	133	60.2
5 × 4	19	8.6
Total	221	100

***Table (15): Shows Stimulants type used by new positive TB patients in wad madani &al managil centers - Gezira state -2016:**

N = 67

Stimulants Type	Total	Percent%
Drugs	3	4.5
Drink	12	17.9
Cigarettes	39	58.2
Snuff	7	10.4
Others	6	9
Total	67	100

***Table (16): Shows number of cigarettes smoked per day by new positive TB patients in wad madani &al managil centers - Gezira state - 2016:**

N =39

Cigarettes Numbers	Total	Percent
Less than three cigarettes	1	2.6%
3 to 5	7	17.9
6 to 9	7	17.9
10 and more	24	61.5
Total	39	100

***Table (17): Shows New positive TB patients stimulants methods of use in wad madani &al managil centers - Gezira state -2016:**

N =67

Stimulant methods of use	Total	Percent%
Single	42	62.7
Pair	10	14.9
Mass	15	22.4
Total	67	100

***Table (18):Shows Pair and mass Contacts of new positive TB patients using stimulants has been infected with tuberculosis disease in wad madani &al managil centers - Gezira state -2016:**

N =25

stimulants infected	Total	Percent%
Yes	9	36
No	16	64.6
Total	25	100

***Table (19): Shows treatment of contacts those who had tuberculosis and were taking stimulants with new positive TB patients in wad madani &al managil centers - Gezira state -2016:**

N = 9

Treatment	Total	Percent%
Yes	7	77.8
No	2	22.2
Total	9	100

Table (20): Shows known chronic diseases of new positive TB patients in wad madani &al managil centers - Gezira state -2016:

N = 221

known chronic diseases	Total	Percent%
Diabetes mellitus	8	3.6
HIV/ADIS	0	0
Cancers	0	0
Has no chronic disease	213	96.4
Total	221	100

***Table (21): Shows New positive TB patients sent out from their house due to TB positive result in wad madani &al managil centers - Gezira state -2016:**

N = 221

TB patients sent out from their house	Total	Percent%
Yes	13	5.9
No	208	94.1
Total	221	100

Table (22):shows the relationship between age and occupation for new positive TB patients - Gezira state -2016:

N = 221

	Work				Total
Age	Worker	Farmer	House wife	Other	
11-20 Year	4	0	6	15	25
21 -30 Year	31	8	21	31	91
31 -40 Year	15	7	11	15	49
41 -50 Year	5	3	3	7	19
Over 50 Year	4	11	15	7	37
Total	60	29	57	73	221

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	41.464 ^a	24	.015
Likelihood Ratio	42.762	24	.011
Linear-by-Linear Association	1.695	1	.193
N of Valid Cases	221		
a. 19 cells (54.3%) have expected count less than 5. The minimum expected count is .02.			

Table (23): shows the relationship between age and Use of stimulants by new positive TB patients - Gezira state -2016:

N = 67

Age	Stimulants Abuse	
	Yes	No
11-20 Year	1	1.5%
21 -30 Year	28	41.5%
31 -40 Year	22	33%
41 -50 Year	7	10.5%
Over 50 Year	9	13.5%
Total	67	100%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.708 ^a	30	.062
Likelihood Ratio	35.847	30	.213
Linear-by-Linear Association	.555	1	.456
N of Valid Cases	221		
<p>a. 33 cells (78.6%) have expected count less than 5. The minimum expected count is .02.</p>			

***Table (24): Shows relationship between age and patients sent out from their house due to TB positive infection - Gezira state -2016:**

N = 221

Age	TB patients sent out from their house		Total
	Yes	No	
11-20 Year	0	24	24
21 -30 Year	9	80	89
31 -40 Year	2	45	47
41 -50 Year	1	18	19
Over 50 Year	1	36	37
Total	13	208	221

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.602 ^a	6	.469
Likelihood Ratio	7.009	6	.320
Linear-by-Linear Association	.265	1	.606
N of Valid Cases	221		
a. 8 cells (57.1%) have expected count less than 5. The minimum expected count is .12.			

Table (25): shows the relationship between localities and Use of stimulants by new positive TB patients - Gezira state -2016/:

N = 67

Locality	Stimulants Abuse		Total
	Yes	No	
Madani Elkobra	44	66	110
South of Gezira	5	17	22
Um Alqura	1	1	2
Al managil	11	53	64
24 Alqurashi	2	13	15
East of Gezira	4	4	8
Total	67	154	221

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.396 ^a	5	.009
Likelihood Ratio	16.027	5	.007
Linear-by-Linear Association	4.567	1	.033
N of Valid Cases	221		
a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .62.			

Table (26): shows the relationship between Education level and Use of stimulants by new positive TB patients - Gezira state -2016:

N = 67

Education level	Stimulants Abuse		Total
	Yes	No	
Illiterate	19	41	60
Some education before school	7	26	33
Primary	30	50	80
Secondary	11	21	32
University	0	16	16
Total	67	154	221

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.136 ^a	4	.025
Likelihood Ratio	15.793	4	.003
Linear-by-Linear Association	.614	1	.433
N of Valid Cases	221		
a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.92.			

***Table (27): Shows the relationship between Education level and stigma sense in society for new positive TB patients - Gezira state - 2016:**

Education level	Sense of stigma		Total
	Yes	No	
Illiterate	10	50	60
Literate	4	29	33
Primary	8	72	80
Secondary	7	25	32
University	4	12	16
Total	33	188	221

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.371 ^a	4	.358
Likelihood Ratio	4.244	4	.374
Linear-by-Linear Association	.433	1	.511
N of Valid Cases	221		
a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 2.39.			

4-3-Check list:

The check list conducted on Wad madani and Almanagil centers for diagnosis and treatment of tuberculosis disease in Gezira state – 2016

<i>NO</i>	<i>Statement</i>	<i>Wad madani Hospital</i>	<i>Almanagil Hospital</i>
1.	Infrastructure		
1.1	Situation of clinic building	Medium	Medium
1.2	Situation of lab building	Good	Medium
1.3	Clinic staff function	Medical assistant	Medical assistant
1.4	Lab staff function	Technician	Technician
1.5	Attendance of clinic staff	Attending	Attending
1.6	Attendance of lab staff	Attending	Absence
1.7	No. of courses for clinic staff	More than three courses	More than three courses
1.8	No. of courses for lab staff	More than three courses	More than three courses
2.	Quality of process		
2.1	How to check samples TB	Sputum	Sputum
2.2	No. of take samples TB	Twice	Twice
2.3	quality control for samples	Yes	Yes
2.4	Prepare of samples	Good	Good
2.5	Education and Counseling of patients about TB disease.	Yes	No
3.	Work environment		
3.1	Lighting	Enough	Enough
3.2	Ventilation	Enough	Enough

4.	Waste disposal		
4.1	How to disposal of sputum containers	By incinerators and disinfectants	By incinerators and disinfectants
4.2	How to disposal of lab wasts	By incinerators	By incinerators

4-4-Figures:

Gender distribution of new positive TB patients – Gezira state-2016

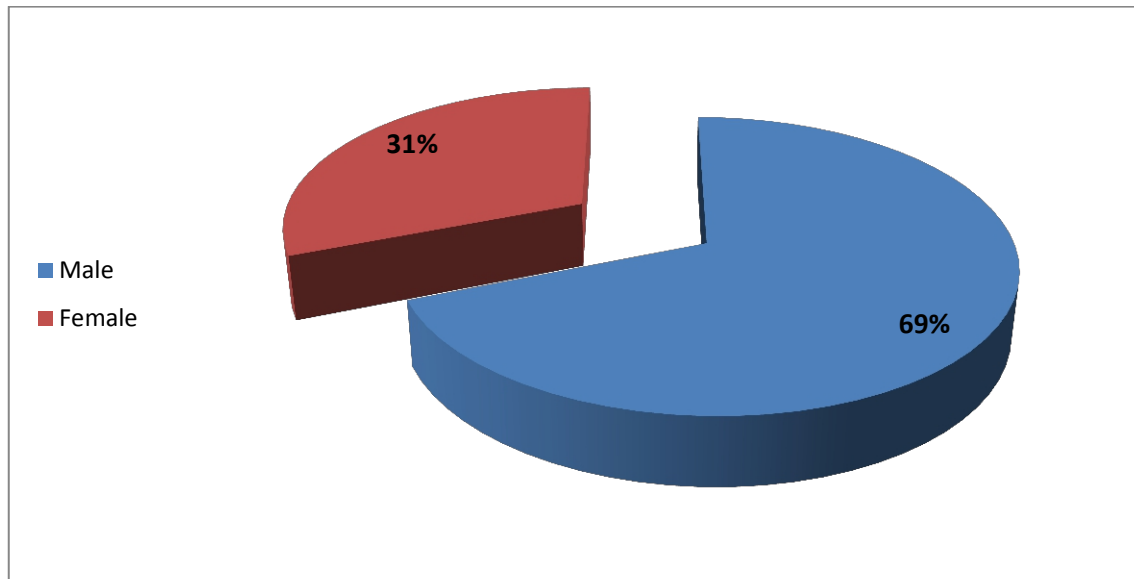


Figure (1): The study indicate that the males more exposed fore TB disease than females , More than two-thirds of patients are male (69%) of patients and females (31%) .

Age distribution of new positive TB patients –Gezira state- Sudan -2016

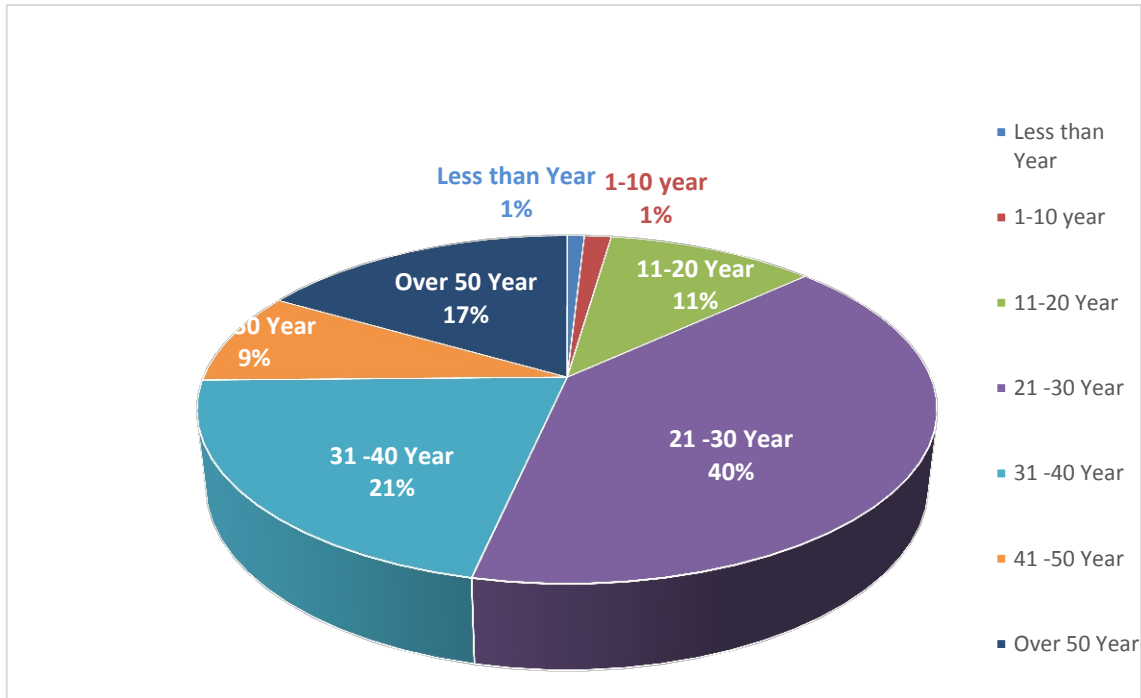


Figure (2): Young people are the most affected by TB, age groups (21-30) and (31-40) years (40% and 21 %) represented about two-thirds of the patients, distribution of the studied group.

This could be explain by active movement between places and high communication in small places in this age group, which can be risk factors as TB transmission between them.

New positive TB patients distribution per localities-Gezira state – Sudan-2016

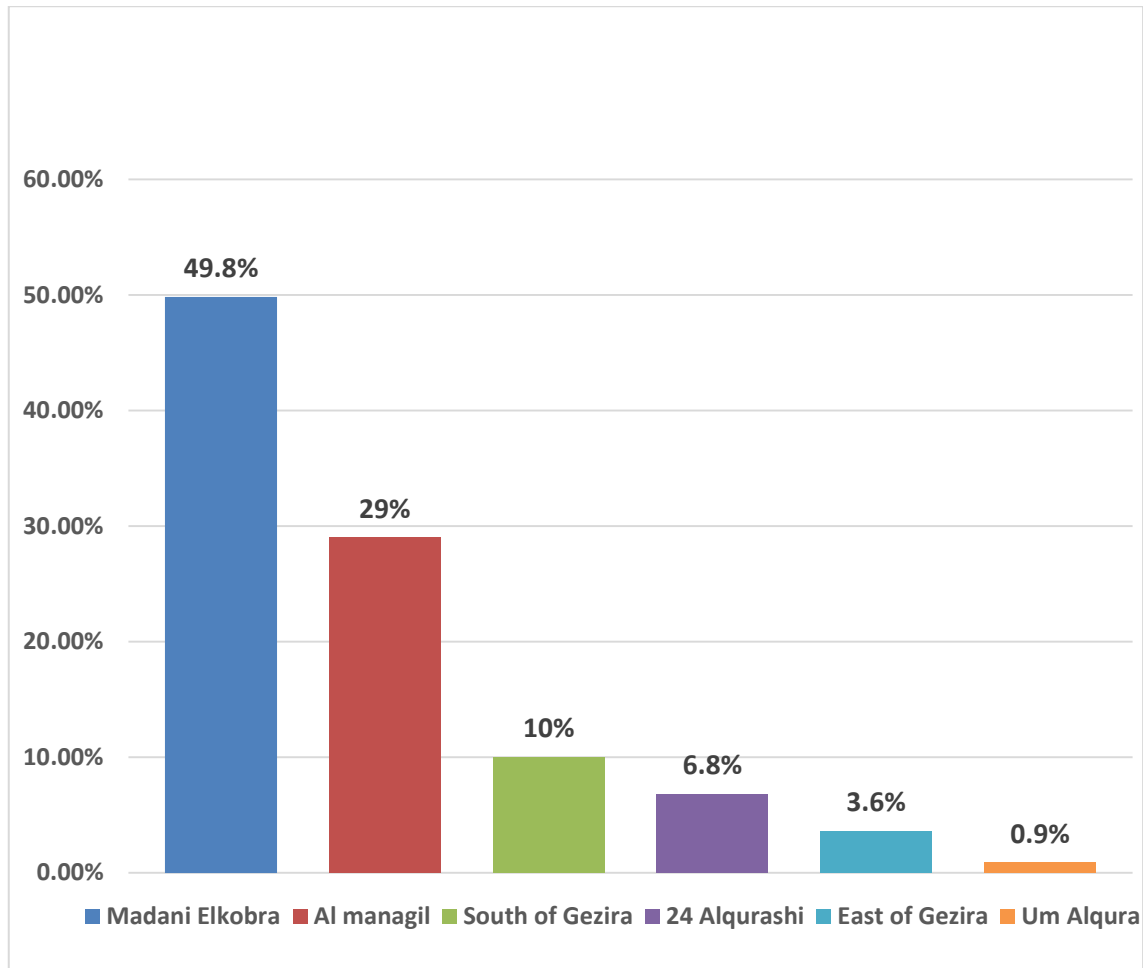


Figure (3): Most Gezira state localities affected by TB disease but Madani Elkobra locality represent about half of the studied group (49, 8%) While Al managil locality about third (29%). Madani and ALmanagil hospitals catchment area bigger than other localities health services area. In addition, feeling of stigma can lead patients to seek treatment in other big localities instead of their own small localities.

Percent of Education level for new positive TB patients –Gezira state – Sudan- 2016

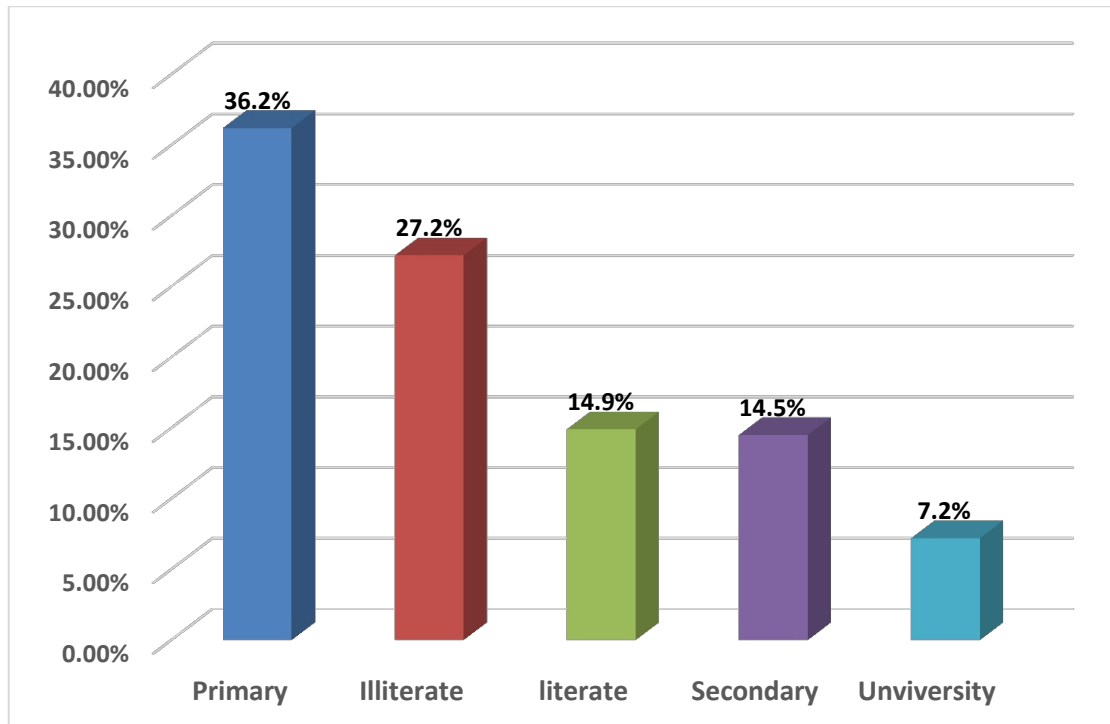


Figure (4): lowest levels of education have represent all most more than 60% out of the studied group which can reflect strong relation and link between level of education and TB infected people, Although there are 7.2% were high educated .

Occupation Percent for new positive TB patients Gezira state – Sudan-2016

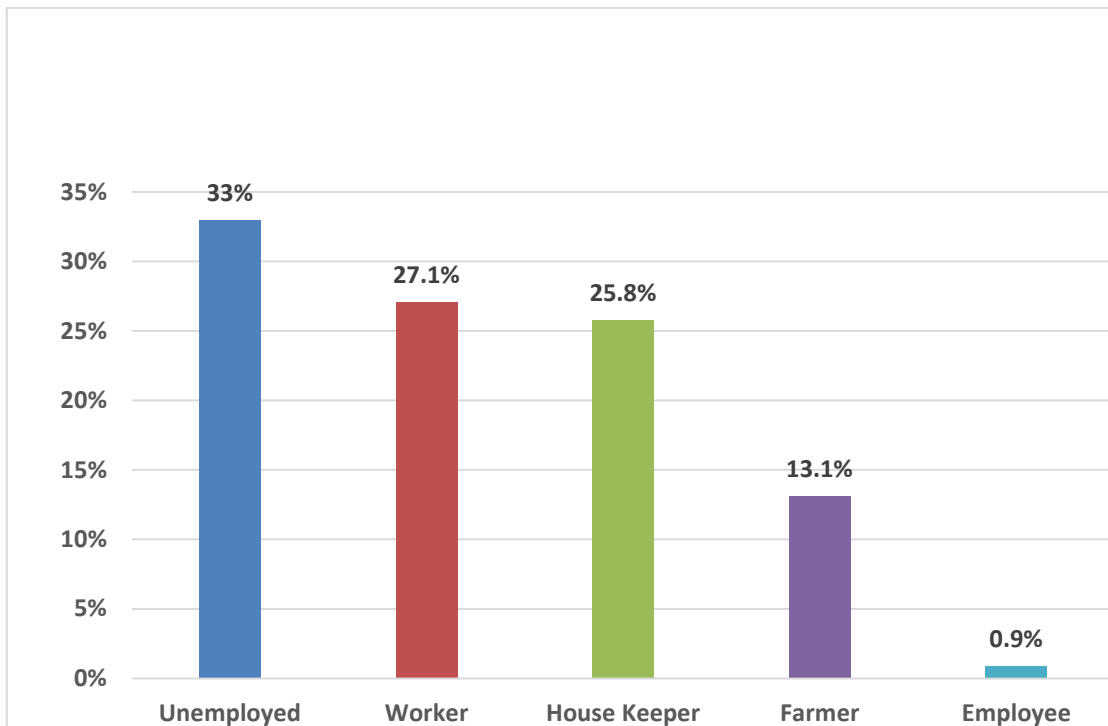


Figure (5): Figure reflect relation of the occupation and TB positive cases its shows that unemployed (58.8%) more affected than employed persons about (41.2%).

Meals number per day for new positive TB patients -Gezira state - 2016

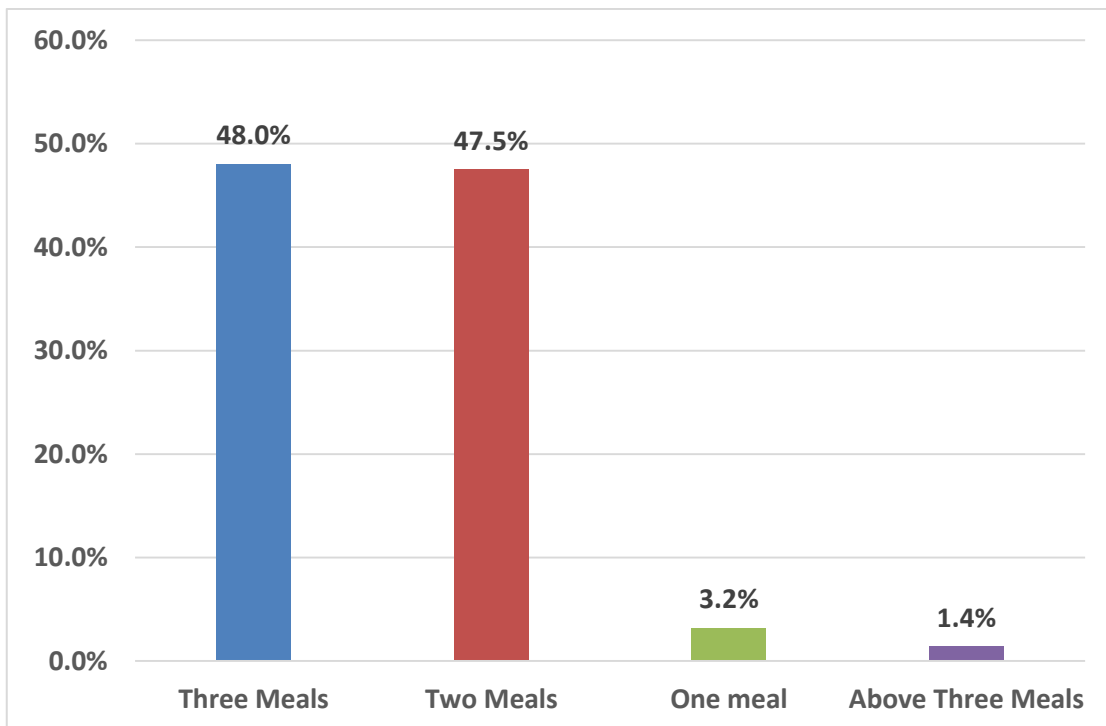


Figure (6): Number of TB diagnosed positive how use to take two or three meals per day represent 95.5% of studied group, But as per the next figure shows that the nutritional value for those group is very poor and all most inadequate to the standard nutritional needs.

Percent of Type of daily meals for new positive TB patients -Gezira state - Sudan 2016

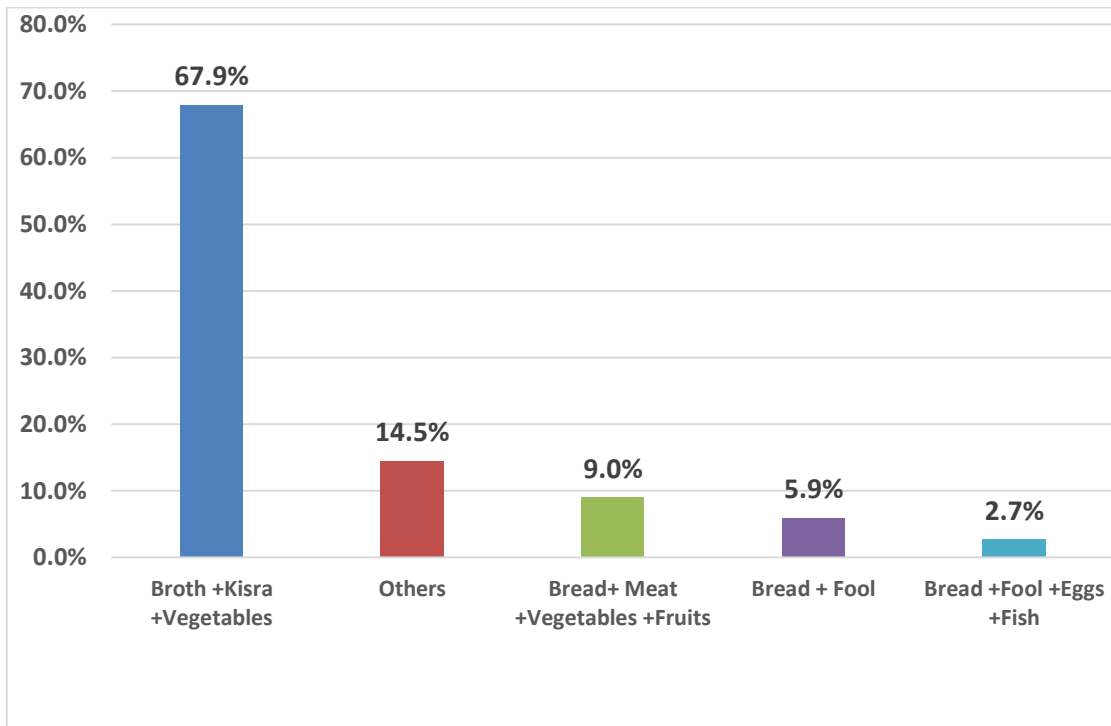


Figure (7): Majority of the studied group (67.9%) use to eat meals consisting of broth, kisra and vegetables), indicating that meals quality have low nutritional value.

Percent of monthly income for new positive TB patients -Gezira state - Sudan – 2016

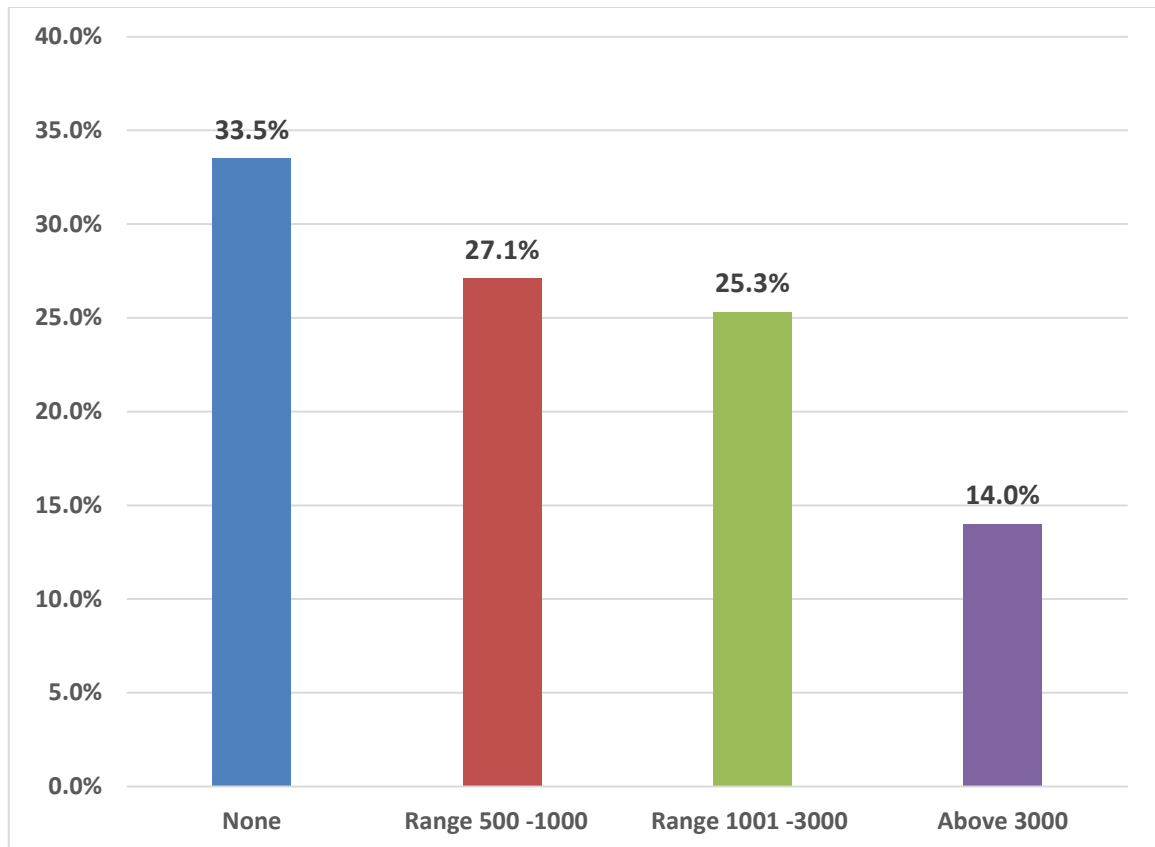


Figure (8): Zero and low income is common among the studied group (60.7%) as well as the medium income represent (25.3%) and overall zero to medium represent (86%) witch reflect strong relation between economic status and TB positive cases .

Percent of ventilation used by new positive TB patients- Gezira state - Sudan 2016

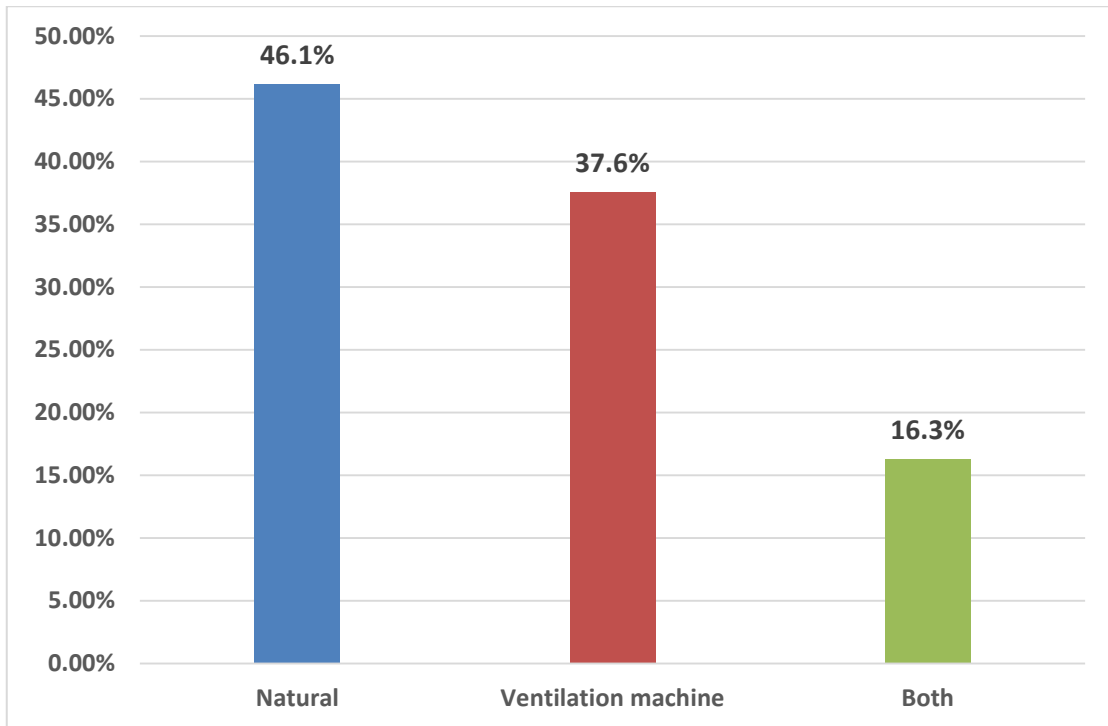


Figure (9): Shows ventilation used by positive TB studied group majority are using natural.

Use of stimulants by new positive TB patients -Gezira state - Sudan 2016

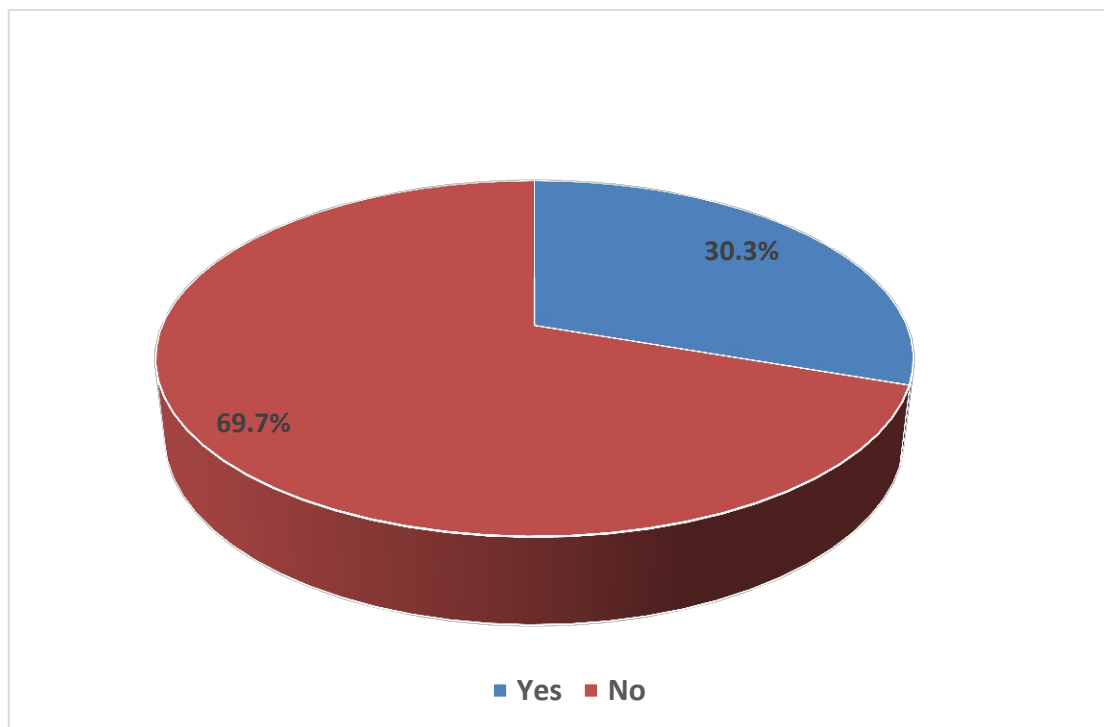


Figure (10): Shows use of stimulants by the studied group of the TB positive (about one third of patients).

Stigma sense in the society for new positive TB patients -Gezira state - Sudan 2016

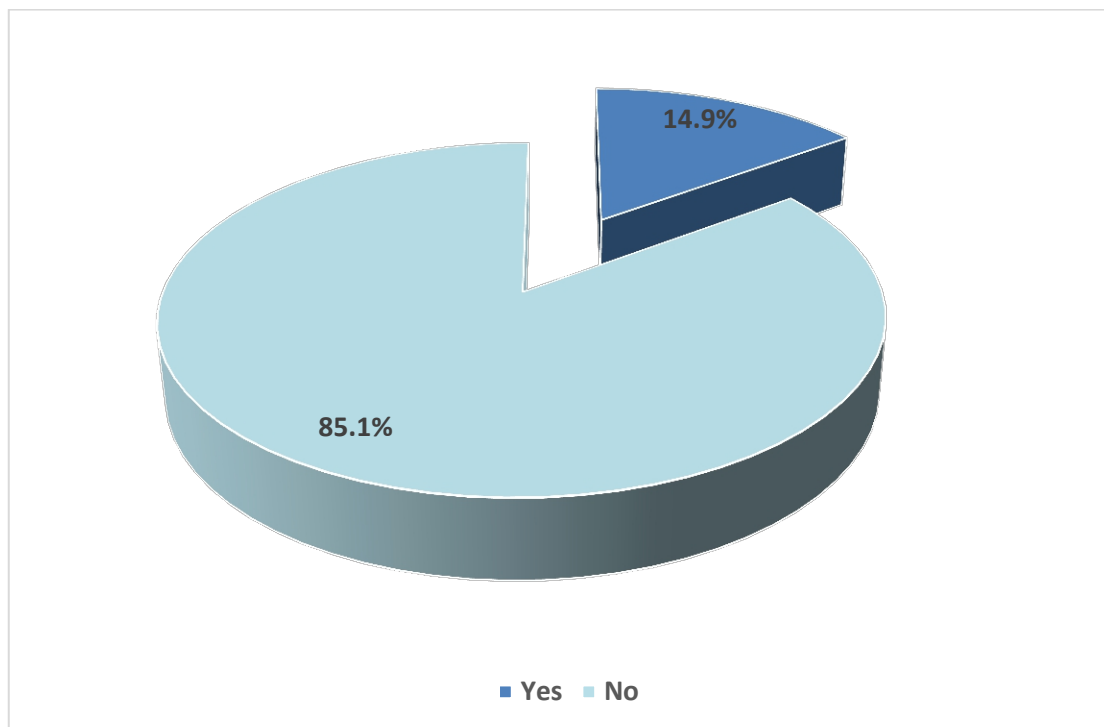


Figure (11): Only (14.9%) out of the studied group have stigma sense in the community.

New positive TB patients sent out from their work due to TB positive result -Gezira state - Sudan 2016

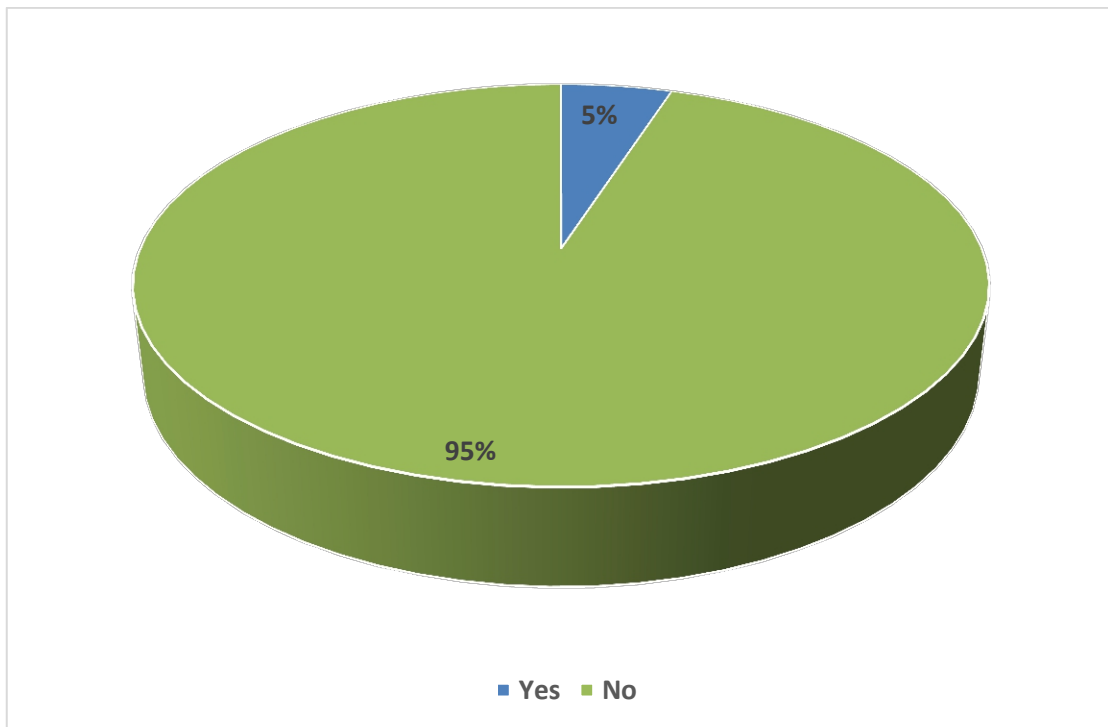


Figure (12): About (5%) of workers were dismissed from their jobs due to infect with TB disease.

5-Discussion:

This study was conducted at Wad Madani & Almanagil - Gezira State, country of Sudan, from 2016 to 2018.

The study aimed to identify epidemiological factors of new positive cases among TB patients.

The study indicated that the incidence rate in Wad madani center about (22 cases per 100.000 population), while the incidence rate in Al managil center estimate (11 cases per 100.000 population), Compare to total incidence rate in Gezira State (14 cases per 100.000 population) in year . WHO standard (86 cases per 100.000 population) in year .These incidence have indicated to poor detection rate in these centers and Gezira state generally.

The study indicated that (74.7%)of the targets ,in the age groups between 11 years and 40 year (product category more high risk), compare with previous study conducted in Kampala city (Uganda) by researchers (Kirenga et al, 2015) has indicated to (81%) of targets equal and less than 40 year. (The cost of TB is difficult to estimate because 80% of the victims are 15-49 years old which is the most financial productive time of their lives, and a patient that isn't diagnosed or cured loses approximately an entire year of work(www.results.org, 2005). And Other study conducted in Iran by researchers (Ghaffri et al.2015) has indicated to : age group (18-40) years with (39%) , age group over 60 years (31.5%) , age group below 7 years (2.5%) and age group 7-18 about (3.5%).

The study showed that (7.2%)of targets received high level education { (14.5) secondary ,(7.2)university }.compare with previous study conducted i in Kampala city (Uganda) by researchers (Kirenga et al, 2015) has indicated to (40.4%) of targets received high level education. And Other study conducted in Iran by researchers (Ghaffari et al,2015) has indicated to :(32.5%) were illiterate, (20%) were elementary and (20.5%) were guidance school.

The study reported that (69%) of the targets are male, The women about (31%). Indicating that men are most susceptible to tuberculosis disease than women . compare with previous study conducted in Eastern Sudan (Kassala Hospital)-2011- by researchers (Abdallah and Ali ,2012) has indicated to (63%) of the study group male , and (36,3) female .Compare also with previous study conducted in South India by (shetty et al ,2006) has indicated (the sex distribution of the group was 58% men and 42% women (Global Tuberculosis Report, 2014) has indicated that (Though most TB cases and deaths occur among men, the burden of disease among women is also high. In 2013, there were an estimated 3.3 million cases and 510 000 TB deaths among women, as well as an estimated 550 000 cases).

The study confirmed just (60.2%) know tuberculosis as infectious disease, that indicating poor of awareness among patients. (CDC- 2008) has indicated: (The infection is transmitted from one person to another through invisible droplet nuclei which are generated when someone with active TB of the lungs or larynx coughs, sneezes, spits, laughs or talks. Active TB may also occur in sites outside the airways but transmission does not occur from these sites or is very uncommon (eg. discharging wounds or abscesses).

The study has indicated (33%) of patients un employed (highest category), (28.8) house keeper.(27.1)worker and employee (0.9%)as less category. Compare with previous study conducted in in Eastern Sudan (Kassala hospital)- 2011- by researchers (Abdallah and Ali,2012) has indicated to(36.8) were non skills workers, (26.1%) skill workers , (25%)employees and (11.7%) were house keeper .

The study confirmed about (51.6%) of the targets have low income((33.5%) non and (27.1%) between 500 and 1000 SDG) , That means these patients living below poverty line .(according to World Bank about 1.25 USD/day), While other study conducted in Rewa – India by researchers

Aashutosh Asati and others, has indicated to: (61%) of patients were below poverty line . Compare with previous While other study conducted in Rewa – India by researchers Aashutosh Asati et al , has indicated to (39.5%) income below poverty line. And other study conducted in Sudan – Khartoum state by researcher (R. Khalid,2014)has indicated to :(23.8%) of the study participants were with monthly income less than 500 SDG , (32.8%) were within 500- 1000 SDG, (30.9%) were 1001- 2000 SDG and (12,5%) were with an income of more than 2000 SDG per month . (H. Rieder et al-2009)has indicated to (This leads to poor-quality and overcrowded housing or poor work conditions..

These may lower defenses as well as making infection more likely. People living in such conditions are often also poorly nourished. The whole complex of poverty makes it easier for the TB to cause disease.

The study indicated about (68%) of the targets meals are incomplete (quality) were eating (bread + kissra+ vegetables). (Hans L.Rieder, all-2009) has indicated :{ Starvation or malnutrition reduces resistance to the disease. This is a very important factor in poorer communities, in both adults and children Drug-induced immunosuppression treatments used for treating certain diseases such as cancer also increase the chance of developing tuberculosis.

The study showed that the population has used of natural and ventilation machine (both) about (16.3%) . (WHO- 2006) has indicated { Natural ventilation, mixed-mode and mechanical ventilation systems can be used and supplemented with ultraviolet germicidal irradiation(UVGI) in areas where adequate ventilation is difficult to achieve. Where feasible, installation of ventilation systems should be a priority, because ventilation reduces the number of infectious TB germs in the air.

The study confirmed (30,3%)of the target use of stimulants (drugs ,alcohol, cigarettes, snuff and others). About (17.6%) of the targets were smoking

cigarettes, compare with previous study conducted in Georgia by (Madea a Gegia and others -2011 to 2013) has indicated to (45,9%) current smokers and (31.8%) were past smokers. And other study conducted in Sudan – Khartoum state by researcher (R. Khalid,2014)has indicated to: out of the 272 participants , (23.9%) stated that they smoked cigarettes , (36.9%) were currently smokers , while (76.1%) had never smooed.

The study reported that (15%) of the targets were sense of stigma in society ,through with living in society and focus on them . (Collins et all- 2008) said: {The stigmatized individual often internalizes this sense of disvalue and adopts a set of self-regarding attitudes about the marked characteristic including shame, disgust, and guilt. These attitudes produce a set of behaviors that include hiding the stigmatized trait, withdrawing from interpersonal relationships, or increasing risky behavior}.

The study indicated to (6%) of the targets were sent out from their house and (5%) sent out from the work . (Baral et all-2007) said: { Stigmatization is conceptually distinct from discrimination – another social determinant of health – in that the primary goal of discrimination is exclusion, not necessarily for the target to feel ashamed or guilty}.

The study reported : A total of 221 participants were enrolled in this study including (3.6%) infected with diabetes, and (96.4%) did not infected with any chronic disease. compare with previous conducted in China by researchers (Liqun Zhang et al,2016) , has indicated to :(22.9%)no infected, (40%) diabetes , (12%) liver diseases and (25%) others , While other study conducted in Rewa – India by researchers Aashutosh Asati and others , has indicated to : (7.6%) were HIV infected , (10.2%) patients had diabetes mellitus , (13.7%)were using corticosteroids for treatment of other chronic illness , (26.4%) were malnourished , (16.2%) had history of contacts with other pulmonary T.B patients , (3.4%) patients had chronic kidney disease, and (1.7%) had malignancy .(CDC-2012)indicated to : All

people newly diagnosed with HIV should be tested for TB infection as soon as possible. People living with HIV and at ongoing risk for TB exposure should be tested annually. The risk for exposure to TB is the same for everyone: being in close contact with someone with infectious TB disease, Unfortunately, some people with HIV do not know they are infected with TB.

Zero percentage attribute to several reasons, there is no HIV screening among TB patients in AL managil hospital, lack of HIV screening among TB patients in Wad madani hospital, there is no counseling in TB department in AL managil hospital, poor coordination between counseling unit , laboratory and case management unit in TB department in Wad madani hospital.

One the other hand by the observation during data collection from tuberculosis units in hospitals main observation were found regarding to tuberculosis impact over epdimelological factors were egarding to infrastructure in two hospitals (wad madani &almanagil; the clinical building needs to be rehabilitation as general, the lab building in al managil hospital need to maintenance and the clinics in two hospitals need to doctors (medical assistants inadequate for hospitals. Note that some staff do not attending daily, improper disposal of lab wastes (in two hospitals), there is no counseling units in tuberculosis department in al managil hospital.

6- Conclusion:

The present study reveals that various demographic , socioeconomic and environmental factors play a vital role in the etiology of pulmonary TB . Most important factor found were young age group , male gender , low socioeconomic status , low education standard , exposure to TB infected patients , malnourishment and co-existing immune-compromised disease , Hence this study provides useful information about the epidemiological factors for new positive pulmonary TB that can used to control disease , by preventing these potential risk factor in population and timely diagnosis and providing treatment for pulmonary tuberculosis .

6- Recommendations:

1. For Ministry of Health in Gezira State:

- Providing of two hospitals with physicians for treatment of cases.
- Establishing counseling unit in Al managil hospitals.
- Activation of HIV testing Al managil hospitals.
- Maintenance of laboratories and clinics building in Wad madani and Al managil hospitals. And providing with proper medical equipment's.
- Raise detection rate for TB disease in Gezira State by:
 - * Strengthen of refer system .
 - * Decrease of stigma by health education.
 - * Activation of mobile clinics and teams investigation.
- Raising health awareness for patients and community with regard to TB disease by seminars and health lectures , multimedia and educational offers about T.B disease.
- Promote community participation to fight TB disease by:
 - * attend of contacts for testing disease .
 - * Volunteer to referring suspects to T.B centers

2. For the government :

- Reliance on local and government support for detection and treatment of TB cases rather than global fund , so that alternatives are available if global fund support stop
- Improving per capita income and encouraging production.
- Opening employment and alleviating poverty
- Encouraging researches and studies in disease detection , prevention and control.

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بسم الله الرحمن الرحيم

جامعة شندي

كلية الدراسات العليا

استبيان بحث دكتوراة لمرضى الدرن موجبي التفاف بمركزي مستشفى ودمدني ومستشفى

المناقل -ولاية الجزيرة

1- رقم سجل المريض:

2الجنس :

1/ ذكر 2/ أنثي

3- العمر بالاعوام:

1/اقل من سنه 2/ سنه – 10 3/ 11- 20 4/ 21- 30 5/ 31- 40

6/ 41- 50 7/ أكبر من 50 سنه

4-المحلية :

1/ مدني الكبرى 2/ جنوب الجزيرة 3/ ام القري 4/ المناقل 5/ 24 القرشي

6/ الحصاحيصا 7/ الكاملين 8/ شرق الجزيرة

5- المستوي التعليمي :

1/ أمي 2/ ملم بالقراءه والكتابة 3/ اساس 4/ ثانوي 5

/جامعي

6- الحالة الاجتماعية :

1/ أعذب 2/ متزوج 3/ مطلق 4/ أرمل

7- في حالة انك متزوج : هل لديك أطفال :

1/ نعم 2/ لا

8- هل سمعت بمرض الدرن ؟

1/ نعم 2/ لا

9/ هل هو معدي ؟

1/ نعم 2/ لا 3/ لا أعرف

10 - هل حدث وأن أصيب احد افراد اسرتك بمرض الدرن ؟

1/ نعم 2/ لا

11 - في حالة الاجابة بنعم : هل تم علاجه ؟

1/ نعم 2/ لا 3/ اخري (حدد)

12/ طبيعة العمل :

1/ موظف 2/ عامل 3/ مزارع 4/ ربة منزل

5/ اخري (حدد)

13/ هل حدث وان اصاب احد زملاؤك في العمل بمرض الدرن ؟

1/ نعم 2/ لا

14/ في حالة الاجابة بنعم : هل تم علاجه ؟

1/ نعم 2/ لا 3/ اخري (حدد)

15/ كم يبلغ متوسط دخلك الشهري ؟

1/ 500-1000 ج 2/ 1001-3000 ج 3/ اكثر من 3000 جنيه

4/ لا يوجد دخل

16/ هل دخلك يكفي لاعالتك انت واسرتك ؟

1/ نعم 2/ لا 3/ لا يوجد دخل

1/ في حالة الاجابة بلا : كيف تسد الفجوة ؟

1/ يعمل اضافي 2/ بمساعدة الاهل 3/ بديوان الزكاة 4/

بمنظمات تطوعية

18/ في حالة العمل الاضافي كم تبلغ مدة الدوام الاضافي ؟

1/ ساعتين 2/ اربع ساعات 3/ اكثر من اربعة ساعات

19/ كم عدد الوجبات التي تتناولها خلال اليوم ؟

1/ واحدة 2/ اثنتين 3/ ثلاثة وجبات

4/ اكثر من ثلاثة وجبات

20/ هل تتناول الوجبات الرئيسية بانتظام ؟

1/ نعم 2/ لا

21/ مانوعية الطعام الذي تتناوله ؟

1/ كسره + ملاح + سلطة خضار 2/ خبز + فول 3/ خبز + لحم + سلطة + فواكه

4 / خبز + فول + بيض + سمك 5/ اخري (حدد)

22/ كم تبلغ عدد الغرف في منزلك ؟

1/ غرفة واحدة 2/ غرفتين 3/ ثلاث غرف 4/ اكثر من ثلاثة

غرف

23/ كم تبلغ مساحة الغرفة الواحدة ؟

1/ مترين × 6متر 2/ 3 × 4متر 3/ 4 × 4متر 4/ 4 × 5متر (حدد)

24/ مانوع التهويه الموجودة بالغرف ؟

1/ طبيعية 2/ صناعيه 3/ طبيعية وصناعية

25/ هل تتعاطي اي نوع من المكيفات

1/ نعم 2/ لا

26/ إذا كانت الاجابه بنعم : أي نوع من المكيفات تتعاطي؟

1/ مخدرات 2/ خمر 3/ سجائر

4/ تمباك 5/ أخري

27/ في حالة تعاطي السجائر : كم عدد السجائر التي تدخنها في اليوم؟

1/ اقل من 3سجارات 2/ 3- 5 سجارات 3/ 6 - 9 سجارات 4/ 10سجارات

واكثر

28/ كيف تتعاطي المكيفات ؟

1/ مفرد 2/ زوجي 3/ جماعي

29/ هل حدث ان أصيب احد من الذين تتعاطي معهم المكيفات بالدرن ؟

1/ نعم 2/ لا

30/ في حالة الاجابة بنعم : هل تم علاجه من الدرن ؟

1/ نعم 2/ لا 3/ اخري (حدد)

31/ هل حدث ان اصبت بواحد من الامراض ادناها ؟

1/ ايدز 2/ سكري 3/ سرطان

4/ لم أصب باي مرض

33/ هل تشعر بالتمييز او الوصمه من المجتمع ؟

1/ نعم 2/ لا

34/ هل حدث ان تم ابعادك من المنزل بسبب مرض الدرن ؟

1/ نعم 2/ لا

35/ هل حدث ان تم ابعادك او اجبارك علي اخذ إجازة من العمل بسبب مرض الدرن ؟

1/ نعم 2/ لا

بسم الله الرحمن الرحيم

Shendi University

Faculty of Graduate Studies

**Questionnaire of PHD with study the epidemiological factors of
pulmonary TB patients in Wad madani & Almanagil centers –
Gezira State- From 2016 to 2017**

1/ Register of patient :

2/ Gender :

A- Male

B- Female

3/ Age :

A- Less than year

B- 1- 10

C- 11- 20

D-

21- 30

E- 3

F- 41- 50

G- Above 50

4/ Locality :

A- Madani al kobra

B- South of Gezira

C- Almanagil

D- 24 Alqurashi

E- Al hasahisa

F- Alkamleen

G- Um alqura

H- Eastern of Gezira

5/ Education Level :

A- Illiterate

B- Some education before school

C- Primary

D- Secondary E- University

6/ Marital Status :

A- Single

B- Married

C- Divorced

E- Widow

7/ If you married : do you have children ?

A- Yes

B- No

8/ Are you hear about Tuberculosis :

A- Yes

B- No

9/ Do you know it is infectious ?

A- Yes

B- No

C- I don't know

10/ Has anyone in your family been infected with T.B disease ?

A- Yes

B- No

11/ If yes : do you treated ?

A- Yes

B- No

C- Other

12/ Occupation :

A- Employee

B- Worker

C- Farmer

D- House Keeper

E- Others

13/ Do you any contacts infected with T.B disease ?

A- Yes

B- No

14/ If yes; : do you treated ?

A- Yes

B- No

C- Other

15/ Monthly income :

A- 500- 1000SDG

B- 1001- 3000SDG

B- C- Above 3000 SDG

D- None

16/Do you enough income ?

A- Yes

B- No

17/ If no ; what do you do ?

A- Additional work

B- Relatives Help

B- C- Zakat Chamber

D- Organizations

18/ If additional work ;how many hours ?

A-2 Hours

B- 4 Hours

C- Above 4 Hours

19/ Daily meals :

A- One meal

B- Two Meals

C- Three Meals

D- Above Three Meals

20/ Do you eat regular daily meals ?

A- Yes

B- No

21/ Quality of meals :

A- Broth +Kisra +Vegetables

B- Bread + Fool

C- Bread+ Meat +Vegetables +Fruits

D- Bread +Fool +Eggs +Fish

E-Other

22/ Number of chambers :

A- One B- Two C- Three D- Above three

23/ Rooms Space/Meters :

A- 2 × 6 B- 3 × 4 C- 4 × 4 D- 5 × 4

24/ Type of ventilation :

A- Natural B- Ventilation machine D- Both

25/Do you using any type of stimulants ?

A- Yes B- No

26/ If yes ; any type ?

A- Drugs B- Drink C- Cigarettes D- Snuff E- Others

27/If use cigarettes ;how many?

A- Less than three cigarettes B-3 to 5-cigarettes

C- 6 to9- cigarettes D- 10 and more

28/How to use stimulants ?

A- Single 2- Pair 3/ Mass

29/ Did anyone with whom use stimulants has been infected with TB?

A- Yes B- No

30/ If yes : do you treated ?

A-Yes B- No

31/Do you infected with below comorbidity :

A- Diabetes B- HIV/ADIS C- Cancers D- No infected

32/ Do you sense of stigma ?

A- Yes B-No

33/ Do you sent out from your house due to TB infected ?

A- Yes B- No

34/ Do you sent out from your work due to TB infected ?

A- Yes B- No

4-3-Check list:

The check list conducted on Wad madani and Almanagil centers for diagnosis and treatment of tuberculosis disease in Gezira state – 2016:

<i>NO</i>	<i>Statement</i>	<i>Wad madani Hospital</i>	<i>Almanagil Hospital</i>
1.	Infrastructure		
1.1	Situation of clinic building		
1.2	Situation of lab building		
1.3	Clinic staff function		
1.4	Lab staff function		
1.5	Attendance of clinic staff		
1.6	Attendance of lab staff		
1.7	No. of courses for clinic staff		
1.8	No. of courses for lab staff		
2.	Quality of process		
2.1	How to check samples TB		
2.2	No. of take samples TB		
2.3	quality control for samples		
2.4	Prepare of samples		
2.5	Education and Counseling of patients about TB disease.		
3.	Work environment		
3.1	Lighting		
3.2	Ventilation		
4.	Waste disposal		
4.1	How to disposal of sputum containers		
4.2	How to disposal of lab wastes		

إقرار

لقد قرأت الاسئلة الموجودة بالاستبيان أو تم قراءتها لي وقد أتحت لي الفرصة لطرح الأسئلة حول هذا الموضوع ولقد تمت الإجابة على أي أسئلة طرحتها بإرتياح، وأفق طوعا للمشاركة كمشارك في هذا البحث.

إسم المشارك: _____ التاريخ _____

توقيع المشارك: _____

إسم الشاهد: _____ التاريخ _____

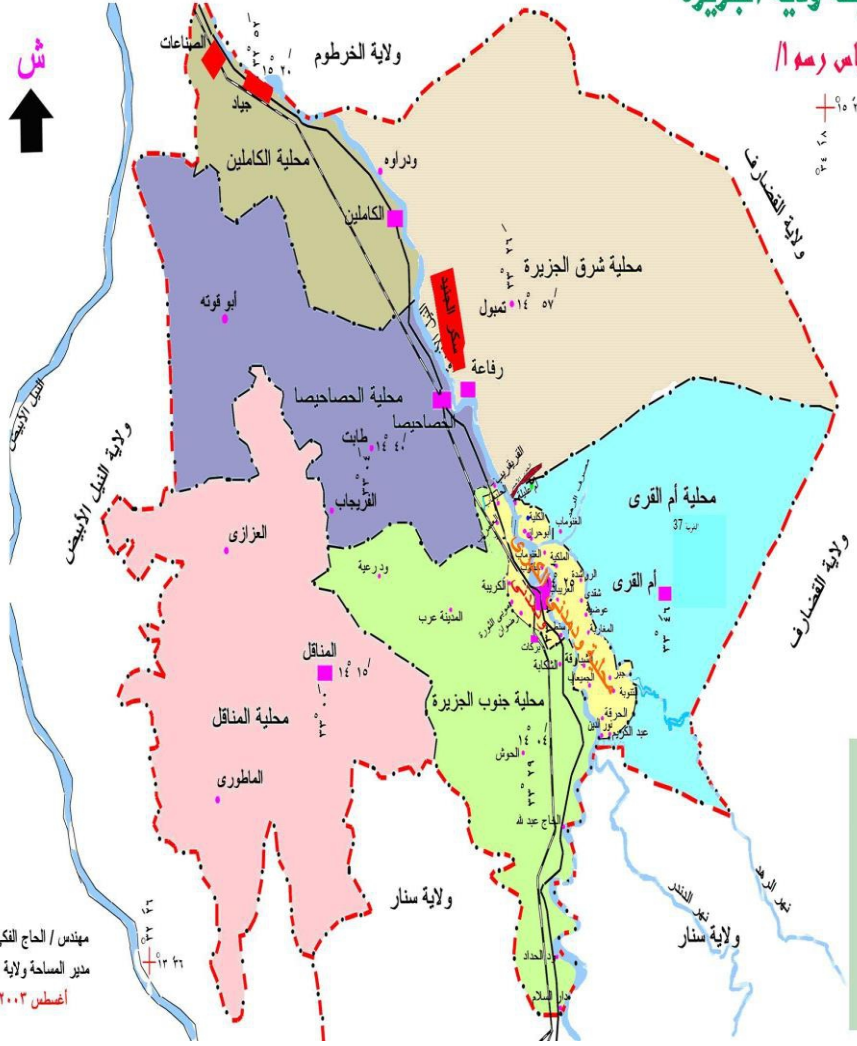
توقيع الشاهد _____

إسم الباحث: _____ التاريخ _____

توقيع الباحث _____

خريطة ولاية الجزيرة

مقياس رسم 1/



مهندس / الحاج الفكي يوسف
مدير المساحة ولاية الجزيرة
أغسطس ٢٠٠٣م