# 

# Faculty of health science

# Department: medical laboratory science

# “Effects of toxoplasma on pregnant women in the Guriel distract ”

# SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE IN MEDECAL LABOROTORY SCIENCE

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# CHAPTER ONE

# INTRODUCTION

## 1.0 INTRODUCTION

Section one represent research background, Section two investigate statement of the problem, section three state research objectives , Section four prepare research questions, section five exhibit significant of the study, Section six is working definition, section seven will research scope of the study and limitation, then making conclusion .

## 1.1 RESEARCH BACK GROUND

Toxoplasmosis Worldwide distribution in human populations infecting prevalence of toxoplasmosis is due to a preference for Up to one third of global population (approx yb.500 million) eating undercooked or raw meat; whereas it’s And a wide range of other mammalian & avian species. Prevalence in Central America is due to a large number it is a major health problem, with a high socio- of stray cats in a climate favorable for survival of Economic impact in terms of human suffering including Oocysts (Biswaranjan, 2010)**.**

Toxoplasmo Gondiioccurs throughout the world. This organism is especially prevalent in warm, humid climates, but significant numbers of animals and humans have been exposed even in very cold regions such as the Arctic (medici, 2017).

Toxoplasmo Gondii infection is widespread in humans although its prevalence varies widely from place to place and it is estimated that up to fifty million people worldwide are infected. Abortion and fever due to unknown causes were observe in Tendalty hospital record during the last years cover a period of June 2015 to January 2016 to determine the prevalence of toxoplasmosis among pregnant women attending to Tendalty hospital for delivery, White Nile State, Sudan from June 2015 to January 2016 (Tamomh, 2016).

So there is a large variation between countries, for example in France, the prevalence rate lies at 88%, and in Germany, the Netherlands and Brazil, prevalence rates are around 80%, over 80% and 67% respectively. In Britain about 22% are carriers, and South Korea’s rate is 4.3%. In Africa Toxoplasmosis has long been reported to be widespread in West Africa In sub-Saharan Africa, toxoplasmosis often remains undetected and untreated due to insufficient diagnostic procedures.

Several studies have shown a consistently high *T. G ondii*-prevalence for this region, ranging from 35% to 84% in different African countries south of Sahara Considering that around 30–50% of those confected with HIV and *T. Gondii* are expected to ultimately develop toxoplasmosis, the high prevalence combined with the HIV-pandemic indicate that 2.5–10 million people in this region may be at risk dying from toxoplasmosis (Ali & others, PREVALENCE OF TOXOPLASMA GONDII AMONG MISCARRIAGE WOMEN IN BANADIR REGIO, 2016).

## 1.2 STATEMENT PROBLEM

Toxoplasmosis is common infection in pregnant women that is usually harmless that risk the infection could cause miscarriage , still birth impaired cognitive development if problem do develop they are to be more serious.Toxoplasmosis is the one of the challenges that exists in the Galgadud region particularlyIn Guriel distract.

Somalia health indicators are among the worst in the entire world and are a reflection of the chronic conflict that has affected the country for the last 20 years. In the Absence of functioning governmental institutions, multinationals organizations and Bilateral NGOs has provided most of the support to the health system over this time.

This condition needs a raped solution by all the stakeholders including health institutions, partners, and ministry of health. If this problem remains it will bring bad consequences. Most mothers complain the effect of toxoplasmosis in pregnant women, It effects the pregnant women, and may cause abortion It affects the pregnant women when the mother eats a contaminated plate That a cat salivates, and then the infection transmitted in the blood stream and tissues.

# 1.3 Research Objectives

## 1.3.1 General objectives

To find out effects of Toxoplasmo Gondii among miscarriage women in Guriel Region.

## 1.3.2 Specific objectives

* To determine how toxoplasmosis effects on pregnant women.
* To clarify the role cats play in the spread of toxoplasmosis.
* To determine how stages occur that transmits the mother to the fetus.

## 1.4 Researcher Question

- How toxoplasmosis effects on pregnant women?

- What role cats play in the spread of toxoplasmosis?

- How occur stages that transmit the mother to the fetus. ?

# 1.5 Significant of the study

The results of this study are useful to provide information about effect and associated risk factors of toxoplasmo Gondii among miscarriage women in Guriel region. If central government, Gulmudug state and local NGOs cooperate to reduce the effects of toxoplasmosis on pregnant women, people awareness to avoid factors that brings increase affected toxoplasmosis.

The information obtained from the study may also be useful in giving an estimate of the prevalence among miscarriage women thus it is helpful for the future researchers as a base. its findings may contribute literature that maybe used by the academicians that are interesting to carry out for further study in this field and to help anyone who will conduct research about anemia including students.

The findings and conclusions of this thesis should be useful for community health workers who Work in hospitals. The research will benefit the Health sector through providing information on the Determinants of Toxoplasmosis related of knowledge attitudes among high school students the research will also provide the much needed information for policy formulation and systems amplification.

1.6 Scope of the study.

This study of Toxoplasma Gondi on pregnant women only be in Galgadud particularly Guriel region.

## 1.7 Limitations of the study.

* Lack sufficient library and reference books.
* Low quality of laboratories in Guriel region.
* Insufficient hospitals where that the researcher can get from exact data.

## 1.8 operational definitions

## Toxoplasmosis

Toxoplasmosis is one of most important worldwide Zoonotic disease caused by the obligate Intracellular, protozoan parasite known as Toxoplasma Gondii.(Jilo & Adem, 2016).

Toxoplasma Gondii is an intracellular parasite able to cross the placental barrier and known to infect Foetal tissues leading to abortions and congenital deformities.(Ali & others, 2016).

**1.8.1 Work definition**

Toxoplasma Gondii is an intracellular parasite able to cross the placental barrier and known to infect foetal tissues leading to abortions and congenital deformities.

# 

# Chapter two

## 2.0 Interdiction

This chapter contains CONCEPTS, OPINIONS, OR IDEAS FROM AUTHORS/ EXPERTS, and Theoretical / Conceptual/Applications Perspectives.

## 2.1 CONCEPTS, OPINIONS, OR IDEAS FROM AUTHORS/ EXPERTS.

## 2.1.1 Definition of toxoplasmosis

Toxoplasmosis is an important cause of miscarriage or adverse fetal effects such as neurological and ocular diseases and may also lead to late sequelae in the life of the infected newborn. Toxoplasmosis prevalence varies among adult individuals depending on the studied population and on the age of the individuals.

These variations occur due to the difference of exposure to the main sources of infection which are: soil, water or food contaminated with feces from infected cats that contain T. Gondii Oocysts; or raw or uncooked meat that contain bradyzoit cysts. The ubiquity of the infection source and the differential exposure of the individuals to it due to cultural and hygienic habits, may explain why the prevalence of toxoplasmosis is extremely variable between countries and even within different regions of the same country.

Toxoplasmosis one of the major causes of food borne death in the United States is toxoplasmosis. It also represents an annual cost of illness around $3 billion in the same country.The large variability of the toxoplasmosis prevalence described by the literature from studies performed in different regions characterizes the great regional variability of the incidence of this disease and also the specific characteristics of each studied population. (da Silva, Vinaud, & Castro, 2015).

The history and general Toxoplasma Gondii (T. Gondii) (Toxon=”bow” in Greek, plasma=creature, Gondii=the African rodent “Gundi”) is a protozoan parasite that can infect all warm-blooded animals, including humans. The parasite was first described by Laveran in 1900 and was found in the liver and spleen of North African rodents (Ctenodactylus gundi) by Nicolle and Manceaux in 1908.

The same year Splendore described the organism in rabbit tissue and Darling described the first case in humans. In 1923 parasitic cysts were found on the retina in an 11-month-old child with congenital hydrocephaly and micropthalmia, described by the ophthalmologist Janku. Levaditi suggested a possible connection between congenital hydrocephaly and the parasite and was among the first to report that tissue cysts persist for months. Kean et al.

Were probably the first to describe congenital toxoplasmo infection and in 1939 infection with T. gondii was established as a prenatal transmitted disease. In 1942, Sabin described the characteristic symptoms and signs of congenital toxoplasmosis; the classic tetrad with chorioretinitis, hydrocephaly, convulsions and intracerebral calcifications.

Sulphonamides were discovered to have antitoxoplasma effect in mice in 1942. In 1952 pyrimethamine was shown to protect mice from infection. The drugs were observed to act synergistically. In 1958 the macrolide spiramycin was found to have an ant parasitic effect. Sabin and Feldman originated a serologic test, the dye test, in 1948 to diagnose acute toxoplasma infections.

In 1969 the life cycle of the parasite was reported and the cat was found to be the definitive host. The first case of congenital Toxoplasmo infection in Sweden was reported in 1947, in Denmark in 1948 and in Norway by Standal and Kåss in 1952 (16-18). During the seventies, Stray-Pedersen conducted studies on Toxoplasma infection in pregnancy and infancy; and during the nineties Jenum did his research on diagnosis and epidemiology of T. Gondii among Pregnant women in Norway.(Oslo, 2017).

Toxoplasmosis is one of the most frequent zoonoses in the world. It is caused by Toxoplasmo Gondii, an obligate intracellular protozoan parasite infecting man and almost all warm-blooded animals. Infection is mainly acquired via oral, by consumption of raw and undercooked meat containing tissue cysts and ingestion of water and food contaminated with oocysts, or by transplacental passage of Tachyzoites.

Nearly one third of humanity carries the parasite, but most of infections remain asymptomatic . However, severe symptoms may occur via acute infection or reactivation of latent infections among people with acquired immunodeficiency syndrome or under other immunosuppressive

Condition. Congenital transmission is associated with abortions or major fetal lesions including malformation, blindness, deafness, mental retardation, hydrocephalus and other neurological sequels. (MOHAMMED, ZAGLOOL, KHODARI, & AL-HARTHI1, 2016).

## 2.0 Effect on pregnancy.

Infection with *Toxoplasmo Gondii* before pregnancy confers little or no risk to the fetus except in women who become infected up to 3 months before conception.

9, 10 in the neonate, manifestations of congenital toxoplasmosis might include hydrocephalus, microcephaly, intracranial calcifications, retinochoroiditis, strabismus, blindness,

epilepsy, psychomotor and mental retardation, petechiae due to thrombocytopenia, and anemia.11, 12 While infection in early pregnancy poses a small risk of fetal transmission (less than 6%), rates of transmission range between 60% and 81% in the third trimester.

Conversely, although the transmission of *Toxsoplaso Gondii* during embryogenesis is rare, it results in far more serious effects on the fetus.14 In contrast; maternal infection in the third trimester often results in asymptomatic newborns. However, if not treated appropriately, these newborns might develop retinochoroiditis and neurologic deficits in childhood or early adulthood.14-16 There is no evidence of *Toxoplasmo Gondii* transmission through breastfeeding or via direct human-to-human contact.(Chaudhry & Gideon, 2014).

## 2.1. Effect on pregnancy.

The frequency of primary maternal Toxoplasma infection depends on the proportion of

Seronegative pregnant women who are susceptible to infection and on the prevailing infection risk. After primary infection, lifelong immunity develops, which can be demonstrated by the presence of Toxoplasma immunoglobulin G (IgG).

The prevalence of Toxoplasma IgG in women of fertile age indicates indirectly the general susceptibility to infection in the pregnant population as a whole. Knowledge of the prevalence is important because preventive guidelines are most often based on this information.(Oslo, Toxoplasma infection among pregnant women in Norway susceptibility, diagnosis and follow-up, 2017).

## 2.1.2. Incubation Period

The incubation period in animals is probably similar to the 5-23 day incubation period in humans. Experimentally infected kittens developed diarrhea 5-6 days after inoculation. Reactivation can occur years after an animal was infected.(university, 2017).

## 2.1.3 Transmission of toxoplasmosis

Two main routes of transmission have been described in humans: - By oral ingestion of the parasite and through placental transmission to the fetus. The organism is horizontally transmitted to humans by accidental ingestion of water, food, or soil contaminated with T. Gondii oocysts or consumption of meat containing Toxoplasmo Gondii cysts that is eaten raw or undercooked.

Toxoplasmo Gondii can be vertically transmitted to the fetus during pregnancy and may cause a wide range of clinical manifestations in the offspring depending on the gestational age at which the primary maternal infection was acquired, the virulence of the parasite, and the immunologic development of the fetus. T. gondii is a tissue-cyst-forming coccidium functioning in a prey-predator system that alternates between definitive (sexual reproduction) and intermediate (asexual replication) hosts.

It is unique among this group because it can be transmitted not only between intermediate and definitive hosts (sexual cycle) but also between intermediate hosts via carnivorism (asexual cycle) or even between definitive hosts. The parts of the sexual and asexual cycles and transmission dynamics in a given environment vary according to physical characteristics and according to the structures.

Following ingestion of the tissue cyst or oocyst form by humans, gastric digestive juices disrupt their outer cyst wall releasing infective forms, bradyzoites and sporozoites which rapidly invade intestinal enter epithelial cells. They transform to active and replicate form of tachyzoites and infect adjacent cells to reach the lymphatic and blood stream.(Tamomh & others, 2016).

The Oocysts are secreted by cats in their feces and Remain viable in the environment for more Than a year. Apart from ingestion of oocysts, carnivorous and omnivorous animals and humans may also get infection through ingestion of tissue cysts present in meat.

The main route of transmission to herbivorous animals is through ingestion of sporulated oocysts. However the infection can also be transmitted to carnivorous or omnivorous hosts via consumption of tissue cysts present in meat. Transmission of *T. Gondii* is through Food-borne, with cats playing the major role in the transmission, through faecal contamination of soil, food or water.



Figure 1.0

In animals, the risk of T. Gondii infection depends upon herd size, animal age, farm management, and hygienic conditions, Source of drinking water and presence of cats in district. Semen also contains T. Gondii but further studies are needed to know the possible transmission through this route, Contamination of pregnant women may cause serious health problems when it is transmitted congenitally from mother to offspring and may result in different complications like embryonic death, abortion, stillbirth, neonatal death or weak offspring.

## 2.1.4 Laboratory Diagnosis

For this reason early diagnosis in pregnancy is highly necessary, allowing prompt intervention in cases of infection. Prevention of human toxoplasmosis is based on care to avoid the infection, understanding the disease and serological exams during gestation. (Ali & others, 2016).

Humans can become infected by any of several routes: eating undercooked meat of animals harboring tissue cysts, consuming food or water contaminated with cat feces or by contaminated environmental samples (such as contaminated soil or changing the litter box), blood transfusion or organ transplantation and transplacentally from mother to fetus. It is assumed that approximately half of the cases of toxoplasmosis are food borne.(F & Darde, 2012) .

Over the years, several tests to detect maternal and foetal Toxoplasma infection have been developed. Infection may be detected indirectly by demonstration of antibodies or directly by demonstration of parasites (Tachyzoites or bradyzoites) in placental or foetal tissue or by demonstration of parasitic nucleic acid by polymerase change reaction (PCR) in blood, tissue or cerebrospinal fluid. Attempts to isolate the parasite are most often performed by injection,(Oslo, Toxoplasma infection among pregnant women in Norway; susceptibility, diagnosis and follow-up, 2017).

The greatest challenge in diagnosing toxoplasmosis is to establish the acute (primary) infection and distinguish it from past (chronic) infection. *Toxoplasma Gondii* infection can be diagnosed using serologic tests, ultrasound scans, mand amniocentesis. Results of serologic tests measuring

Immunoglobulin (IGM and IgG) are often difficult to interpret when differentiating between acute and chronic infections.

Following acute infection, IGM antibody titresm rise starting on day 5 and reach the maximum level at 1 m to 2 months. At this point, IGM antibodies decline more rapidly than IgG antibodies.

However, in many cases the IGM antibodies persist for years following acute infection. In contrast, IGG antibodies are usually detectable within 1 to 2 weeks after acute infection, peak within 12 weeks to 6 months, and usually remain detectable throughout life. The absence of IGG and IGM antibodies before or early in pregnancy indicates no previous infection and identifies women at risk of acquiring the infection during pregnancy.

The detection of IgG antibodies and absence of IGM antibodies indicates an old infection. However, if test results are positive for both IGG and IGM, interpretation

Is difficult, as the positive results might be owing to either a recent infection or low levels of IGM antibodies from a previous infection. If acute infection is suspected, repeat testing is recommended within 2 to 3 weeks. A 4-fold rise in IGG antibody Titre between tests indicates a

Recent OF infection.



**Figure 1.1**

(Chaudhry MD & MD FRCPC FACMT, 2014).

## 2.1.5 Treatment

Clinical cases are treated with antibiotics. Only certain drugs, such as clindamycin, trimethoprim-sulfonamide, azithromycin and pyrimethamine, used alone or in various combinations, are effective. Corticosteroids may be administered concurrently in ocular disease, to reduce inflammation. While antibiotics can suppress actively dividing parasites, they cannot destroy tissue cysts and are unlikely to completely eliminate *T. Gondii* from the body. Intensive supportive treatment may be necessary in animals with disseminated disease,(Toxoplasmosis, 2005-2017).

## 2.1.6 Healthy people (no pregnant):

Most healthy people recover from toxoplasmosis without treatment. Persons who are ill can be treated with a combination of drugs such as pyrimethamine and sulfadiazine, plus folic acid.

## 2.1.7 Pregnant women, newborns, and infants:

Pregnant women, newborns, and infants can be treated, although the parasite is not eliminated comletely. The parasites can remain within tissue cells in a less active phase; their location makes it difficult for the medication to completely eliminate them.

## 2.1.8 Persons with ocular disease:

Persons with ocular toxoplasmosis are sometimes prescribed medicine to treat active disease by their ophthalmologist. Whether or not medication is recommended depends on the size of the eye lesion, the location and the characteristics of the lesion (acute active, versus chronic not progressing).

## 2.1.9 Persons with compromised immune systems:

Persons with compromised immune systems need to be treated until they have improvement in their condition. For AIDS patients, continuation of medication for the rest of their lives may be necessary, or for as long as they are Immunosuppressed. Currently recommended drugs in the treatment of toxoplasmosis act primarily against the Tachyzoite form of Toxoplasmo Gondii.

Thus, they do not eradicate the encysted form (bradyzoite). Pyrimethamine is the most effective agent and is included in most drug regimens. Leucovorin (i.e. folinic acid) should be administered concomitantly to prevent bone marrow suppression. Unless circumstances preclude using more than 1 drug, a second drug (e.g., sulfadiazine, clindamycin) should be added. The efficacy of azithromycin, clarithromycin, Atovaquone, daps one, and cotrimoxazole is unclear; therefore, they should be used only as alternatives in combination with pyrimethamine. The most effective available therapeutic combination is pyrimethamine plus sulfadiazine or trisulfapyrimidines (e.g., a combination of sulfamerazine, sulfamethazine, and sulfapyrazine).

These agents are active against tachyzoites and are synergistic when used in combination. Careful attention to dosing regimen is necessary because it differs depending on patient variables (e.g., immune status, pregnancy). Pyrimethamine may be used with sulfonamides, quinine, and other antimalarials and with other antibiotics.

2.2No pregnant patients**:**

Immunocompetent, no pregnant patients typically do not require treatment. Treatment of no pregnant patients is described below. The 6-week regimen is as follows: • Pyrimethamine (100mg loading dose orally followed by 25-50 mg/day) plus sulfadiazine (2-4 g/day divided 4 times daily) OR

• Pyrimethamine (100-mg loading dose orally followed by 25-50 mg/day) plus clindamycin (300 mg orally 4 times daily).

• Feline acid (leucovorin) (10-25 mg/day) should be given to all patients to prevent hematologic toxicity of pyrimethamine.

• Trimethoprim (10 mg/kg/day) sulfamethoxazole (50 mg/kg/day) for 4 weeks Sulfadiazine or clindamycin can be substituted for azithromycin 500 mg daily or atovaquone 750 mg twice daily in immunocompetent patients or in patients with a history of allergy to the former drugs Consider steroids in patients with radiologic midline shift, clinical deterioration after 48 hours, or elevated intracranial pressure.

## 2.2.1 Pregnant patients:

The diagnosis of acute infection is often difficult to make during pregnancy, and the administration of empiric antimicrobial therapy is discouraged. Substantial controversy exists regarding the efficacy of treatment during pregnancy in terms of reducing the risk of fetal exposure and the subsequent development of clinical disease such as retinochoroiditis or CNS abnormalities.

Controversy also exists regarding the optimal regimen for treating maternally acquired infection. Spiramycin and pyrimethamine-sulfonamide are used, but given the infrequency of fetal infection and the asymptomatic nature of most fetal infections, treatment effects are difficult to measure. Spiramycin appears to be somewhat more easily tolerated than pyrimethamine-sulfonamide. A dosing regimen for pregnant patients is as follows: Spiramycin 1 g orally every 8 hours

• If the amniotic fluid test result for T Gondii is positive: 3 weeks of pyrimethamine (50 mg/day orally) and sulfadiazine (3 g/day orally in 2-3 divided doses) alternating with a 3-week course of spiramycin 1 g 3 times daily for maternal treatment OR

• Pyrimethamine (25 mg/day orally) and sulfadiazine (4 g/day orally) divided 2 or 4 times daily until delivery (this agent may be associated with marrow suppression and pancytopenia) AND

• Leucovorin 10-25 mg/day orally to prevent bone marrow suppression Patients with AIDS: Patients with AIDS are treated with pyrimethamine 200 mg orally initially, followed by 50-75 mg/day orally plus folinic acid 10 mg/day orally plus sulfadiazine 4-8 g/day orally for as long as 6 weeks, followed by lifelong suppressive therapy or until immune reconstitution. Suppressive therapy for patients with AIDS (CD4 count < 100 cells/μL) is pyrimethamine 50mg/day orally plus sulfadiazine 1-1.5 g/day orally plus folinic acid 10 mg/day orally for life or until immune reconstitution.

Patients with AIDS, CNS toxoplasmosis, and evidence of midline shift or increased intracranial pressure may also benefit from steroid therapy. Diagnosing toxoplasmosis in the absence of definitive tissue or culture evidence may be perilous because serology may be misleading and a false-positive IgM result is somewhat common. Consequently, empiric therapy should be avoided. (Mohammed Ha, 2018).

**Independent variables Dependent variable**

**1 Availability number of effected cats**

Toxoplasmosis

**2 Poor hygienic materials**

**3 Cooking and kitchen habits**

Variable one; Availability number of effected cats

Cats are important in the epidemiology of T. Gondii infection because they are the only hosts that can excrete the environmentally resistant oocysts. Reports on seroprevalence are of interest, because Seropositive cats are likely to have already shed T. Gondii oocysts in the environment. In addition, surveys of T. Gondii infection in free-ranging felids can provide.

Toxoplasma gondii infection is common in cats, but the clinical picture is rare. Up to 50% of cats, especially free-roaming ones, have antibodies indicating infection and the presence of cystic stages. Clinical signs usually appear when cats become immunosuppressed – in these situations, cystic stages can be reactivated. Organs commonly affected are the CNS, muscle, lungs, and eyes. Cats can pose a risk for humans when they shed oocysts.

However, this happens only once in their lifetime, usually only for three to ten days after ingestion of tissue cysts. Thus, cats that have antibodies to T. Gondii do no longer shed oocysts and neither are nor will become a risk for humans.(Katrin, 2015).

*T.Gondii* can cause severe disease in sheep, Aeration and temperature, at which time, it becomes goats, dogs, cats and various other animals causing infective. When a susceptible animal ingests abortion which is the most important clinical sporulated oocysts, the sporozoites penetrate the manifestation. It can cause foetal death, resumption or intestinal lining, become tachyzoites and establish an retention of placenta, still birth, abortion and birth of infection. weak, emaciated young in sheep, goats and pigs. (Biswaranjan, Manjit, & i Baithalu, 2010) .

## Variable two: hygienic standards:

A number of factors contribute to the transmission of the infection to humans, Hygienic conditions, are the one of the most risk factors in this parasite , The contaminated water has generally been considered uncommon; however, the widespread infection of marine mammals indicates that contaminated that may be a potential source of infection.

Recent outbreaks of toxoplasmosis linked to contaminated water supplies provide further evidence for these Oocysts can remain viable for long periods of time in water and can resist freezing and moderately high water temperatures. Toxoplasma oocysts can remain viable for extended periods of time in seawater.

Al so Contact with soil was identified as a strong risk factor in a European multicenter case-control study, and 6 to 17% of primary infections in humans were attributed to this risk factor. A U.S. study showed that the detection of antibodies against Toxoplasma was 2-fold higher in a population with positive Toxocara antibodies, suggesting a common exposure to contaminated soil.

The risk of acquiring Toxoplasma infection after soil contact or ingestion is particularly high for children. Toxoplasma oocysts were isolated in as many as 32% of school playgrounds in a Brazilian study. Contaminated water and soil may act as vehicles for the transfer of oocysts to vegetables and fruit for human.(Ali & others, “PREVALENCE OF TOXOPLASMA GONDII AMONG MISCARRIAGE WOMEN IN BANADIR REGION”, 2016).

Food borne parasites are a major public health burden worldwide, particularly in areas with poor sanitary facilities and in populations that traditionally consume raw and undercooked food dishes. It is estimated that over billion people are currently infected by food borne parasites that may be transmitted by food. Infections may have prolonged, severe, and sometimes fatal outcomes, and result in considerable hardship in terms of food safety, security, quality of life, and negative impacts on livelihood. (Japan & Canada, 2015)

Hygiene and sanitation serve an important role in disease prevention. Poor sanitation and hygiene aid in the spread of diseases mainly through the faeco-oral route and bites by vectors. Hygiene is defined as the conditions or practices conducive to maintaining health and preventing disease, especially through cleanliness.

It relies on sufficient quantities of water for cooking, bathing washing and hand washes. The simple act of washing hands at the critical times can significantly reduce the incidence of Diarrheal diseases. (imperial, 2015)

## VARIABLE THREE; Cooking and kitchen habits

There is a widespread distribution of Toxoplasma infection in a variety of livestock, wild Animals and pets. Ingestion of environmentally robust stages (sporozoites in oocysts) or eating raw or undercooked meat or meat products containing tissue stages (tachyzoites or bradyzoites in tissue cysts), are the main transmission routes for T. Gondii to humans.

Some authors assume that about 50% of all human toxoplasmosis cases are related to food borne infection and retrospective epidemiological analyses of human toxoplasmosis outbreaks suggest that many are associated with consumption of raw or undercooked meat or other edible parts of animals. Tenter et al . Estimated that the percentage of meat-borne cases was approximately 30% to 63%, depending on eating habits.(Fernández, Gracia, zaro, & Arquillu, 2012).

## Variable four toxoplasmosis

Toxoplasma Gondii tachyzoites are disseminated throughout the body of the intermediate host in macrophages and lymphocytes as well as free in the plasma. Tachyzoites continue to divide within the host cell by endodyogeny (internal division into two) until the host cell is ﬁlled with parasites. At a given time the dividing tachyzoites cannot be contained within the host cell, which bursts. The tachyzoites are released and seek new host cells to repeat the process.

Depending on the strain of T. Gondii and the host resistance, tachyzoites may be found for days or even months after acute infection. For example, tachyzoites persist in foetal membranes for weeks after infection of the mother or the dam, and are nearly always present in placentas of mothers at the time of parturition, if the foetus was infected in utero.(Mohammed Ha, TOXOPLASMOSIS OVERVIEW, 2018).

# Chapter three

## 3.0 Interdiction

This section contains, research design, research population, sample size, sample procedure, research instrument, validity and reliability of instrument, date collection procedure, date analysis technique, Ethical consideration, limitation of the study, conclusion.

## 3.1 Research design

The study will be conducted between March and July 2019 in Guriel district. It was community based cross sectional done. This means that the sample was taking form the target population and information was obtained at the same time on particular point in time. Cross sectional study design was used in this study.

In this study the researcher will conduct through descriptive research design to investigate effect of the toxoplasmosis on pregnant women.

Research design is the arrangement of conditions for collection and analysis of

Data in a manner that aims to combine relevance to the research purpose with economy in procedure (former principle, 2004)**.**

**Descriptive research** .Sometimes an individual wants to know something about a group of people. Maybe the individual is a would-be senator and wants to know who they're representing or a surveyor who is looking to see if there is a need for a mental health program.

The researchers choose descriptive because Descriptive research may be a pre-cursor to future research because it can be helpful in identifying variables that can be tested.

## 3.2 Research population

According to target population refers to all members of a real set of people for this study (Ali, 2016).

Although accurate statistics of population size in Guriel district is not available because there is no effective working local authority in this district right now. Thus the researchers adapted the target population that most literatures adapted (120-50 individuals) in this study the researchers adapted 100 individuals as target population of this study as shown in the below table.

**Table 1: Target population distribution**

|  |  |  |  |
| --- | --- | --- | --- |
| No. | **Respondents** | **Target population** | **Sample size** |
|  | | Effected Women | 33 | 30 |
|  | | Health workers | 33 | 20 |
|  | | MCHs | 34 | 30 |
| **Total** | | **100** | **80** |

## 3.2.1 Sample size

To determine the sample size from the target population of the study, the researchers used **Slovene’s formula.**

Where **n**= sample size, **N=** target population, **100** and e = margin of error of 0.05

***n*=80.**

## 3.2.2 Sample procedure

The researcher used simple random sampling and all the respondents will have an equal chance to participate when responding the question being asked.

## 3.3Research instrument

Questionnaire method has been used for data collection. this questionnaire was easy to analyze since it was in immediate usable form they was easier to administer because each item is followed by alternative answer and it was economical to use in items of times and money on the other hand it was more difficult to construct because categories must be well throughout and response was limited

The study will use mainly primary data and secondary data. Primary will be collect by using questionnaire. Questionnaire is the easiest method which data collects from the respondents. Questionnaire is a data collection instrument consistant of a series of questions and other prompts for the purpose of gathering information from respondents.

## 3.4 Validity and reliability of the instrument

Two of the most important aspects of the research and data occurrences are validity and reliability of the data. The issue of validity and reliability is one important part that is value to be considered when selecting research design. Thus the study should have to be aware of pressure of reliability and validity of the result in this study.

Defined reliability as the degree to which data collection techniques will yield consistent findings. To increase reliability, the study adapted relevant questionnaire and slightly modified. While Validity refers to the extent to which data collection method accurately measures what it was intended to measure or to the extent to which research findings are about what they are claimed to be about. To ensure the validity of the instrument, it will be given to experts to evaluate the relevance of each item in the instruments to the purpose of this study. So the next section will point out the procedure of data collection.

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In this study the researcher will employ Statistical Package for Social Science (SPSS) version 16 to be processed and analyzed the data collected from the designed questionnaires. SPSS is a suitable for this research Because SPSS can summarize and present data in form of number and percentage.

## 3.6 ethical considerations

All residents that look part in this study have been explained for them to fill the questionnaire, all data collected from respondent was kept confidentiality maximum privacy was being maintained

* Every respondent was asked about permition to complete the questionnaire
* More explanation is given before respondent of questionnaire.
* Confidentiality of the secret information has the high priority freedom to participate the study.
* The researcher will think about the ethical issues throughout research project and will keep the privacy and confident his respondentsiality of the respondents from the public.
* The undisclosed information will stay confidential.
* Good explanation of the respondents was done before filling the questionnaire

**3.7 Limitations of the study.**

* Lack sufficient library and reference books.
* Low quality of laboratories in Guriel region.
* Insufficient records where that the researcher can get from exact data.

# Chapter four

# Data analysis and representation

## 4.0 introductions

The researchers were investigate the topic about effects of toxoplasmo on pregnant women in Guriel distract, the researchers adapted sample size about 80 responders, also used instrument questioner, and data analyst choose the spss version 16, and also this chapter contain interdiction , Demographic data, Data presentation and Analysis, major findings ,and discussion.

## 4.1 Demography analysis

## 4.1.1 Classification responders according Gender responders

|  |  |  |
| --- | --- | --- |
| Category | Frequency | Percent |
| Male | 42 | 52.6 |
| Female | 38 | 47.4 |
| Total | 80 | 100.0 |
|  |  |  |

The above table shows the number of male about (53%) and female number about (47%) the frequency shows exceed males than females.

## 4.1.2 Classification responders according Marital Status responders

The below table shows the number of male about (50%) while the female are about (45%) the male responders are more than female responders**.**

|  |  |  |
| --- | --- | --- |
| Category | Frequency | Percent |
| Male | 40 | 50.0 |
| Female | 36 | 45.0 |
| Widow or divorced | 4 | 5.0 |
| Total | 80 | 100.0 |

## 4.1.3 Classification responders according Age responders

|  |  |  |
| --- | --- | --- |
| Category | Frequency | Percent |
| 20 - 25 years | 33 | 41.2 |
| 26-31 years | 23 | 28.8 |
| 32-37 years | 18 | 22.5 |
| 38-43 years | 4 | 5.0 |
| Above 43 years | 2 | 2.5 |

The above table shows the frequency of 20 - 25 years about (41.2%), the number of 26-31 years about (28.8%), the number 32-37 years responders about (22.5%), the number of the 38-43 years responders about (5.0%),and Above 43 years responders contribute about (2.5%).

## 4.1.4 Classification responders according Educational Level responders

|  |  |  |
| --- | --- | --- |
| **Category** | **Frequency** | **Percent** |
| Secondary level | 3 | 3.8 |
| Diploma level | 11 | 13.8 |
| Bachelor Degree | 65 | 81.2 |
| Master Holder | 1 | 1.2 |

**The above table shows the number of** Secondary level about (3.8%),the number of Diploma level are about (13.8%),the frequency of Bachelor Degree about (81.2%),while The number of Master Holder responders is (1%),

## 4.2.5 Classification responders according Occupation responders

|  |  |  |
| --- | --- | --- |
| **Category** | **Frequency** | **Percent** |
| Doctors | 6 | 7.5 |
| Nurse | 30 | 37.5 |
| Midwifery | 13 | 16.2 |
| Service user | 2 | 2.5 |
| Other | 29 | 36.2 |

The above table shows the number of doctors about (7.5%), the number of nurse are about (37.5%), the number of Midwifery responders are about (16.2%), while the number of Service user about (2.5%), and other number about (36.2%).

## 4.2 classification responders according independent variable

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Variables | N | Mean | std | Responders | Interpretation |
|  | increase number of the effected cats can spread toxoplasmosis on the environment | 80 | 3.71 | 1.478 | Agree | Low |
|  | If you have the effected cats, it can cause toxoplasmosis. |  | 3.54 | 1.211 | agree | Low |
|  | Cats Only host that can transmit toxoplasmosis to the human. |  | 3.19 | 1.192 | Neutral | Moderate |
|  | Vaccine and treat all your cats to reduce the number of effected cats. |  | 3.61 | 1.217 | Agree | Low |
|  | Make the specific place and plates the effected cats. |  | 3.67 | 1.123 | Agree | Low |
|  | to not be effected avoid unwashed vegetables and fruit |  | 3.32 | 1.421 | neutral | Moderate |
|  | Contaminated water with faces cat that can causes toxoplasmosis. |  | 3.48 | 1.283 | Agree | Low |
|  | Poor hygienic is the most common cause of toxoplasmosis. |  | 3.22 | 1.263 | Neutral | Moderate |
|  | Development hygienic standards are one of the ways that reduces toxoplasmosis. |  | 3.46 | 1.272 | Agree | Low |
|  | To decrease toxoplasmosis clean your hands and wear gloves. |  | 3.34 | 1.350 | neutral | Moderate |
|  | Pregnant women should wear gloves when they are gardening or touching soil or sand, because of the possible presence of cat feces |  | 3.62 | 1.095 | Agree | Low |
|  | Pregnant women should be encouraged to keep their cats inside and not to adopt or handle stray cats. |  | 3.55 | 1.190 | Agree | Low |
|  | To avoid toxoplasmosis If you are handling litter trays, wash gloves and hands thoroughly afterwards. |  | 3.40 | 1.121 | Agree | Low |
|  | Wash hands, chopping boards and utensils thoroughly after preparing raw meat. |  | 3.51 | 1.180 | Agree | Low |
|  | Wash all fruit and vegetables thoroughly before cooking/eating to remove all traces of soil |  | 3.57 | 1.251 | Agree | Low |
|  | **Mean index** |  | 3.2 | 1.2 | Neutral | Low |

The above table shows When the in investigated the verge of effect of toxoplasmo responders mean are agree (3.2), while STD responders are low.

**4.3 Classification responders according dependent variable .**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Variables | N | Mean | Std | Responders | Interpretation |
|  | To reduce toxoplasmosis Remove faces from cat litter tray every day wearing rubber gloves (or ask someone else do this), scald trays regularly with boiling water. |  | 3.42 | 1.230 | Agree | Low |
|  | The family should not be give cats raw or undercooked meat. |  | 3.37 | 1.316 | Neutral | Moderate |
|  | The mother may feel severe cramps |  | 3.47 | 1.292 | Agree | Low |
|  | The Mother may feel Pain in your back or abdomen. |  | 3.98 | 1.091 | Strongly agree | Very low |
|  | The main sign of miscarriage is vaginal spotting or bleeding. |  | 3.84 | 1.141 | Strongly agree | Very low |
|  | Toxoplasmosis infection can be passed to a developing baby if the mother becomes infected while pregnant. |  | 3.45 | 1.242 | Agree | Low |
|  | The infection spreads to the developing baby across the placenta. |  | 3.63 | 1.140 | Agree | Low |
|  | Infection of the developing baby can cause serious problems. |  | 3.49 | 1.125 | Agree | Low |
|  | Up to half babies who become infected with toxoplasmosis during the pregnancy are born early (prematurely). |  | 3.32 | 1.028 | Neutral | Moderate |
|  | If not treated, most children with this infection develop problems in their teens. |  | 3.55 | 1.252 | Agree | Low |
|  | Fetuses infected earlier in gestation generally have more severe disease. |  | 3.76 | 1.094 | Agree | Low |
|  | Premature infants with toxoplasmosis may develop CNS and ocular disease in the first three months of life. |  | 3.90 | 1.132 | Agree | Low |
|  | Congenital toxoplasmosis is almost exclusively due to a primary maternal infection during pregnancy. |  | 3.43 | 1.117 | Agree | Low |
|  | The rate of transmission to the fetus is higher in women infected later during pregnancy. |  | 3.64 | 1.139 | Agree | Low |
|  | The women infected during pregnancy will have a congenitally infected child. |  | 3.66 | 1.169 | Agree | Low |
|  | **Mean index** |  | **3.59** | **1.1** | **AGREE** | **LOW** |

The above table shows when the checkups the verge of effect of toxoplasmo on pregnant women responders mean are agree (3.59), while STD responders are low.

## 4.3.1Correlation

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | Miscarriage | Malformation Baby | Congenital Disease |
| Miscarriage | 1 |  |  |
| Malformation Baby | .002  .317\*\* | 1 |  |
| Congenital Disease | .010  .262\*\* | .000  .425\*\* | 1 |

\*\*. Correlation is significant at the 0.01 level (1-tailed).

* The above table shows the relationship between miscarriage and malformation as symptom of the miscarriage women

**(p=317\*\*, R=.002),** Which means in their correlation significant is ( R≤0.05).

* The above table shows the relationship between miscarriage and congenital disease as symptom of the miscarriage women

**(p=.262\*\*R=.010),** Which means in their correlation significant is (R≤0.05).

* The above table shows the relationship between Malformation Baby and congenital disease as symptom of the miscarriage women

**(p= .425\*\*R=.000),** which means in their correlation significant is **(R≤0.05).**

## 

## 4.2.4 Reliability Statistics

The reliability test analysis the internal consistence of the variable of the study to test it is acceptance to generalization and further investigation .the flow table shows the reliability test of this research work.

|  |  |  |  |
| --- | --- | --- | --- |
| No | Variable | Number of items | Cronbach's Alpha |
|  | Effected cats | 5 | .756 |
|  | Hygienic standers | 7 | .855 |
|  | Cooking and kitchen habits | 5 | .939 |
|  | Miscarriage | 3 | .714 |
|  | Malformation baby | 7 | .595 |
|  | Congenital disease | 3 | .585 |

The above table shows that all variable of this study are internally consistence with cronbech, s Alpha of (7) which means all the variable of the study are accepted and can be generalized and can be studied in further investigation**.**

## 4.4 Research major Findings

The researchers was investigate **“effects of toxoplasmo on pregnant women”** the main objectives of the study wasto find out effects of toxoplasmo gondii among miscarriage women in Guriel Region, to get healthily mothers to maintain and keep the wellbeing of the environment, the effects of Toxoplasmo on pregnant women in Guriel distract the researchers obtained many mothers that suffering from it

**The first objective** was to determine how toxoplasmosis effects on pregnant women. When acquired during pregnancy, toxoplasmosis often goes unrecognized in the mother, but it can produce a severe congenital infection with ocular and neurologic damage to the infant. Up to 38% of women in the United States have immunity against *T. gondii*[1](https://www.glowm.com/section_view/heading/Toxoplasmosis%20in%20Pregnancy/item/187#r1) from a prior infection.

**Second objective** the determine how stages occur that transmits the mother to the fetus, The researchers obtained the transitions of toxoplasmosis are two main routes of transmission have been described in humans: - By oral ingestion of the parasite and through placental transmission to the fetus. The organism is horizontally transmitted to humans by accidental ingestion of water, food, or soil contaminated with T. gondii oocysts or consumption of meat containing T. gondii cysts that is eaten raw or undercooked.

**Three objective** To clarify the role cats play in the spread of toxoplasmosis, the cats is the most one that can spread adverse of Toxoplasmo ,The researchers was obtain the Increase number of cats can spread the toxoplasmosis, the researchers know Worldwide distribution in human populations infecting prevalence of toxoplasmosis is due to a preference for Up to one third of global population (approx.500 million) eating undercooked or raw meat; whereas it’s And a wide range of other mammalian & avian species.

The researchers funded the prevention risk of toxoplasmosis and other infections from food, Cook food to safe temperatures. A food thermometer should be used to measure the internal temperature of cooked meat. Color is not a reliable indicator that meat has been cooked to a temperature high enough to kill harmful pathogens like Toxoplasmo. Do not sample meat until it is cooked.

The researchers know the correlation of the study was the relationship between miscarriage and malformation as symptom of the miscarriage women **(p=317\*\*, R=.002),** Which means in their correlation significant is ( R≤0.05), the relationship between miscarriage and congenital disease as symptom of the miscarriage women was **(p=.262\*\*R=.010),** Which means in their correlation significant is (R≤0.05),and also the relationship between Malformation Baby and congenital disease as symptom of the miscarriage women was **(p= .425\*\*R=.000),** which means in their correlation significant is **(R≤0.05).**

The researchers find out all variable of this study are internally consistence with cronbech, s Alpha of (7) which means all the variable of the study are accepted and can be generalized and can be studied in further investigation**.**

## 4.5 Research Discussion

**Demography analysis** is the number of male about (53%) and female number about (47%) the frequency shows of the Demography analysis is exceed males than females.

**Marital Status responders Analysis is** the number of male about (50%) while the female are about (45%) when sees the measures the male responders are more than female responders**.**

**Age responders Analysis** the frequency of the responders is 20 - 25 years about (41.2%), the number of 26-31 years about (28.8%), the number 32-37 years responders about (22.5%), the number of the 38-43 years responders about (5.0%),and Above 43 years responders contribute about (2.5%).

**Educational Level responders Analysis**  the number of Secondary level about (3.8%),the number of Diploma level are about (13.8%),the frequency of Bachelor Degree about (81.2%),while The number of Master Holder responders is (1%),

Occupation responders Analysis the number of doctors about (7.5%), the number of nurse are about (37.5%), the number of Midwifery responders are about (16.2%), while the number of Service user about (2.5%), and other number about (36.2%).

**Effects of toxoplasmosis analysis** When the in investigated the verge of effect of toxoplsma responders mean are agree (3.2), while STD responders are low.

**Effects of toxoplasmosis on pregnant women** When the checkups the verge of effect of Toxoplasmo on pregnant women responders mean are agree (3.59), while STD responders are low.

# Chapter five

## 5.0 introductions

The chapter the researchers introduce this chapter conclusion and recommendation

## 5.1conclusion

This study the researchers investigate effects of toxoplsmo on pregnant women, that risk the infection could cause miscarriage , still birth impaired cognitive development if problem do develop they are to be more serious, this study was general objectives and three specific objectives , the general objectives is To find out effects of Toxoplasma Gondii among miscarriage women in Guriel Region, and also the first specific objectives is To determine how toxoplasmosis effects on pregnant women.

The second objectives was To clarify the role cats play in the spread of toxoplasmosis, the third objectives was determine how stages occur that transmits the mother to the fetus, Significant of the study was study is useful to provide information about effect and associated risk factors of toxoplasma Gondii among miscarriage women in Guriel region, the scope of research was This study of Toxoplasmo Gondi on pregnant women only be in Galgadud particularly Guriel region. The study was conducted between March and July 2019 in Guriel district, and also the researchers used descriptive research design to investigate effect of the toxoplasmosis on pregnant women, the target population was 100 peoples, while the sample size as 80 responders, Sample procedure The researcher used simple random sampling and all the respondents will have an equal chance to participate when responding the question being asked.

Research instrument was use Questionnaire method for data collection, Data Analysis procedure In this study the researcher was employ Statistical Package for Social Science (SPSS) version 16 to be processed and analyzed the data collected from the designed questionnaires.

## 5.2 Research Recommendation

The researchers recommended father research of toxoplasmo Gondii particular (**effects of toxoplasmo on fetus in Guriel distract** )the researchers recommending investigate the relationship between fetus and toxoplasmo, To reduce the adverse of toxoplasmosis on fetus, that can transmutes the mother in to the fetus when the mother is effected of toxoplasmo,

The researchers of this study suggest the following recommendations into the peoples who dwell Guriel distract

 Researcher’s first Recommendation is avoiding contact with cats.

 Researchers’ second recommendation is avoiding eating raw or undercooked meat or even testing food during cooking.

 Avoid eating and drinking untreated water

 a routine *T. gondii* screening program for pregnant women must be initiated in every private and public hospital.

Charts must be displayed in mother and child health centers which clearly indicate the complications caused by toxoplasmosis and suggestions to prevent its risk during pregnancy.

 It is recommended and requested for the government to educate the people about the source, transmission and preventive measures of toxoplasmosis.

 The knowledge regarding the risk factors should first be given to the health care workers, pregnant women and women at child bearing age.

 It’s recommending the pregnant woman to avoid contact with material potentially contaminated with cat feces and to avoid ingestion of raw or badly-cooked meat or sub-products. The use of gloves when handling earth is also strongly recommend.

To achieve reduce the broaden of toxoplasmosis

* Avoiding contact cats that effected toxoplasmosis.
* Clearing all crockery of the family.
* Increasing Awareness of the mortars that susceptible it.
* Good cooking meet can decrease effects of toxoplasmosis.

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# Appendix

# QUESTIONNAIRE

## Dear Respected Respondent

We are students currently undergoing Bachelor degree in Laboratory and pharmacy at **Savannah University**. We are just currying out a research paper entitled **“effect of toxoplasmosis on pregnant women in Guriel distract”**.

We are very glad to inform you that you are one of the potential respondents that wehope to seek assistance in completing the questionnaire which is designed for our graduation project. Therefore, you are kindly requested to answer and to volunteer view minutes of your time for answering the following question.

The information given here will be solely used for academic purpose and will be treated with utmost confidentiality.

Many thanks to you,

## Instruction: Please tick (√) in the box provided as you response

## Part One: Demographics:

## Gender:

## Male

## female

**Marital Status:**

1. Married
2. Single
3. Widow/divorced

**Age:**

1. 20 - 25 years
2. 26-31 years
3. 32-37 years
4. 38-43 years
5. Above 43 years

**Educational Level:**

1. Secondary level
2. Diploma level
3. Bachelor Degree
4. Master Holder
5. PhD Holder

**Occupation**

1. Doctors
2. Nurse
3. Midwifery
4. Service user
5. Other

**Part Two causes of toxoplasmosis**

**Please, tick (√) the appropriate answer**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NO** | **Statement** | **1** | **2** | **3** | **4** | **5** |
| **Effected cats** | | | | | | |
|  | .increase number of the effected cats can spread toxoplasmosis on the environment. |  |  |  |  |  |
|  | If you have the effected cats, it can cause toxoplasmosis. |  |  |  |  |  |
|  | Cats Only host that can transmit toxoplasmosis to the human. |  |  |  |  |  |
|  | Vaccine and treat all your cats to reduce the number of effected cats. |  |  |  |  |  |
|  | Make the specific place and plates the effected cats. |  |  |  |  |  |
| **hygienic standards** | | | | | | |
|  | to not be effected avoid unwashed vegetables and fruit |  |  |  |  |  |
|  | Contaminated water with faces cat that can causes toxoplasmosis. |  |  |  |  |  |
|  | Poor hygienic is the most common cause of toxoplasmosis. |  |  |  |  |  |
|  | Development hygienic standards are one of the ways that reduces toxoplasmosis. |  |  |  |  |  |
|  | To decrease toxoplasmosis clean your hands and wear gloves. |  |  |  |  |  |
|  | Pregnant women should wear gloves when they are gardening or touching soil or sand, because of the possible presence of cat feces. |  |  |  |  |  |
|  | Pregnant women should be encouraged to keep their cats inside and not to adopt or handle stray cats. |  |  |  |  |  |
| **COOKING AND KITCHEN HABITS** | | | | | | |
|  | To avoid toxoplasmosis If you are handling litter trays, wash gloves and hands thoroughly afterwards. |  |  |  |  |  |
|  | Wash hands, chopping boards and utensils thoroughly after preparing raw meat. |  |  |  |  |  |
|  | Wash all fruit and vegetables thoroughly before cooking/eating to remove all traces of soil |  |  |  |  |  |
|  | To reduce toxoplasmosis Remove faeces from cat litter tray every day wearing rubber gloves (or ask someone else do this), scald trays regularly with boiling water. |  |  |  |  |  |
|  | The family should not be give cats raw or undercooked meat. |  |  |  |  |  |

**1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree.**

**Part Three: consequence of toxoplasmosis**

**Please, tick (√) the appropriate answer**

**1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | | **Statement** | **1** | **2** | **3** | **4** | **5** |
| **Miscarriage** | | | | | | | |
|  | The mother may feel severe cramps | |  |  |  |  |  |
|  | The Mother may feel Pain in your back or abdomen. | |  |  |  |  |  |
|  | The main sign of miscarriage is vaginal spotting or bleeding. | |  |  |  |  |  |
| **Malformation baby** | | | | | | | |
|  | Toxoplasmosis infection can be passed to a developing baby if the mother becomes infected while pregnant. | |  |  |  |  |  |
|  | The infection spreads to the developing baby across the placenta. | |  |  |  |  |  |
|  | Infection of the developing baby can cause serious problems. | |  |  |  |  |  |
|  | Up to half babies who become infected with toxoplasmosis during the pregnancy are born early (prematurely). | |  |  |  |  |  |
|  | If not treated, most children with this infection develop problems in their teens. | |  |  |  |  |  |
|  | Fetuses infected earlier in gestation generally have more severe disease. | |  |  |  |  |  |
|  | Premature infants with toxoplasmosis may develop CNS and ocular disease in the first three months of life. | |  |  |  |  |  |
| Congenital disease | | | | | | | |
|  | Congenital toxoplasmosis is almost exclusively due to a primary maternal infection during pregnancy. | |  |  |  |  |  |
|  | The rate of transmission to the fetus is higher in women infected later during pregnancy. | |  |  |  |  |  |
|  | The women infected during pregnancy will have a congenitally infected child. | |  |  |  |  |  |

**Many thanks rendered to you!**