Development Of The Epidemiological Analysis Of Chlamydia Trachomatis Among Male And Female Genders In Osun State.

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Abstract— In this paper, an epidemiological study and analysis of Chlamydia trachomatis infections among the male and female gender in Osun State was presented describing the rate of change of the infections occurring among the various genders. The study was done using a system developed with SwishMAX and Xampp for control panel, while Apache HTTP server was used for the backend and MySQL for the database. PHP and Perl programming languages were used as interpreters. A localhost was connected to an FTP client with HTML as the embedded web-scripting language. The system uses both the server-side and client-side for the implementation to house the application logic layer, the database layer with a browser that is used as a handler for the presentation layer on which to run the applications. This is limited on the data collected on Chlamydia Trachomatis infections from Ladoke Akintola University of Technology Teaching hospital, Oshogbo. The implementation results are presented graphically and discussed. It was discovered that there is a fluctuation of rises occurrence among the different genders but had its peak increase in both genders in the year 2002 due to the level of awareness and changes in the method employed in the control program.

Keywords—Chlamydia Trachomatis,

Epidemiological analysis, SwishMAX Tools, Infections, Male and Female, Gender

I. INTRODUCTION

The term *Chlamydia* infection is caused by species belonging to the bacterial family *Chlamydiaceae* which from the Greek, χλαμύδα meaning "cloak" is the most common curable sexually transmitted infection (STI) worldwide [3]. *Chlamydia* an obligate intracellular bacterial pathogen infects the genital and ocular mucosa of humans causing sexually transmitted disease (STI) and Trachoma. It is an endocervical infections caused by bacterium known as "*Chlamydia Trachomatis*" which is asymptomatic in nature and may persist for months to years and the infection does not produce noticeable symptoms in 75 percent of Women and 50 percent of men, so it is an infection that often goes undiagnosed[10]. Medical experts estimated that three million (3,000,000) people become infected with chlamydia each year. According to Centers swelling, sensitivity to light, and plus a discharge that is commonly found in developing countries and when not treated, results into blindness [10].

Researchers have also discovered that in the United States each year; about three [3] million cases of sexually transmitted infections (STIs) in both men and women are caused by *Chlamydia Trachomatis* and Nongonococcal Urethritis (NGU) which is an infection of the urinary tract but. In men and women, symptoms of sexually transmitted such as *Chlamydia Trachomatis* may include a watery discharge and pain when urinating; but in women, the infection causes inflammation of the vagina, cervix, uterus, fallopian tubes, and ovaries [7]. Although women sometimes can experience vaginal discharge, fever, abdominal pain, and pain in the genital area. *Chlamydia Trachomatis* infections can be seemed in women.

However, there are no experiences of the symptoms of the infections which makes the infection remains untreated thereby developing into more serious conditions which include pelvic inflammatory disease, ectopic pregnancy, and infertility. The expectant mothers with Chlamydia infections can also transfer the infection to their babies during child birth. It can be diagnosed using cell cultures which is use in testing for the presence of Chlamydia. It can also be detected using special urine tests, a noninvasive way to check for the infection in people who show no symptoms. More recently, immunoassays are typically used for diagnosis. These blood tests identify the presence of a specific antibody formed by the body's immune system in order to fight off Chlamydia infection [6].

Furthermore, CDC suggested that all sexually active women under the age of 20 and over 20 years with risk factors, and also having multiple sex partners should receive annual screening for Chlamydia. The infections can easily be treated with antibiotics, but all sexual partners of the affected individual must be treated to prevent reinfection; latex condoms should also be used during intercourse to prevent transmitting or receiving *Chlamydia* infection. The cells of the mucous membranes which include the surfaces of the urethra, vagina, cervix and endometrium, the fallopian tubes, the anus and rectum, the lining of the eyelid and less commonly, the throat are the target of the bacteria. This can be transmitted during vaginal, anal, or oral sex and can be passed from an infected mother to her unborn baby during vaginal childbirth. Chlamydial infection of the cervix can spread to the rectum and the greater the number of sex partners, the greater the risk of infection. Also, it is known as a "silent" disease because about three quarters of infected women and about half of infected men have no noticeable symptoms. If symptoms do occur, they appear usually within 1 to 3 weeks after exposure. The sequelae of *Chlamydia Trachomatis* genital tract infections in women, namely chronic pain, pelvic inflammatory disease (PID), infertility and ectopic pregnancy are the most costly outcomes of any sexually transmitted infection except Human immunodeficiency virus (HIV/AIDS) [10].

However, research have shown that the epidemiological studies emphasize that there is a very substantial prevalence of asymptomatic or minimally symptomatic chlamydial urethral infections, especially in younger men and are of considerable importance epidemiologically, as they are usually not detected nor treated and thus can represent an important reservoir for the infection in female [21]. This can be transmitted during vaginal, anal, or oral sex, and can be passed from an infected mother to her baby during vaginal childbirth. At least half and three-quarters of all women who have chlamydia infection of the cervix (cervicitis) have no symptoms and do not know that they are infected. In men, infection of the urethra (urethritis) is usually symptomatic, causing a white discharge from the penis with or without pain on urinating (dysuria). Occasionally, the condition spreads to the upper genital tract in women (causing pelvic inflammatory disease) or to the epididymis in men (causing epididymitis). If untreated, chlamydial infections can cause serious reproductive and other health problems with both short-term and long-term consequences [6], [8].

Lower genital tract infections with Chlamydia Trachomatis are predominantly asymptomatic in men and women. Diagnostic technology has proved several approaches to the diagnosis of Chlamydia Trachomatis Most invasive specimens, such as cervical or urethral swabs may be collected for culture, antigen or nucleic acid detection while non-invasive samples such as first void urine and vaginal swabs is collected from patients which is tested by more sensitive nucleic acid amplification tests[8].

II. EPIDEMIOLOGY STRUCTURE AND METABOLISM OF CHLAMYDIA TRACHOMATIS INFECTION

The life cycle of Chlamydia Trachomatis consists of two stages which are the elementary body and reticulate body. The elementary body is the dispersal form, which is analogous to a spore and about 0.3 um in diameter; it induces its own endocytosis upon exposure to the target cells and prevents phagolysosomal fusion which allows for the intracellular survival of the bacteria also, a phagolysosome usually produces 100-1000 elementary bodies at a time. Once in contact with the endosome, the elementary body germinates into the reticulate body as a result of the glycogen that is produced which divides into binary fission at approximately 2-3 hours per generation. The cell body has an incubation period of 7-21 days in the host and contains no cell wall also an inclusion in the cell is detected. After the metamorphosis division, the reticulate body goes back to the elementary form releasing of the cell by exocytosis [24]. For metabolism, *Chlamydia trachomatis* has a glycolytic pathway and a linked tricarboxylic acid cycle where glycogen synthesis and use of glucose derivatives plays a supporting role in the metabolism. The presence of metabolic precursors and products, such as pyruvate, succinate, glycerol-3-phosphate and nicotinamide adenine dinucleotide (NADH) dehydrogenases, nicotinamide adenine dinucleotide (NADH) ubiquinone oxidoreductase and cytochrome oxidase indicate that Chlamydia Trachomatis uses a form of electron transport in order to produce energy. The replicate intracellular called an inclusion membrane is a bound structure which aids to avoid lysosomal fusion and degradation. Thus, the metabolically inactive elementary body form Chlamydia is able to become the reticulate body multiplying into reticulate bodies which later become elementary bodies again thereby bursting out of the host cell to continue the infection cycle. As obligate intracellular parasites, it cannot be cultured outside the host cells, leading to difficulties in the research of this infection [13]. The method of diagnosing *Chlamydia trachomatis* infection is usually done

through screening of the urine and cotten swab samples from the cervix or the tip of the penis. If there are swelling or discharge is present, swabs also will be taken from the throat or anus which is used to test for the bacteria; it takes about 3 days for a quick test to diagnosis the infection from the urine sample obtained from a laboratory[2].

The epidemiology of Chlamydia differs in men and women. Women experience a higher incidence and prevalence of Chlamydia infection than their men counterparts. Chlamydia infection of the neck of the womb (cervicitis) is a sexually transmitted infection which is asymptomatic (when an individual is infected but the symptoms are hidden) for about 50-70% of women are infected with the disease. Among those who have an asymptomatic infection that is not detected by their doctor, approximately half develop pelvic inflammatory disease (PID), a generic term for infection of the uterus, fallopian tubes, and/or ovaries. Pelvic inflammatory disease (PID) can cause scarring inside the reproductive organs, which can later cause serious complications, including chronic pelvic pain, difficulty in becoming pregnant, ectopic (tubal) pregnancy, and other dangerous complications of pregnancy [10] The scope of this work is to analyze and also provide the analytical performance of the effect of Chlamydia trachomatis infection system in the given population which will be limited to the data obtained from the records department of Ladoke Akintola University Teaching Hospital (LAUTECH), Oshogbo that ranges from 2002 to 2011.

III. VISION

Chlamydia Trachomatis is a deadly silent killer, been asymptomatic during the early stage of infection and since the disease is undiscovered at the early stage and deadly, it has not only brought about the reduction in the population but also, caused infertility and misery in most female and male which affects the social and economic life of the given population leading to the reduction in the productive segment. However, it is hoped that the result of this research work will provide an impetus for intervention and control of the infection which will be of great benefit to both economic and social health workers through the warning signal that would be served to the economic planners and social workers. Furthermore, it will also assist the scientists and researchers to further understand the epidemiology of *Chlamydia Trachomatis* infection, which enhance opportunities for more innovative methods that will help in setting up an in-depth strategic/techniques in reducing the spread of the infections among the populace. Hence, this work would be of immense benefit to the population at large in fighting against the menace or spread of the infection among the male and female gender in the environment.

The study aimed at determining the development of the epidemiological analysis of *chlamydia trachomatis* infection with respect to the effect among male and female genders in Osun State so as to aid in the control of the infection in the system. The objectives of this research work are to study the epidemiological review and analysis thereby leading to the implementation of the infection using Xampp server with swishmax application.

IV. REVIEW OF RELATED WORKS

Some researchers have carried out a number of studies on *Chlamydia Trachomatis* and other related diseases. Among the researchers are mathematicians, medical scientists and biologists. Those that are relevant have been explained below.

Mathematically in Wilson 2004, it extended the current description of the Chlamydial developmental cycle by reviewing the models developed and their predictions about the Chlamydial pathogenesis which led to the derivations of a simple mathematical description of the change in the interacting species equations. In Emuoyibofarhe 2015, the model was extended by describing the dynamics of *Chlamydia trachomatis* infection in a human carrier by incorporating relevant feature such as recovery through drug administration thereby deriving a model that shows the influence of burst size per infected cell, rate of cell infection and recovery rate due to drug administration is quite significant. While Turner 2004 stated in large part due to the difficulty in reaching those at highest risk, the infection is well controlled. The modelling studies demonstrate the need for accurate data to define the parameters which determine the reproductive number of the infection, namely, the transmission probability, the duration of infectiousness and the contact rate in the population. In the work, some new data were introduced and existing data were reanalyzed in novel ways in order to investigate the epidemiology of a *Chlamydia Trachomatis* infection and the results proved that realistic outputs can be achieved when empirical data are used to parameterize the mathematical models. Also, Walter 1999 describes that the sequelae of chlamydial infections are likely due to immunopathologically mediated events in which both the chlamydial 60kDa heat-protein and genetic predisposition of specific patients play a major role in the progress and problems of the infection medically while in Wariso etal 2012 describe the urgent need by the national policy on routine screening to make the treatment for *Chlamydia trachomatis* to be cheap and effective in order to the reduce the morbidity rate resulting from the delays associated in the diagnosis of the infection.

V. MATERIALS AND METHODS

Based on the above related works, the research work was carried out using a combination of consultation, observation, prototyping and critique of documented materials. Also formal concept analysis knowledge was incorporated into the work. Osun state an inland state in south-western Nigeria which is our case study was created in the year 1991 with its capital at Oshogbo. It is bounded in the North by Kwara, South by Ogun State, and East partly by Ekiti and Ondo

State while in the West by Oyo State; also has land coverage of about 9,251sqkm in area, and 240 sqkm in density. The epidemiology of *chlamydia trachomatis* infection in Osun state shows that the infections are mostly found among the pregnant women, aged people and few young males and females who undergoes the screening when other infection is discovered in them but the infection among pregnant women is mostly discovered at childbirth, cerviticus (infection of the cervix); also chlamydia trachoma (blindness) cases which is mostly among the ages of 70 and above are recorded for both men and women while infection of the urethra among the young male and female leading to low sperm count in the male gender.

The sample analysis was collected from Ladoke Akintola University of Technology (Lautech) Teaching Hospital, Oshogbo, Osun State which was a total of 666 samples collected from males with low sperm count and another 666 from normal individuals to serve as control. Also 855 blood and urine samples were collected for screening of the infection. The samples were analyzed using World Health Organization parameter of 2010 it was stained using the 1gm micro immunofluorescence assay, Giemsa technique and Polymerase Chain Reaction (PCR). From the screening results that was conducted, it was discovered that out of the 666 samples collected from individuals with low sperm count only about 417(62.6%) were positive and from the normal individuals samples, we had 255(33.3%) that are positive while the result from the 1gm micro immunofluorescence assay gave a significant difference in that we have 582(68.1%) samples becoming positive for *chlamydia trachomatis* infections. Hence, the analysis confirms that Chlamydia Trachomatis is also a major cause of low sperm count.

VI. OUR PROPOSED SYSTEM

The system was built using SwishMAX [1] which is a flash creation tool that is commonly used to create interactive and cross platform presentations and XAMPP [2] control panel which is a free and open source cross platform web server solution stack package, consisting mainly of the Apache HTTP [3] server, MySQL [4] was the database used in creating the data of the work and interpreters for scripts written in the PHP [5] and Perl Programming language [6].

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[1] http://www.swishzone.com/index.php

[2] https://www.apachefriends.org/index.html

[3] http://httpd.apache.org/

[4] https://www.mysql.com/

[5] http://php.net/

[6] https://www.perl.org/

Apache as the web server which is like Linux, PHP, and MySQL, having an open-source platform which works best with UNIX environments and runs under windows operating systems also using the third-party modules was incorporated in order to create a website Platform for testing of the data on the system without having access to the internet while security features were disabled by default once installed, and a localhost like a remote host was put in place by connecting an FTP client. Also, HTML is the embedded web-scripting language that is compatible with web servers used in this work consisting of tags enclosed in angle brackets like<html> , within the web page content and commonly used come in pairs like <h1> and </h1>, although some tags, known as empty elements are unpaired, for example <1mg>. While Php serves as the scripting language and a "glue" language, which aids in connecting the web pages to the server-side databases. The purpose of web browser is to read HTML documents and compose them into visible or audible web pages, and does not display the HTML tags, but uses the tags to interpret the content of the page. Also, the elements from the HTML form the building block of the websites which allows images and objects to be embedded and can be used to create interactive forms thereby providing a means to create a platform structured documents by denoting structural semantics for text such as headings, paragraph, lists, quotes and other items which is an embedded scripts written in java script languages. Figure1, 2, 3 and 4 for the implementation of the system and table1 displayed below shows the analysis of the infection on male and female gender from the data collected on *chlamydia trachomatis* infections from Lautech teaching hospital Oshogbo (2002- 2011).
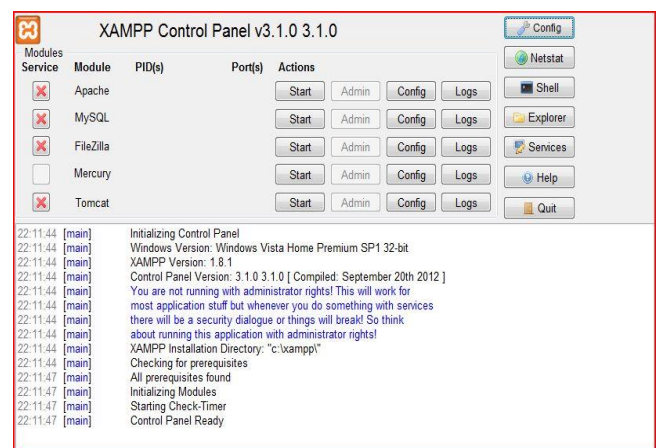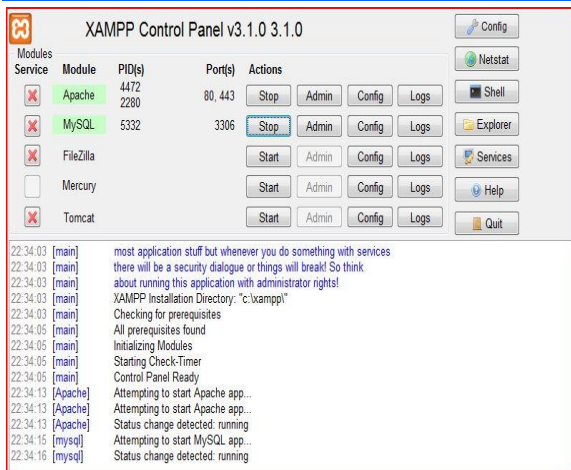

Figure1: Xampp control panel interface

Figure2: Apache and MySQL Web Servers

[1] http://php.net/

[1] https://www.perl.org/

Figure 3: Admin. Interface for Apache web server

Figure 4: MySQL interface for creating the database

Table1: Data Analysis for Chlamydia trachomatis Infected Males and Females from 2002 to 2011 (Source: Lautech Teaching Hospital, Oshogbo, 2013)

Id	Key	Males	Females	Total Infection
1	2002	37	56	93
2	2003	40	43	83
3	2004	25	30	55
4	2005	28	40	68
5	2006	20	42	62
6	2007	30	26	56
7	2008	24	26	50
8	2009	18	22	40
9	2010	17	10	27
10	2011	10	11	21

VII. METHODOLOGY

The system was developed to give the statistical result of the data with their corresponding years by analyzing the solution through the provision of a graphical profile. The system uses both the server side and client-side for the implementation to house both the application logic layer and database layer and a browser that is used as a handler for the presentation layer on which to run the applications. The system aids the user to manage the data collected on Chlamydia trachomatis infections by having a detailed insight and understanding of the infection; also requires that the data analyzed and system application be correctly established to request for collection of data through the system that is acquired, developed and installed. Analyzing the system thoroughly forms the vital part of the system study which helps to enhance access to the system. The data required, however, would have been entered into the a general purpose database management system (DBMS) which includes MySQL used as software designed system in order to allow for the system definition, creation ,querying , update, and administration of databases. Also, the system software requirements for the application were Apache version (Apache 2.0.58) (win 32) for application logic, PHP version 5.1.4, MySQL version 5.0.22-community-nt and Microsoft windows which comprises of Windows 98, Windows Me, NT, 2000, 2003 and XP operating systems while the hardware requirement are Intel Pentium II/III processor running at 400MHz -1.2GHz, 128MB RAM, Network card, SVGA Monitor and 10/100Mbps Network Interface Card

VIII. IMPLEMENTATION OF RESULTS

The illustration of *chlamydia trachomatis* infection data analysis displayed in figure 5 and 6 shows the column and multiple column charts of the various fields that were used to complete to get the desired graphical profiles of the system solution.
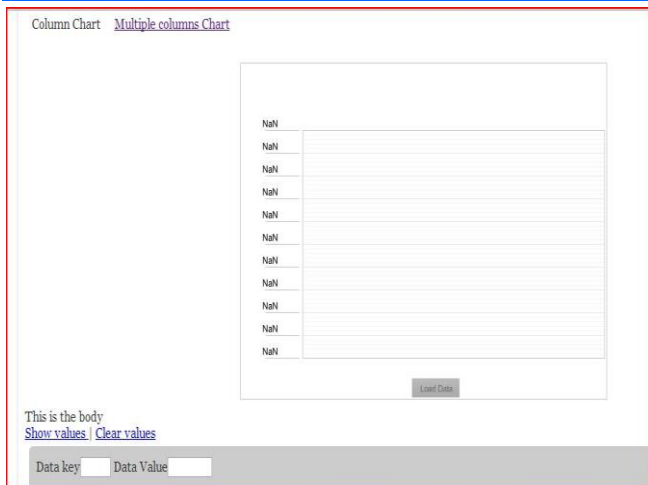
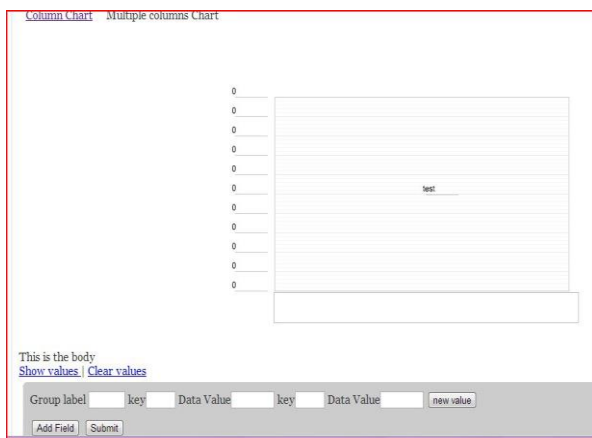Figure 5: The column chart interface

Figure 6: The multiple column chart interface

The following screen shots below displays the graphical profiles of the system solution showing the developmental analysis of the *chlamydia trachomatis* infection among the male and female genders: Figure (7) shows an increase in the number of infected males 2003 and between years 2004 to 2007 a fluctuation occur showing a decrease and increase in the number of infected males due to the rate of awareness created in those number of years while from years 2008-2011 shows a decrease in the number of male infections, Figure (8) shows that the number of infected females were fluctuation in the various years with either having a decreased or an increased state but had a peak increase in the year 2002 which was as a result of the change in the control program being employed in the different years, Figure (9) shows the difference that occurred between the number of infected males and females gender between the years of 2002 to 2006 indicated an increase among the infected females than that of their male genders but in Figure (10) the case was however different in 2007 where the number of infected males was greater than that of the infected females, later an increase occurred in 2008 to 2009 among the number of infected females than that of males due to the increase in the social workers while in 2010 the number of male infected increased than female and year 2011 had lesser male infections than female,

fluctuation in the occurrence here is to shown how significance awareness is among the various gender. Finally, From Figure (11) it shows a fluctuation of rises occurring among the different genders but had a peak increase in the year 2002 which was as a result of the level of awareness and changes in the method employed in the control program.
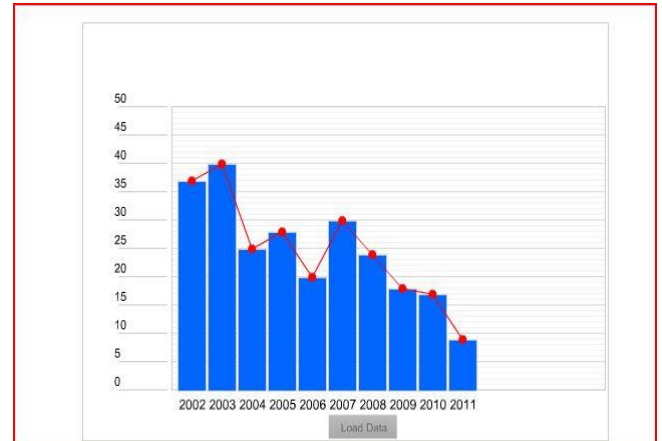

Figure 7:   Graph showing males infected with Chlamydia Trachomatis (2002-2011)
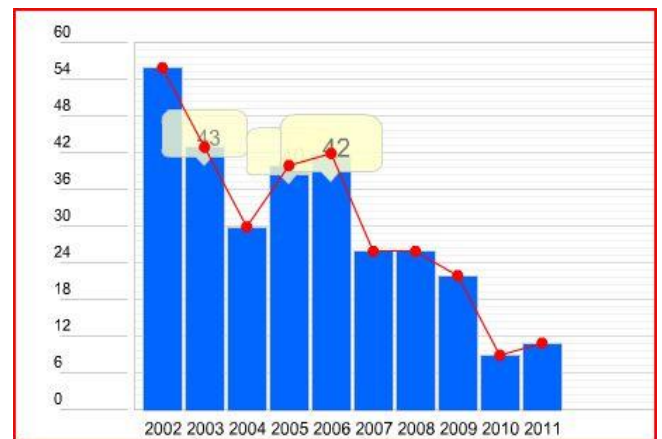

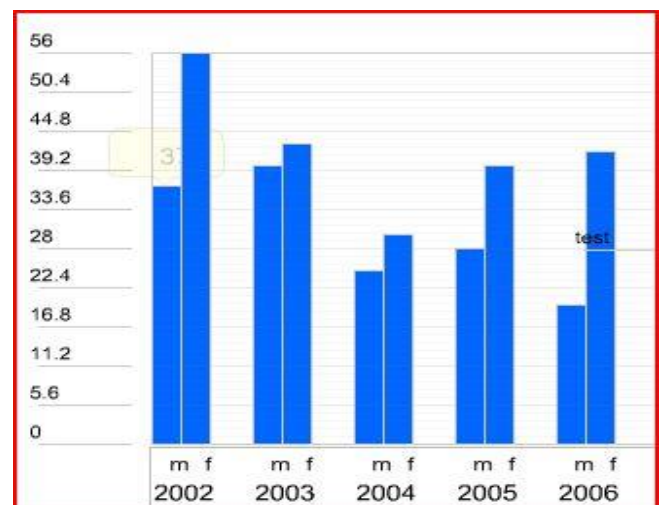Figure 8: Graph showing females infected with Chlamydia Trachomatis (2002-2011)

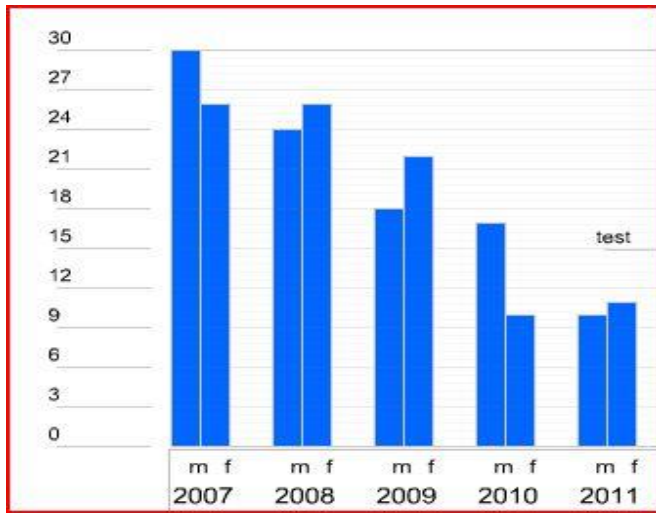Figure 9: Showing males and females with Chlamydia Trachomatis (2002-2006)

Figure10: Showing males and females with Chlamydia Trachomatis (2007-2011)

Figure 11: Graph showing total occurrences of Chlamydia trachomatis infection (2002-2011)

IX.   CONCLUSION AND RECOMMENDATION

The paper presents the epidemiological analysis of chlamydia trachomatis infection among the male and female genders in Osun State which is a platform that was created to be use to ease the problem encountered in determining the rate of occurrence of *chlamydia trachomatis* infection and the trend of the infection on the population over the number of years stated. Hence, in our understanding of the epidemiology of these infections from the research findings, we discovered that from most of the research work conducted on this infection, very little application of it, is found in Nigeria, as the infection and other related problems of chlamydial infections are now common in European countries and other part of world. Also, from the graphical chart observed in figures 7 to 11 it has indicated that if there is a control measures and regular awareness created to educate them on the danger of this infections among the various genders, the infections can be eradicated or minimized.

Hence, we recommend that the following steps should be taken into consideration which is based on the result obtained from our work in order to enhance the prospects of checking and controlling it within the region by having an upper hand in the areas of the following which includes a public awareness in order to sensitize the public on the danger of *chlamydia trachomatis* infection so as to control the spread of the infection; with focus more on the sexually active individuals and homes, provision of health medical centers where counselling and screening of the infection is done preferable freely with special priority to the expectant mothers, in our educational sector, the curriculum of the schools with respect to family life education and sexually transmitted diseases should be strengthened and encouraged and finally further research and improved model screening pattern should be introduced in order to bring about to the total reduction of infection where it be should be extended in order to gain an understanding of the economic impact and thus achieved by incorporating some other relevant features found in the region in order to determine the optimal control of the infection.

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