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Assessment of the level of awareness and knowledge of *Chlamydia trachomatis* infections among youths in Okada Community, Nigeria

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ABSTRACT: This study is designed to assess the level of awareness and knowledge of *Chlamydia trachomatis* infections among the youths of Okada town, Edo State, Nigeria. The study was conducted between March and June, 2010 with the aid of a semi-structured questionnaire administered on 1104 individuals randomly selected from a cross-section of youths in the community. Although majority of the respondents (59.1%) were aware of the existence and importance of *Chlamydia trachomatis* infections, however, the varied and sometimes misconceived notions revealed that a significant proportion of the respondents had inadequate knowledge of the infections. Only 18.8% of the respondents correctly classified *Chlamydia trachomatis* as a bacterium, while 12.4% were not sure or could not even classify the microbe and the remaining erroneously believed it was a virus (22.2%), fungus (11.0%), protozoan (11.9%) or helminth (23.7%). Interestingly, 38.9% of respondents correctly associated *the bacterium* with eye to eye spread by flies, 31.2% knew about its sexual transmissibility and only 5.8% noted its possible oculogenital transfer during parturition; while infection through contaminated air, food or water were incorrectly recorded by some respondents. There is a dire need to evolve strategies to create greater awareness, improve knowledge and initiate *Chlamydia trachomatis* surveillance and control programmes in Nigeria.

Key Words: *Chlamydia trachomatis*; Infection; Awareness; Knowledge.

Introduction

Chlamydia trachomatis (*C. trachomatis*), an obligate intracellular pathogen, is the leading causative agent of sexually transmissible bacterial diseases worldwide (1-4). The non-sexual serotypes of *C. trachomatis* (A, B & C) are responsible for trachoma, the most common cause of preventable blindness globally (5,6); trachoma usually affects both eyes.

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The World Health Organization (WHO), using the SAFE (acronym for Surgery, Antibiotics, Facial cleanliness, and Environmental improvements strategy) aims for the global eradication of trachoma by 2020 (GET 2020) (6,7). The youths in the developing countries (Nigeria inclusive) have a major contributory role to play towards the global control and elimination of *C. trachomatis* infections.

The risk factors for *C. trachomatis* infection include poor personal hygiene, having new or multiple sexual partners, having a prior history of a sexually transmitted disease (STD) and not using latex condom consistently and correctly (8). The infection can be spread from eye to eye by fingers, shared contaminated towels, cloths or eye make-up and by eye-seeking flies (9).

C. trachomatis infections usually run an asymptomatic course, though communicable, and therefore remain unreported, undetected and subsequently untreated; and can linger for months or years (10): the untreated individual stands the risk of not only transmitting the infection but also developing complications. In men, complications of sexually transmitted *C. trachomatis* infection include urethritis, epididymitis, proctitis, prostatitis and infertility (11-14). Complications of *C. trachomatis* infection in women include cervicitis, pelvic inflammatory disease (PID), urethritis, endometritis, salpingitis and increased incidence of ectopic pregnancy and infertility (11,15,16); women infected with Chlamydia are up to five times more likely to become infected with the human immunodeficiency virus (HIV), if exposed (11). Vertical transfer of sexually acquired *C. trachomatis* serotypes D-K during birth from mother to neonate can result in ophthalmia neonatorum (5). The LGV 1,2,3 serotypes of *C. trachomatis*, which are often more invasive than other *C. trachomatis* serotypes, cause lymphogranuloma venereum (LGV). Genitourinary *C. trachomatis* infection has also been associated with the development of Reiter's syndrome—a clinical triad of arthritis, urethritis and uveitis—especially in young people (12).

C. trachomatis infections are more widely distributed throughout all socio-economic, racial and ethnic groups than other bacterial sexually transmissible infections (STIs) (1,2); and they are causing world-wide medical, social and economic problems. The WHO has estimated that *C. trachomatis* infections and their complications result in annual health care cost of US \$ 3.6 billion globally (2, 4). The developing countries, especially in tropical sub-Saharan Africa, account for a disproportionately large share of the *C. trachomatis* burden, mainly because of their climate and high concentrations of youths (who are often associated with a high number of risk markers for *C. trachomatis* infection) coupled with lack of adequate facilities for *C. trachomatis* screening, diagnosis and treatment programmes in these countries. The provision and success of these control measures in different communities would depend largely on the local level of awareness and knowledge of the infections. This has been demonstrated in many infectious diseases, including HIV/AIDS (17, 21) and polio (18).

Individual's awareness of an infection is different from his/her knowledge about the infection. Hearing that an infection exists and is important is awareness but understanding the nature, causes, complications or treatment of sexually transmissible infection, such as *C. trachomatis*, for example, is knowledge about the infection.

Up to date, there is dearth of information on *C. trachomatis* infections in Nigeria and there are no reliable statistics on the relative frequencies of the infections in the country. In fact, no study on *C. trachomatis* infection in our community has been previously undertaken as the infections are not officially reported or microbiologically confirmed in our locality. The present study is designed to assess the level of awareness and knowledge about *C. trachomatis* infections among young men and women in our 'university community', Okada, Edo State, Nigeria.

Materials and Methods

Study Participants and Setting

The study participants consisted of 1104 able-bodied young male and female volunteers randomly selected from a cross-section of the Okada community; individuals aged over 40 years were excluded from participating in the survey.

Okada town is a semi-urban setting with an estimated population of 29,000 inhabitants based on the 2005 National Population Census. Okada is the headquarters and commercial center of Ovia North East Local Government Area of Edo State, Nigeria. Okada, a 'university town' serves as home to the Igbinedion University Okada (IUO) and the Igbinedion University Teaching Hospital (IUTH); the town also hosts the National Youth Service Corps (NYSC) state orientation camp, a number of federal and state government establishments and private industries. The Okada community is composed of mainly young and active individuals originally from different Nigerian ethnic groups, including Bini, Yoruba, Igbo, Ishan, Itshekiri, Tiv, Hausa, Fulani and Ebira. A number of

the people are either students or staff of organised private and public sectors; many of the inhabitants engage in one form of business or the other-all centered around the educational and training disposition of the area

Procedure

This study was conducted between March and June, 2010 at the IUO/IUTH Okada. Ethical clearance was obtained from the Ethical and Research Committee of the university prior to the commencement of this study. Informed consent was sought and obtained from each of the randomly selected participants; participation was voluntary and confidential. The study instrument composed of a semi-structured 20-item questionnaire written in English and was either 'self-administered' depending on the literacy level of the subject or 'interviewer administered' after each question interpretation into subject's understanding (the interviewers were members of the project team). Information obtained included their bio-social data such as age, sex, marital status, level of education, occupation and ethnicity. Each respondent's health-seeking pattern, awareness and knowledge about *C. trachomatis* infections together with associated behavioral risk factors were also established. The responses to some of the questions were either 'Yes' or 'No' while few were open ended. Each questionnaire took approximately 15-20 minutes to complete and were collected back afterwards.

Data Analysis

The data obtained with the aid of the study instrument (questionnaire) was collated and analyzed using Microsoft excel and Epi.info 2002 statistical software package, Chi square (X^2) was used for data entry, validation, clearing, analysis and to compare degree of association among variations. P values less than 0.05 were considered significant. The score on the perceived knowledge on *C. trachomatis* infection ranged from 15 (good knowledge), 10 was graded as fair knowledge and ≤ 5 graded as poor or no knowledge about *C. trachomatis*.

Results

During the period of this study, a total of 1104 questionnaires were successfully administered on 527 (47.7%) males and 577 (52.3%) females; their ages ranged from 14-40 years (mean age 22.9) (Table 1). Two hundred and nineteen (19.8%) of the respondents were students and 142 (12.9%) were members of the NYSC, while the remaining youths interviewed were engaged as civil-servants (13.9%), traders (18.3%), artisanal workers (15.6%), farmers (8.0%) or in other occupations (4.8%); those un-employed as at the time of this study accounted for 6.7%. (Fig. 1).

Awareness of *C. trachomatis* infection

Six hundred and fifty two (59.1%) of the respondents have heard of *C. trachomatis* as an important agent of STD, while the remaining 452 (40.9%) were unaware of the existence of the infections (Table 2).

Analysis of the age-distribution pattern of the respondents aware of *C. trachomatis* showed that: among those 16-20 years old (n=192), 21-25 years (n=277) and 26-30 years (n=262), the awareness rates were respectively 118 (61.5%), 187 (67.5%) and 174 (66.6%); while respondents in the age range 31-35 years (n=166) and 35-40 years (n=135) reported awareness by 98 (59.0%) and 69 (51.1%) respectively. On the contrary, awareness of *C. trachomatis* was noted by only 6(8.3%) of the respondents aged ≤ 15 years (n=72), (p>0.05) (Table 2).

Majority of the respondents, 1091 representing 98.8%, had formal education. Evaluation of the educational level of the respondents indicated that 428, 348 and 315 individuals obtained primary, secondary and tertiary education respectively, and those aware of the existence of *C. trachomatis* infection were respectively 74 (17.3%), 272 (78.2%) and 306 (97.1%); whereas all the 13 (100%) with no formal education were ignorant of the infections (Fig. 2)

Table 1: Age and sex distribution of respondents in Okada Town

Age (Years)	Male Respondents	Female Respondents	Total	%
≤ 15	35	37	72	6.5
16 – 20	91	101	192	17.4
21 – 25	133	144	277	25.1
26 – 30	106	156	262	23.7
31 – 35	92	74	166	15.0
36 – 40	70	65	135	12.2
Total	527	577	1104	100

Table 2: Awareness of the existence of *Chlamydia trachomatis* by different age groups in Okada Town

Age (Years)	No. Aware (%)	No. Unaware (%)
≤ 15	6 (8.3)	66 (91.7)
16 – 20	118 (61.5)	74 (38.5)
21 – 25	187 (67.5)	90 (32.5)
26 – 30	174 (66.4)	88 (33.6)
31 – 35	98 (59.0)	68 (41.0)
36 – 40	69 (51.1)	66 (48.9)

*Figures in parentheses represent the percentage of awareness in each age group. Overall awareness = 59.1% (n = 1,104)

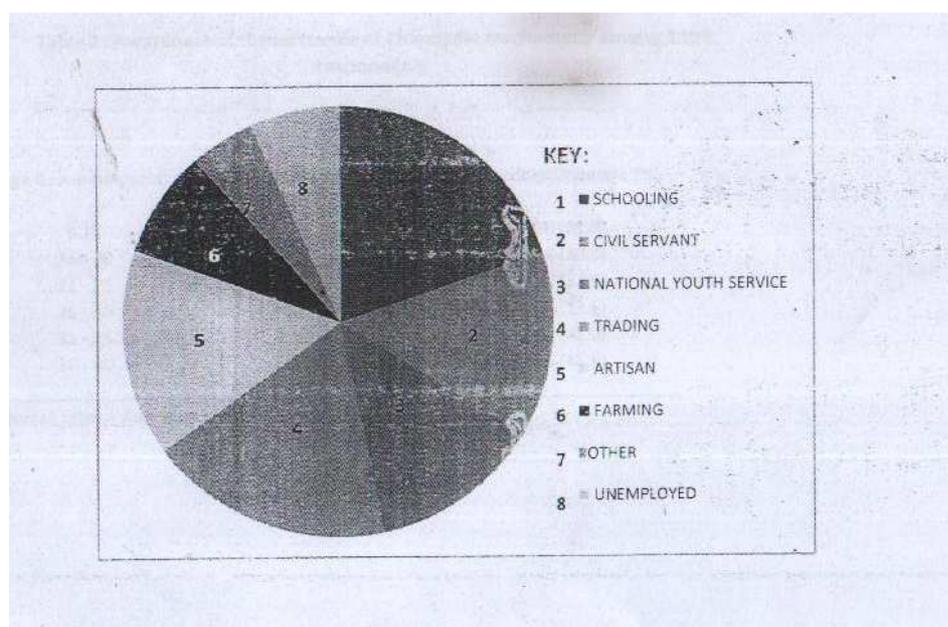


Fig. 1: Pie chart showing the distribution of the occupations of the respondents in Okada Town.

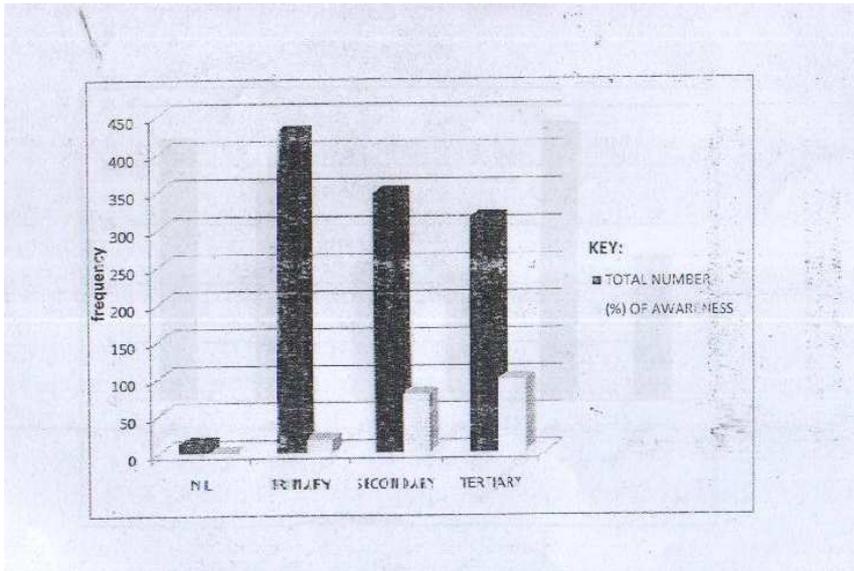


Fig. 2: Bar chart showing the educational levels of the respondents in Okada Town.

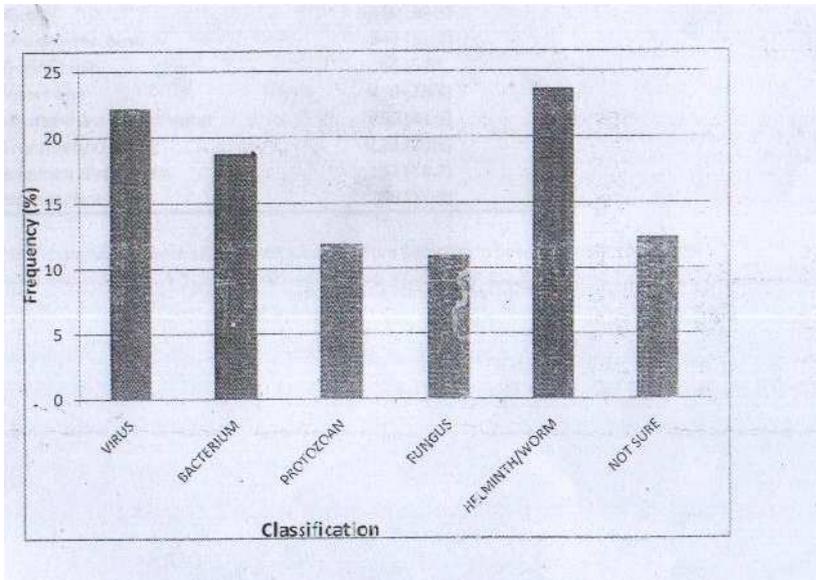


Fig. 3: Classification of Chlamydia trachomatis as indicated by respondents in Okada Town.

Knowledge of *C. trachomatis* Infection.

An analysis of the knowledge of the respondents about the classification of *C. trachomatis* organism showed that 245(22.2%) classified it as a virus, 208(18.8%) called it a bacterium, 121(11.0%) thought it was a fungus, 131 (11.9%) named it protozoan, while 262(23.7%) thought it was a helminth/parasitic worm organism; whereas 137 (12.4%) were not sure or could not classify the microbe (Fig. 3).

An analysis of the knowledge about the modes of transmission of *C. trachomatis* among the respondents revealed that 318 (28.6%) believed *C. trachomatis* could be transmitted through the skin, 340 (30.8%) through kissing, 344 (31.2%) through other intimate sexual contacts and only 64(5.8%) noted vertical transmissibility from mother to the neonate. Also, 430 (38.9%) thought *C. trachomatis* can be transmitted by insect, while 455 (41.2%) believed it can be contracted through contaminated food and/or water. Other sources reported include: infection through air 162 (14.7%) and from dirty clothing, 222 (20.5%). One hundred and ninety eight (17.9%) of the respondents had no idea about the mode(s) of transmission of *C. trachomatis* infections (Table 3).

Table 3: Possible modes of transmission of *C. trachomatis* as indicated by respondents.

Transmission of <i>C. trachomatis</i>	No. and percentage of respondents
Skin	318 (28.6)
Kissing	340 (30.8)
Sexual intercourse	344 (31.2)
During childbirth	64 (5.8)
Insect bite	430 (38.9)
Contaminated food/water	455 (41.5)
From dirty clothing	222 (20.5)
Through the air	162 (14.7)
Not sure	198 (17.9)

Respondents were asked to tick more than one option, based on their conviction.

Sources of information

The findings of our enquiries about the respondents' source(s) of information about *C. trachomatis* infection showed that: the mass media, including textbook, newspaper, radio, television and the internet formed the greatest sources of awareness and knowledge reported by 352 (31.1%) of the respondents, followed by those informed through formal lecture/ conference 224 (19.8%), friend 188 (16.6%) or health care provider 148 (13.1%); while 124 (11%) of the respondents got their information during antenatal clinic attendance and 96 (8.4%) reported being informed by their spouse (Table 4)

Table 4: Sources of information about *C. trachomatis* infections among youths in Okada

Source of information	No. of Respondents	%
Friends	188	16.6
Spouses	96	8.4
Health Care Providers	148	13.1
During Antenatal Care	124	11.0
Lectures/Conferences	224	19.8
Mass Media	352	31.1

Respondents were asked to tick more than one option, based on their conviction.

Discussion

This report on the survey of *C. trachomatis* infection is the first of its kind to be undertaken in Okada community and it is part of our ongoing research programme on *C. trachomatis* infections and their associated diseases. The sampling strategy of the present study focused on the youths, who are more likely to have high-risk markers for STD and therefore more prone to *C. trachomatis* infections. The results revealed a fairly good level of awareness (59.1%) but overall poor knowledge about *C. trachomatis* infections among the 1104 young men and women interviewed.

The greatest level of awareness and knowledge about *C. trachomatis* among the respondents was found among females aged 21-25 years and with tertiary education; a large percentage of the participants (67%) who were knowledgeable about *C. trachomatis* were within the age range of 21-30 years. This finding correlated with the observation in a previous study in Nigeria, which rated the age-range 20-29 years as the period of greatest sexual activity among individuals in the country and that those in the age range tend to be more promiscuous, prone to sexually transmissible infections and hence more knowledgeable about STDs (19). The U.S Preventive Service Task Force (USPSTF) on STD has reported that the age range 20-25 years has the highest prevalence of female genital chlamydial infection (8). Another study has also identified age as an important predictor of *C. trachomatis* infections after controlling for behavioral characteristics (20).

The majority of the Okada town respondents (98.8%) had at least primary education. There was a high positive correlation observed between the level of education and the awareness and knowledge about *C. trachomatis* infections as all of the participants with no formal education and majority (82.7%) of those with only primary education were oblivious of the existence of the infections; whereas only 21.8% and 2.9% of respondents with secondary and tertiary education respectively were unaware of the infections. Education contributes to enthusiasm for learning and have impacted on the awareness and knowledge about *C. trachomatis* infection as observed in this study. The awareness level observed for *C. trachomatis* among our respondents is, however, low when compared with some other STIs such as gonorrhoea, syphilis or HIV/AIDS. For instance, it has been found that 97.6% of primary school children in Port-Harcourt, Nigeria have heard of the HIV/AIDS disorder (17), this is similar to the awareness level of 97.1% for *C. trachomatis* found among respondents with tertiary education in this study.

Although a majority of our participants recorded that they have heard of *C. trachomatis* infections, however, critical analysis of the results in Figs. 3 & 4 revealed that quite a significant proportion of those aware of the infections did not have the correct knowledge about *C. trachomatis*. In fact, only 22.2% of the responses correctly classified *C. trachomatis* as a bacterium, 12.4% were not sure or could not even classify the microbe, while the remaining number of respondents thought it was a virus, fungus, protozoan or helminth/parasitic worm. Moreover, only a scanty 5.8% of respondents knew about perinatal transmission of *C. trachomatis* from infected mother to the neonate. Furthermore, the observation that contaminated food, water or air were commonly mentioned as possible routes of *C. trachomatis* transfer revealed the misconceptions of majority of respondents in this study regarding the modes of *C. trachomatis* transmission. Similar confusion about HIV/AIDS transmission has been reported in previous studies (21-23). Nevertheless, it is noteworthy that up to 38.9% of the responses correctly recorded that *C. trachomatis* could be spread to the eye by insect, probably because of the thoughtful association of *C. trachomatis* with ocular trachomatosis. Trachoma has been shown to be contagious in its early stages and is transmissible among people by eye-seeking flies (9).

It has been well established that *C. trachomatis* is a common and important sexually transmissible bacterial pathogen worldwide, especially among young men and women (1-4, 24-27). However, many youths in developing countries, such as Nigeria are oblivious of this ubiquitous and potentially debilitating pathogen- as has been confirmed in the present study. The observed inadequate knowledge about *C. trachomatis* among our interviewed youths is not surprising for many reasons. Firstly, the often asymptomatic nature of *C. trachomatis* infection does not make it easily noticeable and therefore many infected individuals may not even be aware of the infection. Secondly, while there are well established diagnostic screening centers and procedures for *C. trachomatis* infections in developed countries, in Nigeria, however, there is lack of cheap and widely available diagnostic facilities for the infections. Moreover, it is not a nationally notifiable infection in Nigeria, unlike the other more renowned STIs such as HIV, hepatitis B and syphilis. For these reasons, therefore, *C. trachomatis* infection can run an asymptomatic course, though communicable and therefore remained largely unreported, undetected and subsequently untreated. A recent study in Nigeria has shown *C. trachomatis* infections to be endemic in the North-East zone of the country(28). The ubiquitous but insidious *C. trachomatis* infection could, indeed, be a 'silent epidemic' in the Nigerian population.

The fact that a significant over 50% of our respondents gleaned their information about *C. trachomatis* from formal classroom lectures, conferences and the mass media further emphasized the importance of education in

disseminating the infections. This study has shown that relations and health-care providers are not active enough in the provision of information about *C. trachomatis* infections to the youths. The use of illustrations, such as posters, murals, bill-boards and handbills should be introduced to enhance community awareness and knowledge as has been demonstrated in other communicable diseases such as HIV/AIDS, polio and tuberculosis. Other information agents in the host community, such as ante-natal and STD clinics' health-care providers, members of medical students' unions and volunteer group of the NYSC could be mobilized to embark on enlightenment campaigns to sensitize the Nigerian public about these rather obscure infections.

The contributions of the host community agents towards public enlightenment could be complemented by the introduction of *C. trachomatis* screening programme for all sexually active individuals in the community, initially in those attending the obstetrics & gynaecology and STD clinics, as is being practiced in many developed countries. For instance, the USPTSF has recommended the routine screening of all sexually active women aged ≤ 25 years and their cohorts for *C. trachomatis* infection and that the screening of women aged >25 years should be considered if they are at risk; the taskforce also suggested screening should be indicated by local prevalence data in other countries (8). The adoption of rapid and non-invasive screening techniques for detecting *C. trachomatis*-for example in urine-would eventually help to extend the population being screened and should increase yield as noted by some workers (26,29,30). Identifying other STIs, such as HIV, would be an important secondary benefit to such screening programme. A meaningful and result-oriented community-based *C. trachomatis* screening programme should lay emphasis on disseminating, to the public, resource information on the risk factors of *C. trachomatis* infection and other related factors that could make the human body vulnerable to *C. trachomatis* infection, such as the concurrence of other bacterial and viral infections, immunodeficiency and hormonal factors.

Conclusion

This study has found that the majority of youths interviewed in Okada community were aware of the existence of *C. trachomatis* as an important agent of trachoma and STDs. However, a significant proportion of the youths, though with formal education, had misconceived notions about the infections. Only 18.8% could correctly classify the bacterium. Many respondents mistakenly believed the infections can be contracted through contaminated food, water or air; while only 5.8% knew about its vertical transmission. Most respondents gleaned their information from the classrooms and the mass media; whereas friends, spouses and health-care providers were found not to be proactive in disseminating the infection. It is therefore advocated that enlightenment campaigns on *C. trachomatis* should be intensified in the Nigerian mass media and that the involvement of other information agents, such as health-care providers and knowledgeable youths in host community, should be introduced to draw home the message about this pathogen that is rather obscure in Nigeria. Additionally, it is envisaged that the findings of this study will help in the design of *C. trachomatis* prevalence studies and control programmes. Taken together, these suggested measures would go a long way to promote awareness and improve knowledge about *C. trachomatis* infections, particularly among community youths, with a view to stemming the tide of this 'silent epidemic' and its sequelae of genitourinary, ocular and rheumatological diseases in the Nigerian society.

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References

1. Gerbase AC, Rowley ST, Mertens TE. "Global Epidemiology of sexually transmitted diseases" Lancet 351 suppl 3:2-4.1998
2. World Health Organization. Global prevalence and incidence of selected curable Sexually Transmitted Infections: Overview and Estimates. Geneva.2002
3. Gaydos CA, Howell MR, Quinn JC, Mckee JK, Gaydos JC Sustained high prevalence of Chlamydia trachomatis infection in female army recruits. Sex Transm. Dis.30:539-544. 2003.
4. Niccolai LM, Hochberg AL, Ethier KA, Lewis JB, Ickovics JR. Burden of Chlamydia trachomatis infections in young women. Arch Pediatr& Adolesc.Med Vol. 161(3):246-251.2007
5. Thylefors B, Negrel AD, Pararajesegaram R, Dadzie KY. "Global data on blindness" Bull World Health Organization 73 (1)115-21.1995

6. World Health Organization Trachoma, GET 2020 initiative. Geneva.2008
7. Ngondi J, Onsarigo A, Matthews F, et al "Effect of 3 years of SAFE (Surgery, Antibiotics, Facial cleanliness and Environmental change) strategy for trachoma control in Southern Sudan: a cross-sectional study". *Lancet* 368 (9535): 589-595. 2006
8. CDC-MMWR.Chlamydia trachomatis screening recommendation *Morb Mortal Wkl Report* 51(RR.15):37-38. 2002
9. Mabey DC, Solomon AW, Foster A. "Trachoma". *Lancet* 362 (9339):223-229. 2003
10. Mpiga R, Ravaoarino M "Chlamydia trachomatis persistence: an update". *Microbiol. Res*, 161 (1): 9-19. 2006
11. Morre SA, Rozendaal L, van valkenoed IGM, et al. Urogenital chlamydia trachomatis serovars in Men and Women with a symptomatic or asymptomatic infection: an association with clinical manifestations. *J Clinical Microbiology* 38:2292-2296. 2000
12. Bas S, Scieux C,Vischer TL.Male sex predominance in Chlamydia trachomatis sexually acquired reactive arthritis: are women more protected by anti-chlamydia antibodies?. *Ann Rheum Dis* 06:605-611. 2001
13. Bjercke S, Purvis K.. Chlamydial serology in the investigation of infertility. *Human Reproduction* 7, 621-624. 1992
14. Wagenlehner FM, Naber KG, Weidner W. Chlamydial infections and prostatitis in men. *BJU Int.* 97(4) 687-6790. 2006
15. Berlow RE, Cooke IO, Odukoya O, et al. The prevalence of Chlamydia trachomatis in fresh tissue sections from patients with ectopic pregnancy or tubal factor infertility as determined by PCR and in-situ hybridization. *J. Med Microbial* 50; 902-908. 2001
16. Omo-Aghoja LO, Okonofua FE, Onemu SO, Larsen U, Bergstrom S. Association of Chlamydia trachomatis serology with tubal infertility in Nigerian women. *J.Obstetrics & Gynae Res*; 33 (5):688-695. 2007
17. Anochie I, Ikpeme E. AIDS awareness and knowledge among primary school children in Port Harcourt metropolis. *Nig J Med*, vol.12 (1) 27-31. 2003
18. CDC-MMWR: Progress towards global eradication of poliomyelitis. *Morb Mortal Weekly Report*.51: 253-256. 2002
19. Bakare RA, Oni AA, Umar US, Okesola AO, Kehinde AO, Fayemiwo SA, Fasina NA. Non-gonococcal urethritis due to Chlamydia trachomatis:the Ibadan experience.*Afr J Med Sci* 31,17-20. 2002.
20. Amo JN, Katz BP, McBride-Carty GA, et al. Age and clinical Immunity to infections with Chlamydia trachomatis. *Sex Transm Dis* 21, 47-52. 1994
21. Okediji OE, Ojofeitimi EO, Feyisetan B, Ako – nai AK, Taiwo O. Local knowledge and awareness of AIDS. *Post grad doc Afr* 11:4-7 1989.
22. Odujinrin OMT, Akinkuade FO. Adolescents AIDS knowledge, attitude and beliefs about preventive practices in Nigeria. *Eur J Epidemiol* 3:15-24. 1991
23. Lindegren ML, Hanson C, Miller K, Byers RH, Onorato I. Epidemiology of human immune-deficiency virus infection in adolescents, United States. *Paediatr Infect Dis J* 13:525-35. 1994
24. Miller WC, Ford CA, Morris M. Prevalence of Chlamydia and gonococcal infections among youths in United States. *JAMA* 291: 2229-2239. 2004
25. Ngandjio A, Cierc M, Fonkona MC, et al. Screening of volunteer students in Yaounde (Cameroon, Central Africa) for Chlamydia tachomatis infection and genotyping of isolated C.trachomatis strains. *J ClinMicrobiol* 41:4404-4407. 2003
26. Opaneye AA. STDs among women in Coventry, England *JR.Soc.Health* 117:37-40. 1997
27. Ryan KJ, Ray CG.(Eds). *National Chlamydia screening programme data tables*. Sherries Medical Microbiology (4th edn) McGraw Hill, pp463-470. 2009
28. Esumeh FI, Agbonlahor DE, Okoror LE:Chlamydia activity in North East zone of Nigeria.*Eastern J of Med*14:10-16. 2009
29. Parish WL, Laumann EO, Cohen MS, et al. Population-based study of Chlamydial infection in China. A hidden epidemic. *JAMA* 289:1265-1273. 2003
30. Aideen T, Haghdoost A, Hay P. Urine based screening for asymptomatic undiagnosed genital Chlamydial infection in young people visiting the accident and emergency department is feasible, acceptable and can be epidemiologically helpful. *Sex Transm Inf.* 78:229-233. 2003