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A RETROSPECTIVE ASSESSMENT OF SYPHILIS SEROPREVALENCE AMONG PREGNANT WOMEN, CAPE COAST, GHANA

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ABSTRACT

This is a hospital-based cohort study, which aimed at assessing the seroprevalence of syphilis among pregnant women who sought antenatal care at the Cape Coast Metropolitan Hospital (CCMH). We retrospectively analyzed secondary data of 2,640 term pregnant women, who gave birth from January, 2016 to December, 2018. Data was compiled from the CCMH delivery register. Out of the 2,640 pregnant women who delivered from 2016 through 2018, 107 [4.1%, 95% CI: 3.3 – 4.8] tested reactive (2016, 1.5%, 40/2640; 2017, 1.0%, 26/2640; 2018, 1.6%, 41/2640). Seroprevalence among the primagravida (those with first pregnancy) was 0.8%, while that among the multigravida (≥ 2 pregnancies) was 3.3% (χ^2 = 37.562, p = 0.021). Pregnant women within the age group of 22-31 years were the most reactive, 2.3% (60/2640), followed by 32-41 years, 1.1% (30/2640). A prevalence of 1.9% (50/2640) was recorded among Junior High School holders, while 0.2% (5/2640) was found among those who have attained tertiary level education. A Relatively high prevalence of 3.0% (78/2640) was recorded among informal workers compared to the unemployed, 0.9% (23/2640). An appreciable proportion of 18.9% (499/2640) had no syphilis testing record indicated in the register. Early detection of syphilis and treatment of infected partners, rapid testing for ANC non-attendants at the maternity/obstetrics and gynecology departments is highly recommended either before or after delivery, as laboratory services may not be available in the nights when most deliveries occur.

Contribution/Originality: This study contributes to existing information, a three year socio-demographic trend of syphilis infection among pregnant women along coastal communities. It also reports for the first time, syphilis prevalence among women with different gravidity in Cape Coast, Ghana.

1. INTRODUCTION

Syphilis is a sexually transmitted infection (STI) caused by the spirochete *Treponema pallidum* (Tp) that progresses through active and latent stages with different clinical presentations resulting in substantial morbidity and mortality [1, 2]. Syphilis is known to be transmitted through sexual contact with infectious lesions of the mucous membranes or abraded skin, via blood transfusion, or transplacentally from a pregnant woman to her fetus

(congenital syphilis). Although advances have been made in the diagnosis and treatment, syphilis remains a public health problem in pregnant women in many developing countries [3].

Mother-to-child transmission of syphilis (congenital syphilis) can occur at any time during pregnancy and at any stage of syphilis, and is usually devastating to the fetus if maternal infection is not detected and treated sufficiently early in pregnancy [4]. Each year, approximately two (2) million pregnant women get infected with syphilis worldwide. Out of these, most do not get tested for syphilis, and those who do are either not treated or are poorly treated [5]. According to a 2007 world health organization (WHO) report, syphilis infection rates in pregnant women in Africa as a whole ranges from 3 to15% [6]. Adverse pregnancy outcomes of syphilis may occur in 66.5% of pregnant women with untreated syphilis, and include late spontaneous abortion, prematurity, small for gestational age (SGA) neonates, and stillbirth. Thus, congenital syphilis (CS) can manifest, according to the severity, as neonatal death, neonatal disease, or latent infection leading to later sequelae. Unfortunately, delivery at term of live infants who are fully asymptomatic may occur in approximately two-thirds of live born cases with untreated or inappropriately treated mothers [7]. According to a 2012 World Health Organization (WHO) report, an estimated 350,000 adverse pregnancy outcomes worldwide were attributed to syphilis, including 143,000 early fetal deaths/stillbirths, 62,000 neonatal deaths, 44,000 preterm/low-birth-weight babies and 102,000 infected infants [4].

The objective of this study was to estimate the seroprevalence of syphilis infection among 'at term' pregnant women.

2. MATERIALS AND METHODS

2.1. Study Site

The study was carried out at the Cape Coast Metropolitan Hospital (CCMH). This Hospital is a government hospital located on the 24 Beulah road in the Cape Coast Metropolis of the Central Region. It was the largest health facility prior to the establishment of the Cape Coast Teaching Hospital (CCTH). The Metropolis covers an area of 122 square kilometers and it is located on longitude 1° 15`W and latitude 5°06`N. The Metropolis is bordered by the Gulf of Guinea to the south, Komenda Edina Eguafo Abrem (KEEA) Municipal to the west, Abura Asebu Kwamankese (AAK) District to the east and Twifo Heman Lower Denkyira District to the north Figure 1. The population of the Metropolis according to 2010 population and housing census stands at 169,894 with (82,810 male and 87,084 female).

2.2. Study Design and Sample Size

The study was retrospective. In total, 2,640 pregnant women who's status on syphilis testing and demographics had been captured from 2016 to 2018 in the Delivery Register were collated.

2.3. Ethical Consideration

Clients whose data is included in this study were self-presenting to routine clinics, who accepted recording of their anonymized information. Permission to carry out the study was obtained from Cape Coast Metropolitan Hospital. Data was used strictly for research purposes, specifically as part of requirements for renewal of licenses as allied health professionals working in the Hospital.

2.4. Limitation

Syphilis testing in most government hospitals in Ghana does not include confirmatory tests. As well they are usually performed with brands from different manufacturers. This study was unable to determine the stage of syphilis infection. However, there is a well laid out plan, which manages and treat reactive cases who visit the antenatal clinics.

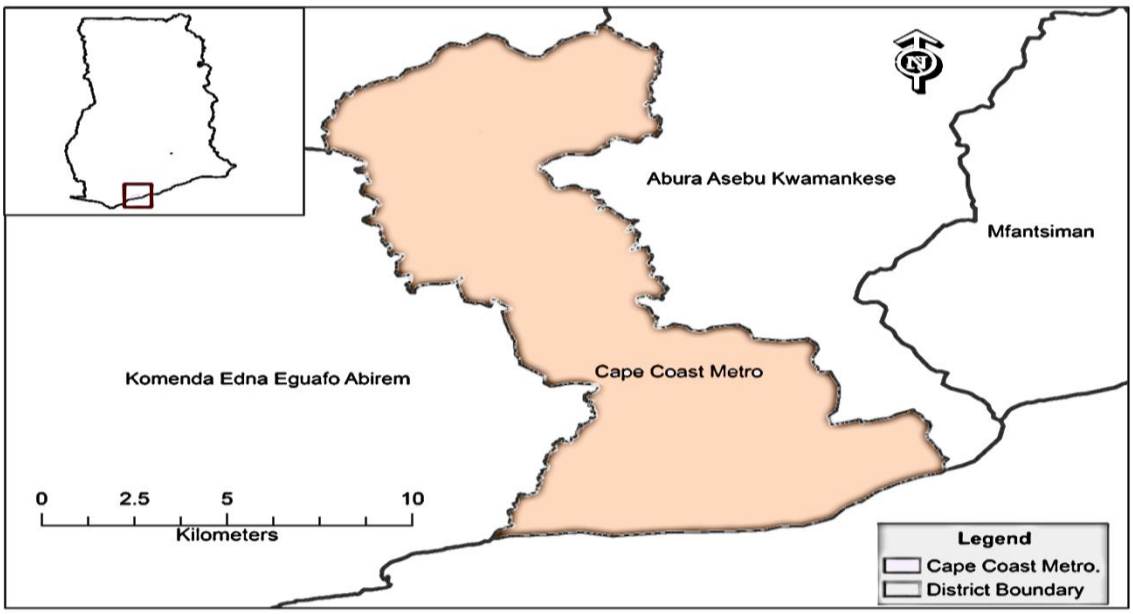

Figure-1. Map of Cape Coast metropolitan area.

2.5. Statistical Analysis

Data entry and analysis was done using Statistical Package for Social Sciences (SPSS, Version 23.0, IBM, https://www.ibm.com) software. Data extracted was analyzed according to age groups, sex, occupation, level of education and sero test outcome for syphilis. Chi square (χ^2) and $p<0.05$ was considered to be significant at 95% confidence.

3. RESULTS

3.1. Demographics

A total of 2,640 pregnant women who gave birth between January, 2016 and December, 2018 were included. The ages ranged from 12-48 years [mean = 27.3 (95% CI: 27.1 – 27.6), std error of mean = 0.1, mode = 28]. Majority, 53.3% (1408/2640), were in the 22-31 years age group. Of the total, 65.6% (1732/2640) were working in the informal sector, 8.0% (211/2640) were formally employed, 2.5% (66/2640) were students, while 23.9% (631/2640) were unemployed. With regards to level of education, 27.8% (734/2640) were uneducated, 7.0% (186/2640) have had up to primary school education, 39.7% (1048/2640) up to Junior High School, 15.3% (404/2640) Senior High School, while the remaining 10.2% (268/2640) have had up to tertiary education Table 1.

3.2. Seroprevalence Distribution

Of the total number of deliveries for the period, 4.1% (107/2640) were cumulatively reactive for syphilis, while 77.0% (2034/2640, 95% CI: 75.5 – 78.6) were non-reactive. The remaining 12.3% (325/2640, 95% CI: 17.5 – 20.3) had no syphilis test information recorded against them in the delivery register Table 1. The seroprevalence observed among the 22-31 years age group was 2.3% (60/2640), while the 32-41 years age group recorded 1.1% (30/2640). Monthly seroprevalence trend for the three-year retrospective analysis is as indicated in Figure 2. The highest monthly percentage reactivity of 0.27% (7/2640) was in December, 2016. October and November, 2017 as well as February, 2018 recorded no reactive case for syphilis. Within these same months, 2.0% (53/2640), 1.6% (43/2640) and 2.0% (52/2640) respectively, had no syphilis test information recorded. For the three consecutive years, the month of June recorded the same seroprevalence of 0.15% (4/2640).

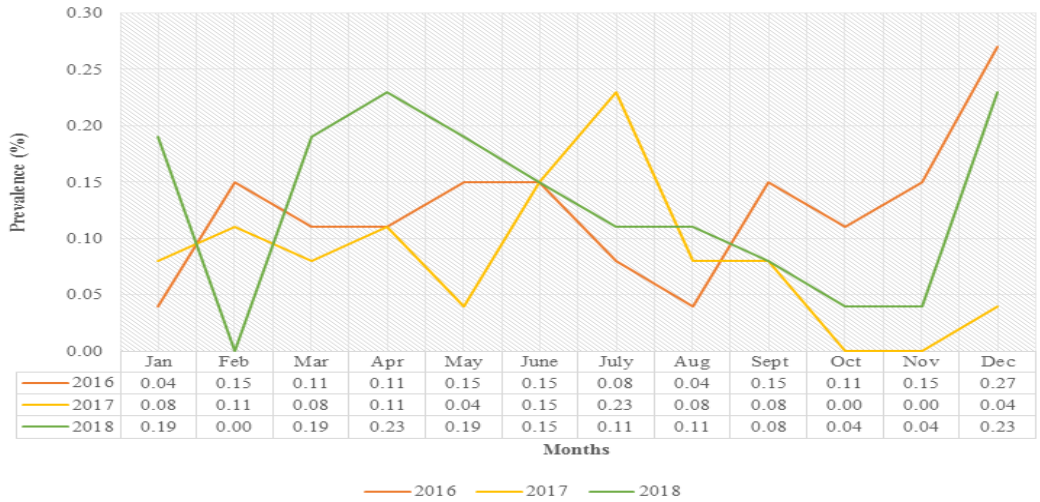

Figure-2. Three-year monthly trend for syphilis seropositivity.
Source: Summarized from the delivery register, CCMH.

Informal workers constituted 65.6% (1732/2640) of the number of term pregnant women attendees during the study period while students, 2.5% (66/2640), were the least. Relatively high seroprevalence of syphilis were observed among informal workers 3.0% (78/2640) followed by the unemployed, 0.9% (23/2640). With regards to seroprevalence among the various levels of education, those with up to Junior High School recorded 1.9% (50/2640). Those without any formal education recorded a seroprevalence of 1.1% (28/2640). The remaining levels had seroprevalence ≤ 0.5% Table 1.

Table-1. Socio-demographic characteristics and seroprevalence of syphilis among term pregnant women.

Category	Syphilis sero-test results			Total
	Reactive (%)	Non-reactive	Test not done/ not indicated	
Year				
2016	40 (1.5)	645	186	871
2017	26 (1.0)	676	139	841
2018	41 (1.6)	713	174	928
Age Range				
12-21	14 (0.5)	403	108	525
22-31	60 (2.3)	1103	245	1408
32-41	30 (1.1)	491	140	661
42-51	3 (0.1)	37	6	46
Occupation				
Formal	4(0.2)	173	34	211
Informal	78(3.0)	1360	294	1732
Student	2(0.1)	53	11	66
Unemployed	23(0.9)	448	160	631
Level of education				
None	28(1.1)	496	210	734
Primary	11(0.4)	151	24	186
JHS	50(1.9)	831	167	1048
SHS	13(0.5)	335	56	404
Tertiary	5(0.2)	221	42	268

Source: Summarized from the delivery register, CCMH.

Out of the total, 22.7% (599/2640) were pregnant for the first time, 68.8% (1815/2640) have had 2 – 5 pregnancies, while 8.6% (226/2640) have had 6 – 12 pregnancies (Data not shown). Figure 3 shows the seroprevalence of syphilis among women with different gravid counts. Seroprevalence among those pregnant for the first time was 0.8% (20/2640). Majority, 2.7% (72/2640), of seropositivity was among women with gravida 2 –

5, while 0.6% (15/2640) was found among women with 6 – 12 pregnancies. Each of gravida 8 – 11, had a prevalence of 0.04%. The only gravida 12 participant was seronegative. There was a significant difference between prevalence of 0.8% for primigravida and 3.3% for multigravida (χ^2 = 37.562, p = 0.021).

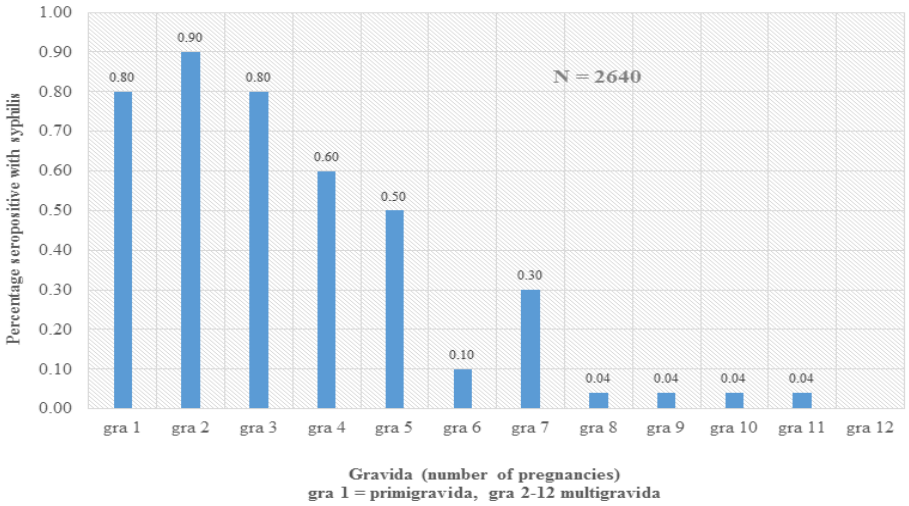

Figure-3. Syphilis seropositivity among primi- and multigravid women.
Source: Summarized from the delivery register, CCMH.

4. DISCUSSION

Syphilis infection during pregnancy still represents a worldwide public health problem, with rates of congenital syphilis rising in several parts of the world [8]. In Ghana, the Prevention of Mother to Child transmission of HIV and other sexually transmitted diseases have been fully implemented and operational. In this study we sought to assess the prevalence of syphilis infection in term pregnant women who delivered at the Cape Coast Metropolitan Hospital. The cumulative seroprevalence in this study was 4.1% with a yearly prevalence < 2.0%. This is consistent with Cape Coast syphilis seroprevalence documented in the 2017 HIV/Syphilis Sentinel Report.

An age-related descending trend of seroprevalence of syphilis was relatively observed in this study. The seroprevalence of syphilis decreased with increasing age. Term pregnant women with an age group of 22-31 years were the most seropositive (2.3%), followed by the age group of 32-41 years of old (1.1%). However, women at age group of 42 years and beyond were the least vulnerable to syphilis. These findings were in contrast to the report from Jimma hospital, Southwester Ethiopia, which revealed that the most affected age groups were 15-19 years [9]. The variations of syphilis prevalence with age may be due to the differences in sexual practices, such as number of sexual partners and unsafe sexual practices like unprotected sex. Therefore, these findings highlighted that the younger age groups are relatively prone to syphilis infection. Pregnant women who were informal workers showed the greatest number of seropositive (3.0%) followed by unemployed pregnant women. Pregnant women who were students showed the least number of seropositive and this may be due to their knowledge about the disease (that is the symptoms and treatment of syphilis). The least affected group in terms of education was those with tertiary education.

The study also found out that 18.9% of term pregnant women had no information regarding serological syphilis testing in the delivery register. Although staff admitted that they sometimes forget to input such information, juxtaposing the delivery, antenatal and laboratory registers reveals that such omissions could be minimal. This information is retrieved from the antenatal care record book at the obstetrics and gynecology department, and is usually completely filled if the client had made at least one visit (four minimum) to the clinic. According to a communication with staff at the department, this percentage constitutes mainly non-attendants and those who were rushed in for emergency deliveries. Staff further mentioned that these clients are brought to the facility only at the late stage and usually deep in the night, making it difficult for them to request for the test to be

done. The reasons pregnant women refuse to attend antenatal care clinics are not clear, although the national health insurance has a huge relieving provision for them. Some studies have shown that most pregnant women tend to be less satisfied with the physical environment, long waiting times, privacy during consultation, health care provider attitude and the provision of information or reassurance in most public facilities [10, 11]. Others are due to transportation cost to health facilities, staff training, monitoring, quality control and logistics [12]. The infection rate for these undocumented cases are currently unknown, and therefore treatment of sexual partners, which is recommended has not been adhered to World Health Organization [13], Workowski and Bolan [14].

With regards to syphilis seropositivity and educational levels, participants with tertiary level education had the lowest prevalence of 0.2%. In congruence with previous studies [15-17] we observed a higher seropositivity, ≥ 0.4%, among participants with lower levels of education. Unfortunately however, these women may also be at increased risk of syphilis infection since lower educational status appears to be an independent risk factor for congenital syphilis [18]. A community based study by Rathore, *et al.* [19] suggests that women with less education were oblivious of reproductive tract infections (RTI), and paid little attention to their genital hygiene. Further to their poor living conditions was also their inadequate health seeking behavior.

The study also compared seroprevalence among primi- and multigravida women. Those who were pregnant for the first time recorded a prevalence of 0.8% while those with ≥ 2 pregnancies had a significantly higher prevalence of 3.3%. Prevalence of RTI has been significantly associated with gravida status [19] as found in this study with the case of syphilis seropositivity.

The study has shown a cumulative seroprevalence of syphilis among pregnant women attending antenatal care at the Cape Coast Metropolitan Hospital as 4.1% (≤ 1.6% prevalence per year, over a three year period). Also, syphilis is more prevalent in the young (22-31 years) and the informal worker category.

We suggest public health strategies aiming at early detection of syphilis and treatment of infected partners. Rapid testing for non-attendants at the maternity/O&G departments is highly recommended, either before or after delivery, as laboratory services may not be available in the nights when most deliveries occur. Promotion of access to sexual healthcare services during pregnancy should be reinforced. Better surveillance data are equally essential to understand where the antenatal screening programs are failing.

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