SCHOOL OF PUBLIC HEALTH,
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA

FACTORS ASSOCIATED WITH RECURRENT VULVOVAGINAL CANDIDIASIS OCCURING IN REPRODUCTIVE-AGED FEMALE PATIENTS VISITING FIVE SELECTED HEALTH FACILITIES IN THE GA EAST METROPOLIS OF ACCRA

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE MASTER OF PUBLIC HEALTH DEGREE

JULY 2019

DECLARATION

I, Paul Osei-Prempeh hereby declare that this dissertation is a result of my independent work. References to other works have been duly acknowledged and cited. I further declare that this dissertation has not been submitted for award of any degree in this institution and any other institution elsewhere.

…… ……..

PAUL OSEI- PREMPEH

(STUDENT)

Date: 25th July 2019

DR. ALEXANDER ANSAH MANU

SUPERVISOR

DEDICATION

This work is dedicated to the Almighty God for the gift of life and strength He has provided for me up to this time. For you also, Mum, Dad and my siblings (Abigail, Lydia, Jochebed) for the care, moral guidance, and encouragement and spiritual support up to this time of my life. Lastly, I also dedicate it to dearest friends Christiana, Priscilla and all other friends for their advice and counsel.

ACKNOWLEDGEMENT

I am grateful to the Almighty God, for the continuous gift of life, strength and his immeasurable grace.

Thanks to my entire family, who have remained steadfast in prayer, love and support throughout the duration of this program.

I also wish to acknowledge the enormous guidance and contribution of my supervisor Dr. Alexander Ansah Manu.

My sincere gratitude also goes out to Dr. BismarkSarfo, the Head of Department of the Epidemiology and Disease Control department of the University of Ghana School Of Public Health and all other faculty members.

Lastly, to all my friends, loved ones and colleague post graduate students who made this course a manageable one, I say thanks to all of them.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CHP	-	Community Health Practice
GHS	-	Ghana Health Service
GSS	-	Ghana Statistical Service
HIV/AIDS	-	Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome
NHIA	-	National Health Insurance Agency
NHIS	-	National Health Insurance Scheme
OCPs	-	Oral Contraceptive Pills
OR	-	Odds Ratio
RSP	-	Reproductive System Problem
RVCC	-	Recurrent Vulvovaginal Candidiasis
VVC	-	Vulvovaginal Candidiasis

ABSTRACT

INTRODUCTION: Recurrent vulvovaginal candidiasis (RVVC) is the occurrence of more than three episodes of Candida infection in the vulva and vaginal area of women in a year. Candida infection is a yeast infection caused by various fungal species in the Candida family. RVCC is a global health problem of women with higher burdens in women with immunocompromising comorbidities and those with low occupational, environmental and personal health hygiene.

AIM: This study aimsat assessing the burden of RVVC in reproductive-aged women and highlighting the factors associated with the occurrence of RVVC.

METHODS: This was a descriptive (cross-sectional) study aimed at describing the prevalence and identifying the factors associated with recurrent vulvovaginal candidiasis (RVCC) occurring in reproductive-aged (15-49 years) female patients visiting selected hospitals in the Ga East Metropolis in Accra. The outcome variable was recurrent vulvovaginal candidiasis. The exposure variables were the factors defined *a priori* as associated with recurrent vulvovaginal candidiasis including age, marital status, occupation, and pregnancy status. Random sampling techniques were used to select 160 female patients in their reproductive ages. Data was collected with the help of structured questionnaires and an in-depth interview guide. Collected data were entered into Microsoft Excel spreadsheet and imported into Stata version 15 software for statistical analysis. Initial analysis of data included tabulation of primary statistics and graphical representation of age groups of patients having RVVC. Chi-square tests of association were done to assess the association between the explanatory variable sand RVVC. Univariable and multivariable logistic regressions models were fitted to determine the factors associated with RVCC.

RESULTS: A total of 160 study participants were enrolled in the research. The females used in the study were between the ages of 18-45 with mean age of 28.9 years.
A logistic regression for each of the sociodemographic factors was also not statistically significant. Logistic regression of the age groups 24-29, 30-35, 36-41 and above 42 against the 18-23 age group showed a statistically insignificant value for all except the age group 24-29. This group also had the highest proportion of participants with RVVC infection. The result for these sociodemographic characteristics when logistic regression

was performed was statistically not significant for all the sub-groups under occupation, religion and marital status. For the age however, the age group of 24-29 showed a statistically significant odds ratio, 6.3 (p=0.001).

CONCLUSION: The research showed that the age range of 24-29 had a higher chance of being infected with RVCC as compared to other age ranges. Thus, this age group has a higher burden of the disease than all other age groups. The burden of RVVC also rested more on office workers, the single females and Christians among the occupational, marital status and religious group classification. The occurrence of RVVC was not associated with sexual activity, and education.

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

The evolution of various forms of technology has aided the scientific community in research procedures. This includes curative researches for infectious diseases. Despite the therapeutic advances in the treatment of Candida infection, it still remains a common fungal infection that occurs among many patients, particularly women. As such, even as we seek to cure our patients, much effort should also be made on ensuring that factors that increase the risk of women being infected with Candida are well studied and appropriate preventive measures taken (Hani et al, 2015).

Candidiasis, which is also commonly known as thrush or moniliasis is a fungal infection. It is the most common opportunistic infection and is caused by Candida species (Martins et al, 2015). These fungi mostly thrive on the surfaces of mucosal membranes such as the mouth, the stomach and intestines, the vulva and vagina, as well as on epithelial tissues such as the skin. They are normal commensals at all these body parts where they are controlled by the immune system. The moist nature of these surfaces supports their existence. Their proliferation is mostly controlled by the immune system, the presence of other microbes and physical conditions such as extreme pH of the mucosal surfaces (Zhang et al, 2015). However, they can outgrow and cause infection in stressful conditions, antibiotic abuse, the presence of other genitourinary infections and poor personal hygiene (Pfaller & Diekema, 2007).

Therefore, any occurrence that offset these controlling conditions such as immune suppression and microbial death due to ingestion of broad-spectrum antibiotics will favor the growth of the fungus thereby resulting in the disease. This makes Candida infection very prominent in the immune suppressed HIV/AIDS patients where it is not only restricted to the mucosal surfaces of the mouth, stomach, throat, intestines, skin, vulva and vagina but also have the capacity to become invasive and affect the entire systems of the body (Zhang et al, 2015). Common symptoms include itching, thick whitish discharge and an inflamed vulvovaginal area (Aikman et al., 2018).

There are numerous factors that can contribute to yeast infection. Thus, Candida infection is a suitable example of an infection with multi-factorial risks factors. As a result of the rapid increase in the incidence of this infection, it is a subject of numerous studies in recent times (Hani et al., 2015). Diagnosis of the disease is quite complicated with both symptomatic and laboratory diagnosis required sometimes.

Lifestyle modification can help to prevent Candida infection since prevention is always preferred to treatment despite therapeutics being needed once the disease presents itself. This research focuses on the best possible ways in the prevention of the disease even as we probe to find the factors associated with recurrent vulvovaginal candidiasis.

1.2 STATEMENT OF THE PROBLEM

According to Javadi et al, 2014, one in every twenty women is affected with recurrent opportunistic yeast infection making it a global burden. Further, enormous amount of money is being spent daily by individuals and governments on the treatment of RVVC (Denning et al, 2018). The relatively high incidence, substantial morbidity and economic

losses (49.4 billion dollars) associated with RVCC necessitates better solutions and improved quality of care for affected women (Javadi et al, 2014). Governments across the world, Ghana inclusive, invests high amount of both human resources and capital into planning effective treatment guidelines for vulvovaginal candidiasis.

However, according to Martins et al. (2014), there is a wide variety of factors that contribute to yeast infection. These factors also explain the rapid increase in incidence of this infection and based on the findings of Martins et al. (2014) these make research into the associating factors of RVVC a good basis for more research.

Recurrent Vulvovaginal Candidiasis is debilitating and can severely affect the quality of life of the affected women (Denning et al., 2018).A research on the associating factors of RVVC in women especially in low- and middle-income country (LMICs) settings like Ghana where there exists relatively low knowledge about RVCC (Adesola et al., 2013) is therefore urgently required.

1.3 PROBLEM JUSTIFICATION

Given the increase in morbidity patterns of opportunistic infection most especially the multi-forms of Candida infection globally, the time is now to act to mitigate the burden of Candida infection especially the vulvovaginal form and all other opportunistic infections as a whole. These yeast opportunistic infections can also occur together with other bacterial infections. They individually subject patients to lot of complications and as such, their existence poses further threats and decreases chance of good therapeutic sequelae. The increase in the number of patients presenting with RVCC makes it necessary to ascertain the factors associated with the occurrence of RVVC. Knowledge about these

factors in the Ghanaian population may inform lifestyle modifications to prevent or limit the occurrence of RVCC.

There is also the need for a pragmatic and proactive approach at reducing and controlling the burden of RVVC infections as well as preventing new infections in vulnerable populations. This would be possible if the associated factors of RVVC are known. This study therefore seeks to determine the burden and factors associated with RVVC in reproductive-aged women and the inter-relationships existing between the various associated factors. The findings from this study will contribute to restructure the public health strategies to control RVVC and increase the attention given to the overall reproductive health of women in Ghana and other LMICs.

1.4 GENERAL OBJECTIVE OF THE STUDY

The study aimed to determine the factors associated with recurrent vulvovaginal candidiasis infection in reproductive-aged female patients in selected hospitals in the Ga East Metropolis of Accra.

1.5 SPECIFIC STUDY OBJECTIVES

The specific objectives of the research were:

1. To determine the prevalence and/or burden of recurrent vulvovaginal candidiasis in reproductive-aged female patients.
2. To examine for the factors (socio-economic, demographic, health and lifestyle) associated with recurrent vulvovaginal candidiasis.

1.6 RESEARCH QUESTIONS

1. What prevalence and/or burden of recurrent vulvovaginal candidiasis exists among reproductive-aged female patients in the Ga East Metropolis of Accra?
2. What are the factors that are associated with recurrent vulvovaginal candidiasis among reproductive-aged female patients in the Ga East Metropolis of Accra?

1.7 CONCEPTUAL FRAMEWORK AND NARRATION

The conceptual framework shown below in Figure 1.1 gives an insight into some of the reasons that may influence the occurrence of recurrent vulvovaginal candidiasis (Wilde et al., 2006). Recurrent vulvovaginal candidiasis depends on the Demographic characteristics of women, their knowledge and beliefs, habits and the Prevalence of vulvovaginal candidiasis (VVC).

The demographic data from the respondents shows their basic information such as age, religion, educational level, occupation and marital status. The age of females may affect their tendency to being infected with RVVC due to the different practices of the various age groups as well as the influence of certain female hormones in females of the reproductive age. Diverse religious practices undertaken by females in the different religions affect may either increase or decrease their risk of being infected with RVVC. Occupation and marital status of a female may also either reduce or increase the risk of a

female being infected with RVVC. Similarly, educational level of females affects their risk to RVVC given the access to information afforded to by the highly educated with the case of the uneducated female a vice versa.

Prevalence of recurrent vulvovaginal candidiasis (RVVC) will play a role in determining the number of females at risk of getting RVVC. Knowledge and perceptions of the recurrent vulvovaginal candidiasis (RVVC) will play a role in the response of individuals to this condition as well as their habits. A passive response to the infection will mean an increase in the prevalence of RVVC and this can be an obvious effect of negative knowledge and beliefs surrounding the disease.

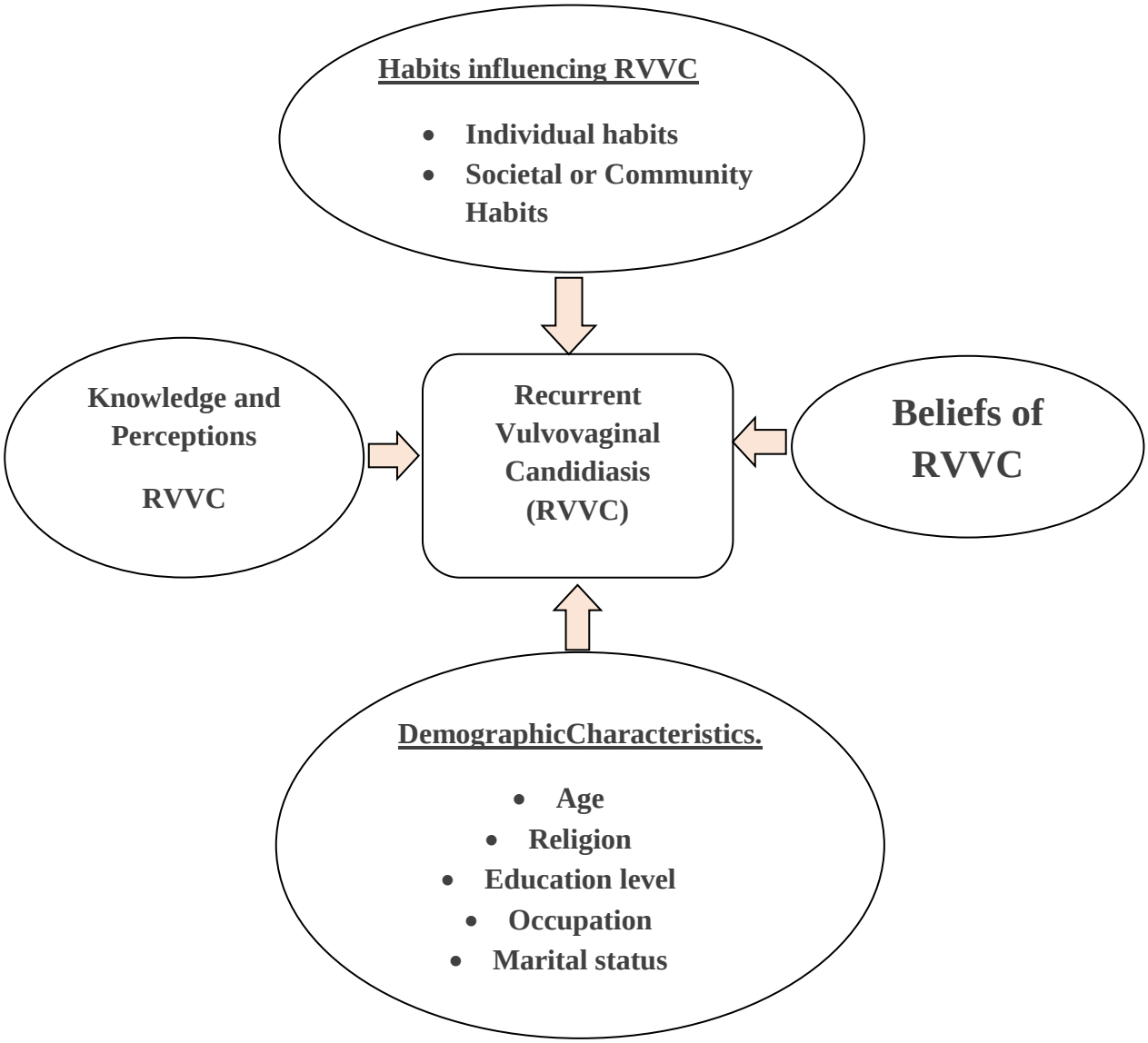

Figure 1.1: Conceptual Framework for Recurrent Vulvovaginal Candidiasis.
Source: Author's own construct

1.8 SIGNIFICANCE OF THE STUDY

A betterunderstandingof the factors associated with recurrent vulvovaginal candidiasis (RVVC) is very important to control the increasing incidence rate and prevalence of RVVC in women in Ghana. With Accra, the capital city of Ghana being the most densely populated city in the country with the highest number of females, it would be very

important to research about such a fast spreading infection among the women in the Ghana with Accra being the focus (Ghana Statistical Service, 2018). A promising outcome out of this study would help clinicians and other public health providers in various communities in Accra and the country as a whole in the pharmacologic and non-pharmacologic approach in the treatment and management of women with RVVC.

Knowledge of the associating factors of RVVC would mean more energy and resources would be channeled towards the prevention of RVVC rather than the treatment which happens to cost the government and citizens a lot of money annually.

1.9 SCOPE OF STUDY

This study focuses on the associating factors of RVCC in hospitals and health facilities in the Ga East Metropolis in Accra, Ghana. In line with this, it focuses on women and acknowledges the fact that recurrent vulvovaginal candidiasis can have multiple associating factors. Similar toApalata et al., 2014, this research focuses on the diagnosis of recurrent vulvovaginal candidiasis by way of lab findings and signs and symptoms description which mostly occurs in our hospitals and health facilities in Ghana. This is a study into the factors associated to recurrent vulvovaginal candidiasis in reproductive-aged women in the Ga-East Metropolis of Accra.

CHAPTER 2

LITERATURE REVIEW

2.1. CANDIDIASIS AND ITS DEFINITION

Candidiasis, which is also commonly known as thrush or moniliasis is a fungal infection. It is the most common opportunistic infection and it's caused by Candida species (Martins et al, 2015). These fungi mostly thrive on the surfaces of mucosal membranes such as the mouth, the stomach and intestines, the vulva and vagina, as well as on epithelial tissues such as the skin. The moist nature of these surfaces supports their existence although their growth is mostly kept in check by the immune system, the presence of other microbes and physical conditions such as extreme pH of the mucosal surfaces (Zhang et al, 2015). Therefore, any occurrences that offset these controlling conditions such as immune suppression and microbial death due to broad-spectrum antibiotics will favor the growth of the fungi thereby resulting in the disease. This makes Candida infection very prominent in the immunosuppressed HIV/AIDS patients where it's not only restricted to the mucosal surfaces of the mouth, stomach, throat, intestines, skin, vulva and vagina but also have the capacity to become invasive and affect the entire systems of the body (Zhang et al, 2015).

2.2 CAUSES OF CANDIDIASIS

Candidiasis is mainly caused by the fungus, *Candida albicans*. *Candida albicans* causes about 50-90% of human candidiasis. Other species of Candida such as *Candida glabrata*, *Candida parapsilosis*, *Candida tropicalis, Candida auris* and *Candida krusei* are currently increasingly being isolated from culture and sensitivity tests as other Candida species that causes Candidiasis (2). *Candida albicans* is part of the commensal flora of above 50% of the healthy population where it provides beneficial effect of microbial protection

especially against bacteria and other opportunistic pathogenic fungi (Martins et al, 2015). An increase in the incidence of human candidiasis has reveals the widening of the pathogenic Candida species spectrum even in the 21st century. According to Brunke et al, 2013, the balance between *Candida albicans* and non-*Candida albicans* (NCAC) species determines the profiles associated with virulence. Related to the virulence of *Candida albican* species is their capacity in forming biofilms with other species which together with the presence of teleomorph forms (sexual phase of fungi in which the same biologic entity could have two different scientific names), increases treatment difficulties resulting from altered susceptibility profiles of conservative antifungal medications (Martins et al, 2015).

2.3 SYMPTOMS OF CANDIDIASIS

The symptom of Candida infection is dependent on the site of occurrence of the infection. Candida infection in the mouth which is also called thrush mostly manifests with visible white patches on the tongue, similar to cottage cheese. Once the white patches are scraped away, the underlying tissue looks reddish and inflamed (sore). This can extend itself into the throat region amidst pain especially when swallowing, nausea, and loss of appetite and can affect the taste of food. Oral thrush can at worse end up in the stomach and intestines. Candida infection of the vagina however can cause itching, burning sensation, redness and soreness of the surrounding tissue due to local inflammation of the genital area and most prominently a thick whitish discharge (British National Formulary, 2017). The symptoms mentioned can serve as able diagnostic tools especially in the community pharmacy setting where syndromic treatment approach is mostly adhered to.

2.4 PREVENTION AND TREATMENT OF CANDIDIASIS

Although Candidiasis as an infection is rarely dangerous, it is a nuisance to a lot of individuals especially when it occurs orally and vulvovaginal thereby making it necessary to treat and prevent the occurrence of the fungal infection. Antifungal therapy is used in the treatment of Candida infection. The formulation and route of administration of the antifungal agent is dependent on the part of the body where the infection has occurred. Oral candidiasis mostly requires oral antifungal suspensions whereas pessaries are mostly used for vulvovaginal candidiasis. Oral antifungal capsules can also be used for these two types of candidiasis and all other types of Candidiasis (British National Formulary, 2018).

Prevention of candidiasis include proper drying of the body after bathing in the case of candidiasis of the skin, avoidance of vaginal douching and vulvo-anal lavatory cleansing technique in the case of candidiasis of the vulvovaginal area. Boosting of the immune system and intake of probiotics are also very critical in the prevention of candidiasis which is mainly an opportunistic yeast infection. Probiotics are live microbial feed elements which improve microbial balance of the mucosal surface of the mouth, vulva, vagina, stomach or intestines by lowering the pH of the surrounding surface (Hani et al., 2015). Probiotics are an emerging therapy in counteracting vulvovaginal and oral candidiasis. Proper personal hygiene of the mouth, body and vulvovaginal area is also important preventive measures.

2.5 RECURRENT VULVOVAGINAL CANDIDIASIS

According to the Standard Treatment Guidelines (2015), vulvovaginal candidiasis is a localized Candida or yeast infection occurring at the vulva and vaginal area of

women.*Candida albicans* causes 90% of patients with vulvovaginal candidiasis followed by *Candidaglabrata* which are non-sensitive to azoles (Hani et al).

Recurrent Vulvovaginal Candidiasis (RVVC) is usually defined as four or more episodes of symptomatic Vulvovaginal Candidiasis (VVC) within 1 year which mostly affects a small percentage of women thus, less than 5% women (Javadi et al, 2014). RVVC which is obviously a much more serious form of vulvovaginal candidiasis has not been well research about with treatment of patient seeming somehow elusive most of the time.

2.6 PREVALENCE OF RECURRENT VULVOVAGINAL CANDIDIASIS

Recurrent vulvovaginal candidiasis infection is considered as the incidence of at least 3 or 4 independent vulvovaginal candidiasis infection with specific clinical symptoms and laboratory confirmation in a year that does not have to do with antibiotic treatment (Javadi et al., 2014).Recurrent vulvovaginal candidiasis is debilitating. Long-term condition can severely affect the quality of life of the affected women (Denning et al., 2018). Not much estimates of global prevalence or lifetime incidence of this disease have been reported (Denning et al., 2018).

A population-based studies in India published between 1985 and 2016 that reported on the prevalence of recurrent vulvovaginal candidiasis defined its prevalence as four or more episodes of the infection every year (Denning et al., 2018). Worldwide, recurrent vulvovaginal candidiasis affects about 138 million women annually with a global prevalence of 3871 per 100000 women (Denning et al., 2018). 372 million women are affected by recurrent vulvovaginal candidiasis over their lifetime. The 25-34-year age group has the highest prevalence of 9% (Denning et al., 2018).

By the year 2030, the population of women with recurrent vulvovaginal candidiasis is estimated to increase to almost 158 million, resulting in 20,240,664 additional cases with current trends using base case estimates in parallel with an estimated growth in females from 3.34 billion to 4.181 billion which could reduce productivity cost up to 14.39 billion US dollars annually (Denning et al., 2018).

2.6.1 Disease Pathogenesis and Treatment

The disease progression of RVVC is not fully understood, and most females with RVVC have no distinct underlying or predisposing condition. *C. glabrata* and other forms of *nonalbicans* species of *Candida* are observed in approximately 10%–20% of women with RVVC. Therapy with antifungal agents are not as effective against these nonalbicans species as against *C albicans*..Each singular episode of RVVC caused by *C. albicans* responds quite well to short duration therapy of topical or oral azoles. Nonetheless, to maintain therapeutic and clinical control, some microbiology specialist physicians rely on a longer duration of first therapy (e.g., 7–14 days of topical therapy or a 100-mg, 150-mg, or 200-mg oral dose of fluconazole every third day for a total of 3 doses [day 1, 4, and 7]) to arrest disease progression before starting a maintenance antifungal ltreatment regimen (British National Formulary, 2018).

Oral fluconazole (i.e., 100-mg, 150-mg, or 200-mg dose) taken weekly for a period of 6 months is the first line therapy for long-term treatment. If this course of therapy is not possible, topical treatments used sporadically can also be considered (British National Formulary, 2018). Maintenance therapies can have suppressive effect and are effective in reducing RVVC. Conversely, 30%–50% of females will have recurrent disease after

maintenance therapy is discontinued. Symptomatic women who remain culture-positive despite maintenance treatment should be managed in connection with a specialist.

2.6.2 Severe VVC

Severe vulvovaginitis (i.e., widespread vulvar reddening, swelling, excoriation, and formation of fissure) is associated with a reduced clinical response rates in people treated with short duration of topical or oral antifungal therapy. Either 7–14 days of topical azole or 150 mg of fluconazole in two sequential oral doses (subsequent dose 72 hours after first dose) is advised.

2.6.3 Nonalbicans VVC

Since no less than 50% of women with positive cultures for non-albicans *Candida* might be slightly symptomatic or have no symptoms and because successful treatment is often difficult, clinicians should make much effort to eliminate other causes of vaginal symptoms in females with non-albicans *Candida* infection (Martins et al., 2015). The best possible treatment of non-albicans VVC remains unknown. Options consist of long therapy (7–14 days) with a non-fluconazole azole regimen (oral or topical) as first-line therapy. If recurrence happens, 600 mg of encapsulated boric acid is recommended, used vaginally once daily for 2 weeks. This treatment regimmen has clinical and is able to eradicate fungal rates of approximately 70% (Javadi et al., 2014).

2.6.4 Management of Sex Partners

Not much research has been done on the management of other sexual partners with *Candida* infection. Having multiple sexual partners does not also directly associate with the Candida infection according to research.

2.6.5 Special Considerations

Compromised Host Immunity

Women with primary immunodeficiency, those with uncontrolled diabetes or other immunodeficient conditions (e.g., HIV), and those receiving immune-suppression therapy (e.g., steroid therapy) do not respond as well to short duration therapies. Efforts to correct changeable factors should be made, and more long-lasting (i.e., 7–14 days) principal treatment is necessary.

Pregnancy

VVC and thus RVVC usually happens during pregnancy. Only topical azole therapies, applied for 7 days, are recommended for use among pregnant women.

HIV Infection

Vulvovaginal *Candida* colonization ocurrences among females with HIV infection are more than that among seronegative females with identical demographic and risk behavior characteristics, and the colonization rates is associated with rising severity of immune-suppression. Also RVCC and VVC are more rampant in women with HIV infection and similarly associate with severity of immunodeficiency. In addition, among females with HIV infection, systemic azole exposure is linked with the isolation of non-albicans species of *Candida* from the vulva and vagina.

Based on existing data, treatment for complicated and uncomplicated VVC in women with HIV infection should not be different from that for seronegative females. Even though extended preventive therapy with fluconazole at a dose of 200 mg weekly has been very useful in decreasing symptomatic VVC and *C. albicans* colonization and (Geiger et

al,1995), this regimen is not recommended for women with HIV infection in the absence of complicated VVC (Geiger et al,1995). Despite VVC being associated with higher HIV seroconversion in HIV-negative and higher HIV cervico-vaginal levels in women with HIV infection, the effect of therapy for VVC on HIV acquisition and transmission remains unclear.

CHAPTER 3

METHODOLOGY

3.1 STUDY AREA

The selected study area was the Ga East Municipal Area, Accra within the Greater Accra region of Ghana as shown in Figure 3.1. Five hospitals in the Ga East Municipal Area were chosen for the research. The hospital setting is the appropriate place for diagnosis of such infections like recurrent vulvovaginal candidiasis due to the presence of a clinician who can diagnose the disease with presenting signs and symptoms. Laboratory results will confirm the presence of *Candida sp*. The selection of this study area is defined by the fact that the hospital is mostly preferred by individuals with recurrent vulvovaginal candidiasis given the confidence and assurance they have in the medical officer.

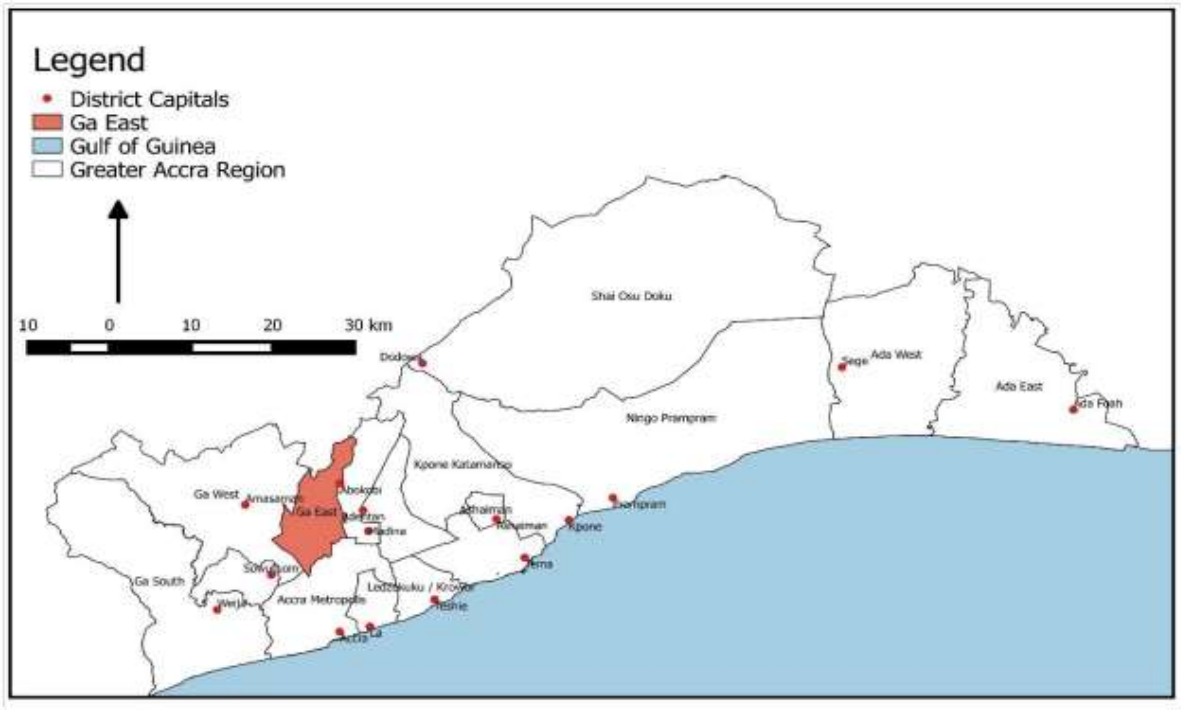

Figure 3.1: Map of Ga East Municipal Assembly (Source: http//www.researchgate.net/figure/map-of-Ga-East-Municipal)

2.2. STUDYDESIGN AND DATA COLLECTION

This was a cross-sectional study design. The research made use of the quantitative research method. Data for the study was obtained from a primary source thus first-hand information would be gained from the study participants. The primary data was gathered by the researcher himself. The main data collection techniques that were made use of in this research are survey questionnaires and in-depth interview and recordings.

2.2.1. STUDY PARTICIPANTS

The study participants were chosen from the study population of females in the reproductive age group (between 18 and 49 years) (Nketiah-Amponsah, 2012) visiting any of the five hospitals Ghana Atomic Energy Commission (GAEC) Hospital, Ashongman Community Hospital, Sam J Hospital, Kwabenya Community Hospital and

AbokobiHealth Centre all in the Ga East Municipal on data collection days. The data collection days were from Monday, 8th July, 2019 to Friday, 19th July, 2019.

Inclusion criterion

Theinclusion criteria were that the participants will be only women between the ages of 15-49 years who give written informed consent to participate in the study.

Exclusion criteria

Patients who werefemales less than exact age 15 or females more than exact age 49 were excluded from this study.

3.2.2. SAMPLING TECHNIQUE

Random sampling technique was used for this research within the various hospitals as research participants with the condition of interest (RVVC) in those hospitals, were chosen at random from the hospital within which the research is going to take place. A ballot of 'yes' and 'no' was being done. Female patients who chose 'yes' took part in the research. Female patients who chose 'no' did not take part of the research. The whole balloting process was explained to the female patients before the ballot itself took place. This random selection method of sampling technique ensured that there were no forms of selection bias by the researcher. Study participants were equally shared among the five hospitals to be used to this particular research namely: Ghana Atomic Energy Commission (GAEC) Hospital, Ashongman Community Hospital, Sam J Hospital, Kwabenya Community Hospital and Abokobi Health Centre. Thus, approximately 32 participants were required from each of the five health facilities.

3.2.3. SURVEY QUESTIONNAIRES

The survey questionnaires were used to help obtain data from respondents or study sample that will be selected from the study population. Questionnaires were used to collect the data with the desired sample population estimated to be approximately 160 study participants.

The questionnaires were divided into two sections which are the biodata section of the study participants and the other section which will capture response on various other potential associating factors of RVVC in women and the degree of their occurrence.

Questionnaires included close-ended questions and open-ended depending on the desired response of the entity and ethics thereof. The systematic sampling technique was used as the sampling technique for the selection of the study area facilities. Participants in every facility were however selected randomly. Questionnaires were distributed to all study participants and were given made use of to get some vital information from certain volunteers among the study participants.

A flexible mode of interview was employed with the volunteering respondent given enough freedom and choice on the direction of the interview concerning the chosen topic of discussion which falls within the confines of the perspective of an open-ended interview recommended by Nicholas, 2000.

3.3 SAMPLE SIZE

According to Azar and Momeni (2005), research populations are divided into two different types namely the restricted and unrestricted. In this research, patients or participants are

restricted both for sex in which case only women are chosen and then age in which case only women above the age of 18 years are chosen. The Cochran's sample size formula of 1967 would be used in the calculation of the sample size of the study participants:

$$n = \frac{Z^2_{1-\alpha/2}\, p\,(1 - p)}{\varepsilon^2}$$

In this formula, 'n' represents the sample size to be calculated, while 'P' represents the estimated highest proportion of females with RVVC which is 9% from a global research (Denning et al, 2018). The value of 'ε' (margin of error) lies on the required confidence level that the researcher works around. If the confidence level is 95%, then the "ε" value will be 0.05. In this research, 95% confidence level adopted and thus a total of 126 participants will be required. However, to make provision for non-responses and/ or withdrawals, a total of 160 participants will be used for the study.

3.4 STUDY VARIABLES

The dependent variable for this research is the recurrent vulvovaginal candidiasis which was determined with a positive laboratory test and a confirmation of a collection of signs and symptoms such as whitish discharge, itchiness, pain and redness of the vulva. This is a categorical variable as there is no measure thereof but rather either the existence or non-existence of the RVVC.

The independent variables are the factors influencing causes of the RVVC which possibly include the age, marital status, sexual activity and history of any Urinary Tract Infection.

3.5 DATA ANALYSIS

The gathered data were entered using Microsoft Excel 2010 Version. Data was analyzed with the use of the STATA Statistical Software version 15.Basic statistics were generated to summarize the data under age groupings of 18-23, 24-29, 30-35, 36-41 and > 41 in a tabular form. Grouping of data for the various age groups was done with a pictorial view of burden of RVVC among the various age groupings(18-23, 24-29, 30-35, 36-41 and > 41) shown with a bar graph. Measures of spread such as the mean group were also being performed for the sociodemographic factors. Proportions of study participants in each subgroup under the sociodemographic factors were being determined. The percentage of individuals in each subgroup that had the outcome of interest, RVCC was also being calculated. A Univariate logistic regression model was being fitted to assess association between the outcome and the associated factors. All factors for which the p-value of association was<0.05 had their odds ratio taken as being statistically significant.

3.6 ETHICAL CONSIDERATION OR APPROVAL

3.6.1 ETHICAL AND STUDY AREA APPROVAL

Ethical approval was obtained from the Ghana Health Service (GHS) Ethics Committee Board and the University of Ghana Ethics Committee. The ERC number given was GHS-ERC 026/06/19. Approval was also be sought from the various hospitals.

Informed Consent

Participation in study was voluntary, no coercion was used and participants were assured that refusal to participate will have no effects on the care they receive in any facility. Willing participants were made to sign an informed consent form expressing their willingness to participate in the study.

3.6.2 CONFIDENTIALITY

Anonymity of participants was assured by coding all questionnaire suniquely using numbers and by not recording names of participants. Confidentiality of information given by clients was upheld. The research findings will be presented to the stakeholders after completion of the study.

3.6.3 RISK/BENEFIT AND COMPENSATION

No known risk was associated with participating in the study and as such no compensation was given to the participants.

CHAPTER 4

RESULTS

4.1. SOCIODEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS

The sociodemographic characteristics that were considered for this study included the age, occupation, marital status and religion. A total of 160 study participants were enrolled in the research. The females used in the study were between the ages of 18-45 with mean age of 28.9 years.

Proportions of the study participants in each age group, occupation, religion and marital status were performed and expressed as percentages. The age group of 24-29 had the highest number of participants with 29.4% percent of the total 160 participants followed by the 18-23 and 30-35 age groups with 25.6% and 24.4% respectively. Office workers were reported to have the most representation with 50% of the study participants. The study also involved 14.4% of traders and 25% of unemployed people. Also, 90% of the study participants were reported to be Christians whereas the Muslim representation among the study participants was 4%. Under the marital status, single and married individuals reported 58.1% and 39.4% of the study participants respectively.

The proportion of the study participants in each age group with the outcome of interest, RVVC were also determined. Among the age groups, 37 out of 47 participants (78.7%) in the age range of 24-29 had the outcome of interest, RVVC. This was followed by the 30-35, 36-41, 42 and above and 18-23 age groups with 48.7%, 36.4%, 36.4%, and 34.2% respectively of their numbers having RVVC. Office workers and the unemployed reported with 57.5% and 71.4 respectively of them having the outcome of interest. Out of 145 Christians, 75 of them (51.7%) reported with the outcome of interest. Four (4) out of 7

Muslims (57.1%) also had the outcome of interest. Fifty-seven percent (57%) and 47.3% of the married and the single respectively had RVVC. These results are shown in Table 4.1, Table 4.2 and Table 4.3.

The proportion of study participants with the outcome of interest, RVVC in each sociodemographic group was also shown in the form of a bar chart in Figure 4.1.

Table 4. 1. Number and percentage of RVVC in various sociodemographic groups

Sociodemographic	No. of females (%)	Yes (%)RVVC	No (%)RVVC
Age group			
18-23	41(25.63)	14(34.15)	27(65.85)
24-29	47(29.38)	37(78.72)	10(21.28)
30-35	39(29.38)	19(48.72)	20(51.28)
36-41	22(13.75)	8(36.36)	14(63.64)
42 above	11(6.88)	4 (36.36)	7(63.64)
Occupation			
Office work	80(50.00)	46(57.50)	34(42.50)
Farming	2(1.25)	1(50.00)	1(50.00)
Trader	23(14.38)	8(34.78)	15(63.22)
Unemployed	7(4.38)	5(71.43)	2(28.57)
Student	40(25.00)	18(45.00)	22(55.00)
Others	8(5.00)	4(50.00)	4(50.00)
Religion			
Christian	145(90.63)	75(51.72)	70(48.28)
Moslem	7(4.38)	4(57.14)	3(42.86)
Traditionalist	3(1.88)	2(66.67)	1(33.33)
Others	5(3.13)	1(20.00)	4(80.00)
Marital Status			
Single	93(58.13)	44(47.31)	59(52.69)
Married	63(39.38)	36(57.14)	27(42.86)
Divorced	1(0.63)	1(100.00)	0(0.00)
Widowed	1(0.63)	0(0.00)	1(100.00)
Others	2(1.25)	1(50.00)	1(50.00)

4.2. CRUDE ODDS RATIO OF SOCIODEMOGRAPHIC FACTORS AND RVVC

The result for these sociodemographic characteristics when logistic regression was performed was statistically not significant for all the sub-groups under occupation, religion and marital status. For the age however, the age group of 24-29 showed a statistically significant odds ratio, 6.3 (p=0.001). The odds ratio and p-value for the respective age groups were provided.

4.1.Age group associated with those who have RVVC by percentage.

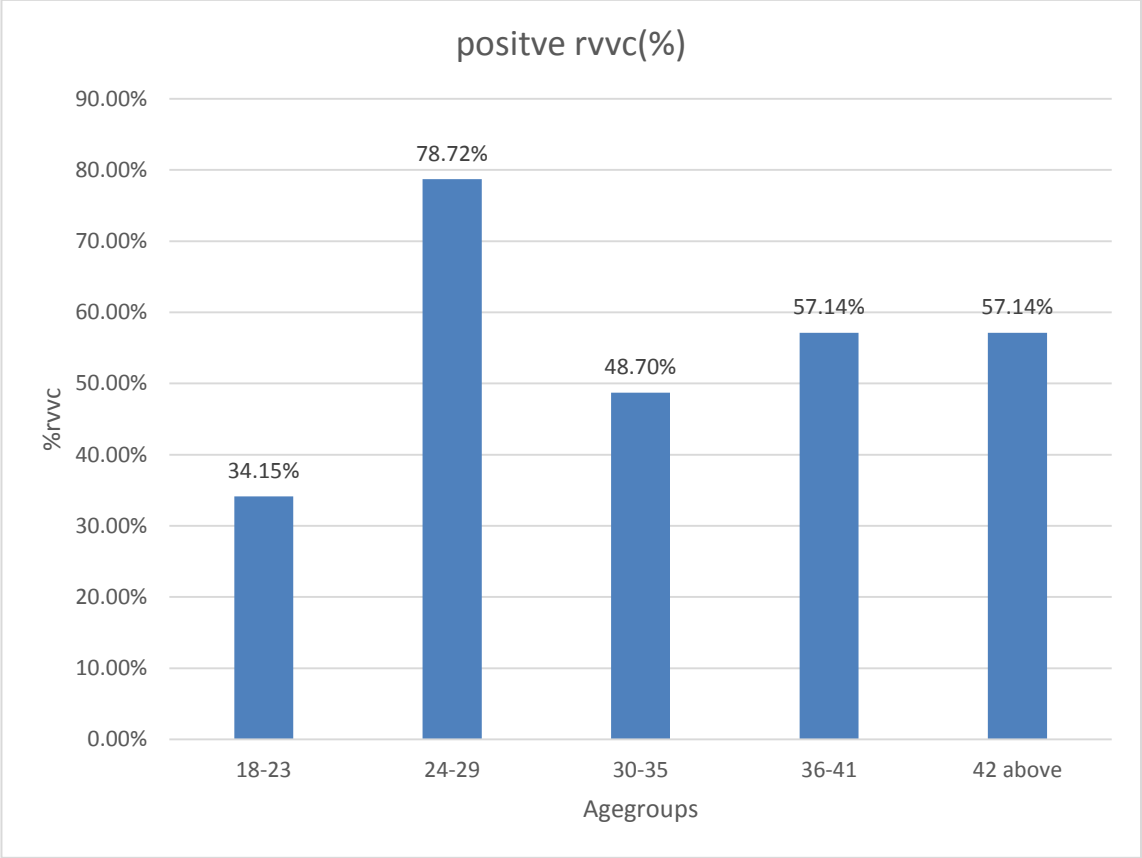

Table 4. 2. Logistic regression with associated socio-demographic characteristics

Sociodemographiccharacteristics	160(%)	Oddsratio	p-value
Age group		**0.75**	**0.094**
18-23	41(25.63)	1.0	0.000
24-29	47(29.38)	6.3	0.001
30-35	39(24.38)	1.6	0.431
36-41	22(13.75)	0.87	0.831
42 above	11(6.88)	0.75	0.732
Occupation		**0.85**	**0.118**
Office work	80(50)	1.0	0.000
Farming	2(1.25)	0.85	0.911
Trader	23(14.38)	0.4	0.060
Unemployed	7(4.38)	1.5	0.624
Student	40(25)	0.45	0.111
Others	8 (5)	0.76	0.710
Religion		**0.82**	**0.479**
Christian	145(90.3)	1.0	0.000
Muslim	7(4.38)	1.32	0.728
Traditionalist	3(1.88)	1.9	0.615
Others	5(3.13)	0.26	0.235
Marital status		**1.4**	**0.234**
Single	93(58.13)	1.0	0.000
Married	63(39.38)	2.0	0.086
Divorced	1(0.63)	1.00	1.00
Widowed	1(0.63)	1.00	1.00
Others	2(1.25)	1.55	0.768

4.3. SYMPTOMS ASSOCIATED WITH RVVC

The various symptoms which could be associated with the RVVC were also shown in Table 4. The respective proportion as expressed in percentages of the individuals with each symptom among the entire study participants was also included in Table 4.

A bar chart showing the individuals having RVVC for each group of people with a particular symptom was pictorially projected as shown in Figure 4.2.Among the study participants presenting with RVVC, 61.9%, 57.9%, 60.0%, 51.4%, 66.7%, 69.1%, 93.0%,

90.9%, 76.8%, and 68.5% presented with vaginal itching, vulvar itching, vaginal burning, vaginal dryness, vaginal discharge, sex pains, pelvic pains, vulvovaginal rashes, and worrying due to symptoms respectively.

Figure 4. 2. Bar Chart of Symptoms of patients with RVVC

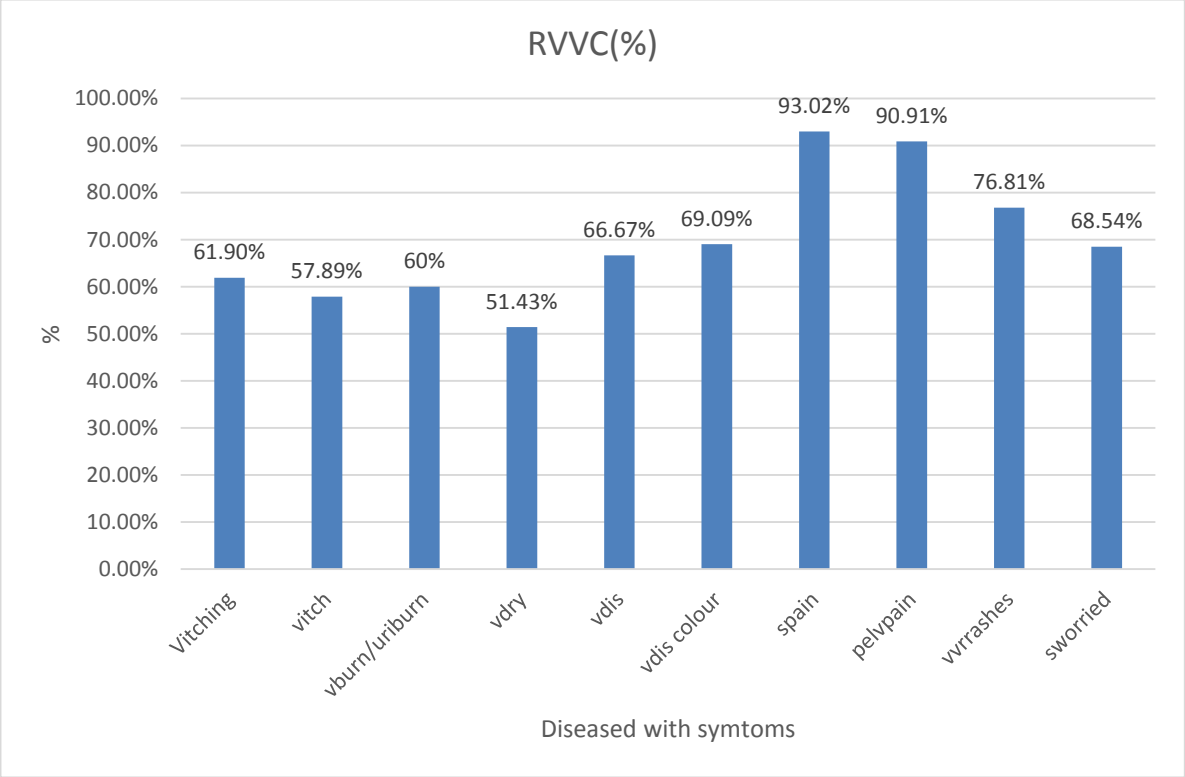

Table 4. 3: RVVC disease with symptoms by proportions

Symptoms	160(%)	Yes (%)RRVC	N0 %(RRVC)
Vaginal itching			
Yes	21(13.13)	13(61.90)	8(38.1)
No	139(86.88)	69(49.64)	70(50.36)
Vulva itching			
Yes	57(35.63)	33(57.89)	24(42.11)
No	103(64.38)	49(47.57)	54(52.43)
Vagina/Urinary burn			
Yes	38(23.750	22(57.89)	16(42.11)
No	122(76.25)	69(49.18)	62(50.82)
Vaginal dryness			
Yes	35(21.88)	18(51.43)	17(48.57)
No	125(78.13)	64(51.20)	61(41.80)
Vaginal discharge			
Yes	45(28.13)	30(66.67)	15(33.33)
No	115(71.88)	52(45.22)	63(54.78)
Colored discharge			
Yes	55(34.38)	38(69.09)	17(30.91)
No	105(65.63)	44(41.90)	61(58.10)
Sex pains			
Yes	43(26.188)	40(93.02)	3(6.98)
No	117(73.13)	42(35.90)	75(64.10)
Pelvic pains			
Yes	44(27.50)	40(90.91)	4(9.09)
No	116(72.50)	42(36.21)	74(63.69)

Symptoms	160(%)	Yes (%)RRVC	No %(RRVC)
Vulvovaginal rashes			
Yes	69(43.13)	53(76.81)	16(23.19)
No	91(56.88)	29(32.87)	62(68.13)
Worrying symptoms			
Yes	89(55.63)	61(68.54)	28(31.46)
No	71(44.38)	21(29.58)	50(70.42)

4.4. HABITS OR CONDITIONS INFLUENCING RVCC

Logistic regression was also performed for study participants who were sexually active and the outcome of interest, RVVC to find the association as shown in Figure 4.3.

The presence of certain medical conditions or procedures and drugs or beverages for a study participant and its association with RVVC was presented in the form of percentages in Table 4.5.

It was reported that participants with history of heavy flow and other reproductive system problems like endometriosis and fibroid had approximately 47% of them having RVVC. Participants concerned about affordable cost of treatment (48%) had less cases of RVVC as compared to those who were not registered with NHIS and had RVVC (54%).

Table 4. 4: Number and Percentages of RVVC in Females with Other Medical factoors

Symptoms	160(%)	Yes (%)RRVC	No %(RRVC)
Heavy Flow/ Other RSP			
Yes	36(22.50)	17(47.22)	19(52.78)
No	124(77.50)	65(52.42)	59(47.58)
Steroid/ OCPs			
Yes	9(5.63)	3(33.33)	6(66.67)
No	151(94.38)	79(52.32)	72(47.68)
Coffee/Herbal			
Yes	33(20.63)	19(57.58)	14(42.42)
No	127(79.38)	63(49.61)	64(50.39)
Exercise			
Yes	113(70.63)	61(53.98)	52(46.02)
No	47(29.38)	21(44.68)	26(55.32)
UTI/STD			
Yes	30(18.75)	18(60)	12(40)
No	130(81.25)	64(49.23)	66(50.77)
Douche			
Yes	32(20)	16(50)	16(50)
No	128(80)	66(51.56)	62(48.44)
Healthfacility			
Yes	155(96.88)	79(50.97)	76(49.03)
No	5(3.13)	3(60.00)	2(40.00)

Symptoms	160(%)	Yes (%)RRVC	No %(RRVC)
Affordcost			
Yes	21(13.13)	10(47.62)	11(52.38)
No	139(86.88)	72(51.80)	67(48.20)
Nhis			
Yes	129(80.63)	65(50.39)	64(49.61)
No	31(19.38)	17(54.84)	14(45.16)

Figure 4. 3: Logistic regression using RVVC with sexual activity (there is no association)

```
Logistic regression                             Number of obs     =        160
                                                LR chi2(1)        =       0.17
                                                Prob > chi2       =     0.6842
Log likelihood = -110.77082                     Pseudo R2         =     0.0007

------------------------------------------------------------------------------
          AK | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          AN |   1.168651   .4482711     0.41   0.685     .5510371    2.478498
       _cons |   1.016129   .1817765     0.09   0.929      .71561     1.44285
------------------------------------------------------------------------------
Note: _cons estimates baseline odds.
```

CHAPTER 5

DISCUSSION

5.1. GENERAL DISCUSSION

The aim of this particular study was to determine the factors associated with recurrent vulvovaginal candidiasis infection in reproductive-aged female patients in the Ga East Metropolis of Accra. The main findings in this study was the burden of RVVC existed more with the 24-29-year age range the other age ranges that classification as made in the study. This age range had 37% of them having the outcome of interest RVCC.

There was also in general more RVVC burden for the younger age groups that the fairly older age groups. The burden of RVVC also rested more on office workers, the single females and Christians among the occupational, marital status and religious group classification. The occurrence of RVVC was not associated with sexual activity, and education. Certain symptoms and conditions could be associated with the outcome of interest RVVC.

5.2. SOCIODEMOGRAPHIC FACTORS ASSOCIATED WITH RVVC

For the age groups, the age ranges that were used are 18-23, 24-29, 30-35, 36-49 and then 42 and above.

The age group of 24-29 contributed the most participants which represented 29.38% of the total 160 participants. This was closely followed by the age group of 18-23 and 30-35 who represented 25.63% and 24.38% respectively. The age groups of 36-49 and 42 and above had the least percentage representation with percentages of 13.75 and 6.88 percent respectively. The higher hospital visits for the24-29-year groups indicate that this year group is more affected by reproductive and sexuality issues which agrees with the findings

of Denning et., al, 2018. Females within this age group of 24-29 are young and mostly curious about anything happening with their sexuality. The age group of 24-29 also forms part of the youth who in general forms the largest proportion of the population of Ga-East Metropolis and Ghana as a whole.

For the occupation, participants who work in the office had the most representation (50%) followed by student, traders, others, unemployed, and farming with representations of 25%, 14.38%, 5%, 4.38% and 1.25% respectively. This shows that office workers visit the hospital more often than traders, farmers, students and unemployed people. This may be because office workers are relatively highly educated as compared to individuals in the other occupational backgrounds. For religion as a sociodemographic factor, participants belonging to Christianity had the highest percentage representation of 90.30% followed by Muslims, Other religious groups and Traditionalists with percentage representations of 4.38%, 3.13%, and 1.88%respectively.

The higher representation of Christians among the study participants is because of their already high representation among the Ghanaian populace. For marital status, those who were single had the highest representation of 58.13% followed by those who were married, others, divorced and widowed with 39.38%, 1.25%, 0.63% and 0.63% percent respectively. This may be because single females are equally concerned about their sexuality as are the married. The widowed and the divorced are not so much worried about their sexuality compared with the later.

The percentage or proportion (as expressed in 100 percent) of participants with RVVC in the various groupings of the sociodemographic factors were being calculated. This value showed which of the sub groupings under each of the sociodemographic groups had more cases of RVVC. The cases were however expressed as a percentage of the number of participants in that particular sub group under the given sociodemographic factor. Under

the age groups, the 24-29 group had the highest percentage with RVVC with 78.72% followed by groups 30-35, 36-41, 42 and above and then 18-23 with percentages of 48.72%, 36.36%, 36.36% and 34.15% respectively. This shows that the 24-29 age groups developed RVVC more than the other age groups. This result is consistent with the findings of Denningset. Al, 2018 which identifies the age range of 25-34 as having the highest prevalence of RVVC.

The bigger part of the age group of 24-29 can be found within the 25-34- year age group in Denning et., al. The 24-29 age group therefore has a greater chance of developing RVVC as compared to the other age groups. Inversely, the age groups of 18-23, 36-41 and then 42 and above had more participants with no RV VC representing percentages of 65.85, 63.64 and 63.64 respectively. They therefore have less chance of developing RVVC as compared to the other age groups.

For the occupation, the participants working in the office had a percentage of 57.50% for the RVVC infection followed by those who farm and others both with 50% of their total numbers. Students and traders had the least with percentages of 45.00% and 34.78% respectively.

For religion as a socio demographic factor, the percentages of the participants with RVCC for each of them were 66.67%, 57.14%, 51.71% and 20.00% respectively for traditionalists, Muslims, Christianity and others. For the marital status, the percentages of the participants with RVCC for each of them were 100.00, 57.14, 50.00, 47.31, and 0.00 for the divorced, married, single and the widowed respectively.

Table 3 is a table showing the output of a logistic regression of the various sociodemographic factors. The table captures the odd ratio for each of the four sociodemographic characteristics which are age group, occupation, marital status and

religion. The odd ratio in this case is the ratio of the odds of having RVVC against the odds of not having RVVC. No statistical significance was achieved for the entire sociodemographic factors when a logistic regression analysis was being done. The logistic regression shows both the crude odds ratio and the adjusted odds ratio

However, when comparisons were being made within the groups and an interaction was been introduced for the logistic regression for the age groups, there was a significant odds ratio of 6.3 with a p-value of 0.001 which implies that the age group of 24-29 is associated with RVVC. Thus, people within the age group 24-29 have more than 6 times odd or chance of being infected with RVVC than people who are in the age group 18-23. The other age groups however showed no significant odds ratio when compared to the age group of 18-23.

Figure 3 is a bar graph of the %RVVC against the various age group classifications. It can be seen from the figure that the age group of 24-29 shows the highest level of RVVC with a percentage of 78.72%. This is followed by the 36-41, 42 and above, 30-35 and 18-23 age groups with the percentage occurrence of 78.72%, 57.14%, 57.14%, 48.70% and 34.15% respectively. This therefore shows that females of the age group 24-29 have the highest chance of being infected with RVVC.

5.3. SYMPTOMS ASSOCIATED WITH RVVC

RVVC was being diagnosed with the help of the laboratory testing in the research. However, certain signs and symptoms have always gone together with RVVC (Martins et. al, 2014). Some of these symptoms and signs which accompany the infection were being included in the in-depth questionnaire. They include vulva and vaginal itching, vulva and vaginal burning sensation, burning sensation of the urinary tract, vaginal dryness, clear

vaginal discharge, colored vaginal discharge, pain in the vulva and vaginal area, pelvic pain, and then vulvovaginal rashes. Out of the 160 participants, 13.3%, 35.63%, 23.75%, 21.88%, 28.13%, 34.38%, 26.19%, 27.50%, and 43.13% experienced vulva and vaginal rashes, vulva and vaginal burning sensation, burning sensation of the urinary tract, vaginal dryness, clear vaginal discharge, colored vaginal discharge, pain in the vulva and vaginal area, pelvic pain, and then vulvovaginal itching respectively.

The tendency of vulvovaginal symptoms to affect the psyche of females was also being ascertained. Of the 160 participants, eighty-nine (89) of them representing 55.63% had disturbed psyche while having any of the symptoms that have been mentioned above. 61(68.54%) out of these 89 participants were infected with RVVC. The bar chart below, Figure 4 shows the number of participants diagnosed with RVCC out of who showed each of the various symptoms. Those with vulvovaginal and pelvic pain had the highest percentages of RVVC which were 93.02% and 90.91% respectively. Those with vulva itching, vagina itching, burning sensation of the vagina or urinary tract, vaginal dryness, vaginal discharge, colored vaginal discharge, vulvovaginal rashes and worried psyche had percentages of 61.90, 57.89, 60, 51.43, 66.67, 69.09, 76.81, 68.54 respectively.

5.4. OTHER POSSIBLE FACTORS ASSOCIATED WITH RVVC

There was no statistical significance when the educational levels of participants were regressed with RVVC. Table 5 is about the number and percentages of RVVC in females with medical conditions or taking some medication. The medical conditions include heavy menstruation, endometrial, ovarian issues and fibroid, coffee intake, exercise, use of herbal medicine, vaginal douching (Geiger et. al, 1995), and other related affordable hospital cost¸ having NHIS, and availability of health facility with RVCC percentages of

47.22, 33.33, 57.58, 53.98, 60, 50, 50.97, 47.62, and 50.39 respectively. Thus, females who were involved in vaginal douching had a higher chance of being infected with RVCC as compared to those who were not douching. Likewise, females who were taking herbal medications also had more than half of them having RVVC. This means that some herbal medicines could possibly be associated with the disease. It was however not determined the type of herbal medicines they were using. Logistic regression which was done for participants using the herbal medicines was also not significant.

There was also no statistical significance when the logistic regression was run for RVVC and sexual activity.

5.5. LIMITATIONS

The study was subject to some limitations. Firstly, the research failed to capture some other factors that could influence the occurrence or not of *Candida* infection such as the type of underwear being used, the type of clothes worn and then the type of sanitary pad used during the menstrual period. Secondly, the results that were obtained from the research cannot be generalized to fit what happens with the whole population of Ghana. In addition to this, interviewer, respondent and recall bias may have influenced the response provided by study participants during the in-depth interview and filling of questionnaires.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1. MAJOR FINDINGS

The burden of RVVC existed more with the 24-29 year age range the other age ranges that classification as made in the study. This age range had 37% of them having the outcome of interest RVCC. There was also in general more RVVC burden for the younger age groups that the fairly older age groups. The burden of RVVC also rested more on office workers, the single females and Christians among the occupational, marital status and religious group classification. The occurrence of RVVC was not associated with sexual activity, and education. Certain symptoms and conditions could be associated with the outcome of interest RVVC.

6.2. GENERAL CONCLUSION

The research was about the factors associated with vulvovaginal candidiasis in female patients of the reproductive age visiting the Sam-J, Ashongman Community, Kwabenya Community, and GAEC Hospitals. From the research there was high burden of RVVC infection in females in the age range of 24-29. A higher burden of the disease also exists among both the single and married, office workers and then Christians as a whole. The disease is therefore more distributed among females who are Christians, younger, the single, the married and those working in the office environment. Females infected with RVVC were affected by it both physically (intimacy) and emotionally with cost of treatment and registration of NHIS playing a part in earlier treatment or not.

It was also discovered from the research that most of the symptoms that comes along with RVCC can be used as a first tool to screen for individuals among whom it will be necessary to test for RVCC. These symptoms include vulva and vaginal itching, urinary tract burning sensation, vaginal dryness, vaginal discharges, pelvic pain, and vulva rash. These symptoms do not explicitly mean an individual would have the infection though.

Association was not found between the sociodemographic factors (occupation, marital status and religion) and RVVC from the research except for age where those in the age bracket of 24-29 were found to be more at risk to RVVC than females of the other age ranges. Education status, breast feeding, sexual activity, use of steroids, OCPs, coffee, pregnancy, vaginal douching and herbals were also not associated with RVVC. Vaginal Douching and pregnancy were however found to be associated with RVVC in some earlier publications.

6.3. RECOMMENDATIONS

Although being a weak one, an association was found between the age groups and RVVC. Further extensive research should be conducted to ascertain the nature of the association that exists between age, sexual activity and medical conditions on the occurrence of RVVC. This will tell us whether the association is that of a confounder or an effect modifier.

The burden of RVVC in this study was more with the 24-29 year age group. More studies also ought to be done to depict the burden of RVVC on the entire nation. This will help regulators and policy makers to know the burden of the disease among the entire population.

REFERENCES

Abbott, J. (1995). British National Formulary. Clinical and Microscopic Diagnosis of Vaginal Yeast Infection: A Prospective Analysis. Annals of Emergency Medicine.25(5).587-591.

Aikman, K & Bloor, R. (2018).British National Formulary.Royal Pharmaceutical Society.7(2) 758.

Amsel, R., Totten, P.A., Spiegel, C.A., Chen, K.C., Eshenbach, D. & Holmes, K.K.(1983). Non-Specific vaginitis.Diagnosti criteria and microbial and epidemiologiassociations.American Journal of Medicine. 74(1), 14-22.

Asare, B.A., Awuku, Y.A., Ofei, E.V, Badoe F.W., Dzradosi, K.O. &Kodua, A. (2012). Standard Treatment Guidelines.Ministry of Health. 7.656.

Atashi, J., Poole, C.&Ndumbe, P.M. (2008) Bacterial Vaginosis and HIV acquisition: A Meta-analysis of published studies, 22: 1493-1501.

Balkus, J.E., Manhart, L.E. & Lee, J. (2016) Periodic presumptive treatment for vaginal infections may reduce the incidence of sexually transmitted bacterial infections.Journal of Infectious Diseases. 213: 1932-7.

Broklehurst, P., Gordon, A., Heatley, E. & Milan, S.Antibiotics for treating bacterial vaginosis in pregnancy.*7*(6), 1–2.

Brotman, R.M. &Klebanoff, M.A. (2010). Bacterial Vaginosis assessed by Gram Stain and diminished colonization resistance to incident gonococcal, chlamydial and trihomonal genital infection. 202: 1907-1915.

CDC. (2015).Treatment Guidelines of sexually transmitted diseases.(2015). MMWR. 64: 72-75.

Cherpes, T.L., Meyn, L.A., &Krohn, M.A.(2003)Association between acquisition of herpes simplexvirus type 2 in women and bacterial vaginosis. 37: 319-325.

Cohen, .R.,Lingappa, J.R., &Baeten, J.M. (2012) Bacterial vaginosis associated with increased risk of female-to-male HIV-1 transmission : A prospective cohort analysis among African couples. PLos Medicine. 9(100): 1251.

Denning, D.W., Kneale, M., Sobel, J.D. &Rautemaa-Richardson, R. (2018). Globbal Burden Of Recurrent Vulvovaginal Candidiasis: A Systematic Review. The Lancet Infectious Diseases.http://doi.org/10.1016/S1473-3099(18)30103-8.

Deorukhkar, S.C. &Saini, S. (2014). Laboratory Approach for Diagnosis of candidiasis through ages.International Journal of Current Microbiology and Applied Sciences. 3(1): 206- 218.

Deorukhkar, S.C. &Saini, S.(2012) Bacterial Species Distribution and Antifungal Susceptibility Profile of Candida Species Isolated from the bloodstream. Journal of Medical and Dental Sciences. 1: 241-249.

Geiger, A.M., &Foxman, B. (1996). Risk factors of vulvovaginal candidiasis: A Case Control Study among college students. Epidemiology.7: 182.

Geiger, A.M., Foxman, B. & Gillespie, B.W. (1995).Epidemilogy of vulvovaginal candidiasis among university students. American Journal of Public Health. 85: 1146.

Ghannoum, A.M., & Rice, L.B. Antifungal Agents: Mode of Action, Mechanism of resistance, and correlation of these with Bacterial Resistance. Clinical Microbiology Reviews. 4 (12): 501-517.

Javadi, E.H. S. (2014). Effect of Probiotic in Treatment of Recurrent Vulvovaginal Candidiasis. International Journal of Current Research and Academic Review. 8(2): 258-265.

Jeffrey, M.J. (1990). Laboratory Diagnosis of Invasive Candidiasis.Linical Microbiology Reviews. 3(1): 32-42.

Martinsa, N., Ferreiraa, C.F.R.I., Barrosa, L., Silvab, S. &Henriques, M. (2015). Candidiasis: predisposing factors, prevention, diagnosis and alternative treatment. Military Medicine.180 (6): 652.

Koumans EH, Sternberg M, Bruce C, McQuillan G, Kendrick J, Sutton M. (2007). The prevalence of bacterial vaginosis in the United States, 2001-2004; associations with symptoms, sexual behaviors, and reproductive health. Sex Transm Dis. 34(11): 864-869.

Kramer, M. S. (2003). The Epidemiology of Adverse Pregnancy Outcomes: An Overview. The Journal of Nutrition, 133(5), 1592S–1596S.https://doi.org/10.1093/jn/133.5.1592S

Pappas, P.G., Rex, J.H., &Sobel, J.D. (2004). Guidelines of Treatment of Candidiasis.Clinical Infectious Diseases. 38: 161-189.

Pappas, P., Kauffman, C., & Andes, D (2009). Clinical practice guidelines for themanagement of candidiasis: 2009 update by the Infectious Diseases Society of America.Clin Infect Dis 48: 503-535.

Pfaller, M.A. &Diekema, D.J.(2007). Epidemiology of invasive candidiasis: A Persistent Publi Health Problem. Clinical Microbiology Revised. 20: 133.

Zaragoza, R., Peman, J., Quindos, G., *et al*. 2009. Clinical significance of detection ofCandida albicans germ tube-specific antibodies in critically ill patients.ClinMicrobiol Infect. 15:592-595

Zhang, B.&Izadjoo M. (2015). Differential Diagnosis of Candida Species With Real-TimePolymerase Chain Reaction and Melting TemperatureAnalyses (RTPCR-MTA)

APPENDICES

APPENDIX I: PARTICIPANT INFORMATION SHEET

Name of Researcher: PAUL OSEI-PREMPEH

Name of Institution: University of Ghana School of Public Health, College of Health Sciences

Name of Supervisor: Dr. Alexander Ansah Manu

Project Title:

FACTORS ASSOCIATED WITH RECURRENT VULVOVAGINAL CANDIDIASIS OCCURING IN REPRODUCTIVE-AGED FEMALE PATIENTS VISITING GAEC, ASHONGMAN, KWABENYA, SAM-J HOSPITALS AND ABOKOBI HEALTH CENTRE IN THE GA EAST METROPOLIS OF ACCRA

Institution:

Background

I am Paul Osei-Prempeh, a master's student in Public Health. As part of the programme, I am conducting a research work. My work is on the 'Factors Associated With Recurrent Vulvovaginal Candidiasis Occuring In Reproductive-Aged Female Patients Visiting GAEC, Ashongman, Kwabenya, Sam-J Hospitals And Abokobi Health Centre In The Ga East Metropolis Of Accra'. This research is an epidemiological research which is cross-setional in nature. Data will be collected from participants using a structured questionnaire and in-depth interview. Collected will be compared with laboratory results from the respective hospitals on the various patients.

The purpose of this research is to determine and explain the factors associated with recurrent vulvovaginal candidiasis infection in reproductive-aged female patients in the

GaEast Metropolis of Accra. The information generated from this research will be used for academic research or publication and will therefore help to advance knowledge about the current trends necessary for policy makers and administrators to make a decision.

I hope that the findings of this study will help address the burden of recurrent vulvovaginal candidiasis in females living in the Ga-East Metropolis in Accra and point out the various factors associated with the disease condition.

All information obtained will be encrypted, secured and treated as confidential as much as possible. For this research, you will be asked to answer questions in a survey. You are free to withdraw your participation at any point in time should you in any case become uncomfortable with the research. If you have any questions or concerns, feel free to contact me on 0505875907, or by email at paul.oseiprempeh@yahoo.com. You can also contact Miss Hannah FrimpongGhana Health Service Ethics Review Committee Administrator on 0507041223**.** I hope you will enjoy this opportunity to share your experiences and viewpoints. Thank you very much for your help.

I certify that the participant will be given enough time necessary to read and familiarize or learn about the study. Any queries and clarifications raised by the participant will be appropriately well-addressed.

…….. ……

Signature of Researcher Date

APPENDIX II: CONSENT FORM

Project Title: Factors Associated With Recurrent Vulvovaginal Candidiasis Occuring In Reproductive-Aged Female Patients Visiting GAEC, Ashongman Community, Kwabenya Community, Sam-J Hospitals and Abokobi Health Centre In The Ga-East Metropolis Of Accra.

PARTICIPANTS' STATEMENT

I acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and all questions satisfactorily explained to me in a language I understand (English/Twi/Ga). I fully understand the contents and any potential implications as well as my right to change my mind (i.e. withdraw from the research) even after I have signed this form.

I consent with audio recording *(fill where applicable)* Yes ☐ No ☐

I voluntarily agree to be part of this research.

Name or Initials of Participant…… ID Code ……..

Participants' Signature ……OR Thumb Print……..

Date: …….

INTERPRETERS' STATEMENT

I interpreted the purpose and contents of the Participants' Information Sheet to the afore named participant to the best of my ability in the (Twi/Ga) language to his proper understanding.

All questions, appropriate clarifications sort by the participant and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter……

Signature of Interpreter…….. Date: ……

Contact Details

STATEMENT OF WITNESS

I was present when the purpose and contents of the Participant Information Sheet was read and explained satisfactorily to the participant in the language he/she understood (Twi/ Ga)

I confirm that he/she was given the opportunity to ask questions/seek clarifications and same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

Name: ……

Signature……. ……..OR Thumb Print …….....

Date: ……

INVESTIGATOR STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's name…….

Signature …….

Date…….

APPENDIX III: QUESTIONNAIRE

TOPIC: FACTORS ASSOCIATED WITH RECURRENT VULVOVAGINAL CANDIDIASIS OCCURING IN REPRODUCTIVE-AGED FEMALE PATIENTS VISITING GAEC, ASHONGMAN, KWABENYA, SAM-J HOSPITALS AND ABOKOBI HEALTH CENTRE IN THE GA EAST METROPOLIS OF ACCRA

Instructions: Please answer every question as honestly as possible. Do not leave any question unanswered unless indicated. You may select more than one choice where appropriate.

Respondent Number –

Date –

SOCIO-DEMOGRAPHIC INFORMATION

1. Age: [ ]

2. Occupation: Office work [ ] Farming [ ] Trader [ ]

Unemployed [ ] Student [ ] Others……

3. Religion: Christian [ ] Moslem [ ] Traditionalist [ ]

Others…….

4. Marital Status: Single [ ] Married [ ] Divorced [ ]

Widowed [ ] Others……

5. How many children do you have [ ]

6. What is your highest level of education? None [ ] Primary [ ]

JHS [ ] SHS [ ]

Tertiary [ ]

7. Have you had any miscarriages? [ ]

8. How many miscarriages have you had ? Yes [ ] No [ ]

PRE-EXISTING MEDICAL CONDITIONS

9. Do you have any urinary tract infection? Yes [ ] No [ ]

10. Do you have any sexually transmitted diseases? Yes [ ] No [ ]

11. Do you have HIV/ AIDS? Yes [ ] No [ ]

12. Have you had any other viral infection recently Yes [ ] No [ ]

13. Are you diabetic? Yes [ ] No [ ]

14. Do you have any cardiovascular disease? Yes [ ] No [ ]

15. Have you been involved in a surgery recently? Yes [ ] No [ ]

16. Are you pregnant? Yes [ ] No [ ]

17. Are you breastfeeding? Yes [ ] No [ ]

18. Have you taken tetracycline or other antibiotics for acne? Yes [ ] No [ ]

If Yes, how long? Less than 1month [ ] More than 1 month [ ]

19. Have you at anytime in your life, taken other broad spectrum antibiotics for any infection?

If Yes, how long? Less than 2 months [] between 2- 12 months [ ]More than 1year [ ]

20. Have you taken an antibiotic drug just once for any period of time? Yes [ ] No [ ]

21. Have you at anytime of your life had any vulva, vaginal or any other infection affecting the reproductive organ? Yes [ ] No [ ]

22. Have you been pregnant before? Yes [ ] No [ ]

If Yes, How many times? [ ]

How long has it been since your last pregnancy? [ ]

How many antenatal visits did you have during that period? [ ]

Did you experience any pregnancy complication? Yes [ ] No [ ]

23. Have you taken a birth control pill before? Yes [ ] No [ ]

How long? 1. 6 months or less [ ]2.6 months to 2 years [ ] 3. More than 2 years [ ]

24. Have you taken prednisolone or any other cortisone-type drug by mouth or inhalation?

Yes [ ] No [ ]

If Yes, How long? 1. Less than 2 weeks [ ] 2. More than 2 weeks [ ]

25. Have you had athlete's foot rot, ringworm or any other chronic fungal infection of the skin/ nails before? Yes [ ] No [ ]

Was this infection severe or not? 1. Severe [ ] 2. Moderate [ ] 3. Mild [ ]

26. Do you experience heavy menstrual flow monthly? Yes [ ] No [ ]

27. Have you had a history of endometriosis, ovarian cysts of fibroids? Yes [ ] No [ ]

KNOWLEDGE, BELIEFS AND PRACTICES THAT MAY BE LINKED WITH THE OCCURRENCE OF RECURRENT VULVOVAGINAL CANDIDIASIS

28. Do you take in alcohol? Yes [ ] No [ ]

29. Do you smoke cigarette? Yes [ ] No [ ]

30. Do you smoke marijuana? Yes [ ] No [ ]

31. Do you use any drugs of abuse? Yes [ ] No [ ]

If yes please specify …….

32. Do you take in coffee or any other caffeinated drink? Yes [ ] No [ ]

33. Do you use traditional medicines Yes [ ] No [ ]

34. Do you douche? Yes [ ] No [ ]

How often do you douche if yes

1. At least once weekly 2. 1-3 times monthly 3. Less than once monthly

35. Do you exercise? Yes [ ] No [ ]

How often do you exercise if yes 1.More than once weekly 2. Less than once weekly

36. Do you have a health facility in your community? Yes [ ] No [ ]

37. What is the distance from your residence the facility? Yes [ ] No [ ]

38. Is the cost of service affordable to you? Yes [ ] No [ ]

39. Do you have NHIS? Yes [ ] No [ ]

POSSIBLE SIGNS AND SYMPTOMS OF RECURRENT VULVOVAGINAL CANDIDIASIS

40. Have you had recurrent vulvovaginal candidiasis before? Yes [ ] No [ ]

41. Have you had vulvovaginal candidiasis recently again? Yes [ ] No [ ]

42. How many times have you experienced the latter in the last 12 months?

1. 2 or less [ ] 2. More than 2 [ ]

43. Does exposure to perfumes, insecticides, fabric shop odours, or other chemicals provoke any of the symptoms above? Yes [ ] No [ ]

Please specify the symptom.....

What is the level of severity of the symptom above? 1. Severe [ ] 2.Moderate [ ] 3. Mild [ ]

44. Are your symptoms worse with specific weather conditions? Yes [ ] No [ ]

Please specify if yes.....

45. Do you experience vulva itching? Yes [ ] No [ ]

46. Do you experience rectal itching? Yes [ ] No [ ]

47. Do you experience burning or stinging of the vulva? Yes [ ] No [ ]

48. Do you experience burning sensation during urination? Yes [ ] No [ ]

49. Do you experience urinary frequency or urgency or incontinence? Yes [ ] No [ ]

50. Does your vulva hurt when touched? Yes [ ] No [ ]

51. Is your vulva irritated? Yes [ ] No [ ]

52. Is your vulva mostly dry? Yes [ ] No [ ]

53. Are you having discharge from the vulva or vagina? Yes [ ] No [ ]

What is the colour of the discharge if yes? [ ]

54. Are you having odour from the vulva or vagina? Yes [ ] No [ ]

55. Do you experience pelvic pain? Yes [ ] No [ ]

56. Do you have chronic rashes around the vulva, vaginal or rectal area? Yes [] No [ ]

INFLUENCE OF RECURRENT VULVOVAGINAL CANDIDIASIS ON THE PSYCOLOGY AND EMOTIONS OF PATIENTS WITH ASSOCIATED SIGNS AND SYMPTOMS

57. Do you get worried about the symptoms you are having? Yes [ ] No [ ]

58. Do you get worried about the appearance of your vulva? Yes [ ] No [ ]

59. Do you get frustrated about your vulvar symptoms? Yes [ ] No [ ]

60. Do you get embarrassed about your vulvar symptoms? Yes [ ] No [ ]

61.Do your vulvar symptoms affect your interaction with others? Yes [ ] No [ ]

62. Do your vulvar symptoms affect your desire to be with people? Yes [ ] No [ ]

63. Do your vulvar symptoms make it hard to show affection? Yes [ ] No [ ]

64. Do your vulvar symptoms affect your daily activities? Yes [ ] No [ ]

65. Do the vulva symptoms affect your desire to be intimate? Yes [ ] No [ ]

66. Are you currently sexually active with a partner? Yes [ ] No [ ]

If Yes,

67. Has your vulvar symptoms had an effect on your sexual relationships? Yes [ ] No [ ]

68. Do your vulva symptoms cause pain during sexual activity? Yes [ ] No [ ]

69. Do your vulvar symptoms cause dryness during sexual activity? Yes [ ] No [ ]

70. Do your vulva bleeding cause bleeding during sexual activity? Yes [ ] No [ ]

71. Do your vulvar and vaginal symptoms affect your concentration? Yes [ ] No [ ]

72. Do people around you complain of your recent mood swings or changes? Yes [ ] No [ ]

73. Do your vulvar and vaginal symptoms make you jittery or irritable? Yes [ ] No [ ]

74. Do your vulvar and vaginal symptoms make you anxious? Yes [ ] No [ ]

75. Do your vulvar and vaginal symptoms make you feel 'drained'? Yes [ ] No [ ]

76. Do you experience any premenstrual tension? Yes [ ] No [ ]

THANK YOU

Appendix IV: Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

MyRef. GHS/RDD/ERC/Admin/App
Your Ref. No. 191267

Research & Development Division
Ghana Health Service
P. O. Box MB 190
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GPS Address: GA-050-3303
Tel: +233-302-681109
Fax + 233-302-685424
Email: ghserc@gmail.com
5th July, 2019

Paul Osei-Prempeh
University of Ghana
School of Public Health
Legon,

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC 026/06/19**
Project Title	Factors Associated with Recurrent Vulvovaginal Candidiasis Occurring in Reproductive Aged Female Patients Visiting GAEC, Ashongman, Kwabenya Sam-J Hospitals and Abokobi Health Centre in the Ga East Metropolis of Accra
Approval Date	5th July, 2019
Expiry Date	4th July, 2020
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.
- Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra