

# Knowledge and Attitudes of Female Adolescents on the Causes, Effects and Prevention of Vaginal Candidiasis in the Adenta Municipality of the Greater Accra Region of Ghana

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## Abstract

**Introduction:** Among every four women, at least, three of them experience vaginal candidiasis caused by *Candida albicans*. People with dysfunctional immune system such as the aged, very young children, altered pH and sugar content in vaginal secretions as a result of pregnancy, HIV/AIDS, diabetes, hormonal fluctuations, smoking, black race, oral-contraceptives, obesity and use of broad-spectrum antibiotics increases the frequency to acquiring infection and are therefore vulnerable to fungal infections. Poor hygiene, chemical irritants and the presence of foreign body in the vagina can also cause vaginal candidiasis

**Objective:** This study sought to access the knowledge and attitudes regarding causes, effects and prevention of vaginal candidiasis among female adolescent in the Adenta Municipality.

**Methods:** A cross-sectional design and a multi-stage sampling technique was used to obtain a sample of 403 female adolescents within the Adenta Municipality using a structured questionnaire. The data collected from respondents were collected and entered into Epi Data Entry Client v4.0.2.4.9 and was exported into Stata 14.0 for analysis. All numerical data was analyzed using descriptive statistics. Chi-square, p-values were used to establish the associations between variables. Logistic regression of less than 0.05 were considered statistically significant at 95% confidence interval. Results were presented in tables and graphs.

**Result:** The study revealed that the overall knowledge of respondents was good (54.7%). Majority (57.7%) of the respondents knew poor hygiene to be the major cause of vaginal candidiasis and it can easily be transmitted through sexual intercourse (67.8%). About 97% of the respondents most agreed that sugar intake was a major risk factor of vaginal candidiasis with (39.9%) of them knowing infertility as a major effect of vaginal candidiasis if not treated. Friends (47.5%) and school (41.1%) were seen to be the

major source of information regarding vaginal candidiasis. The attitude towards the prevention of candidiasis among female adolescents was good (58.9%). Though, more than 50% of the respondents agreed that candidiasis infection was dangerous, majority (82.7%) of them were unsure of symptoms and therefore (87.6%) agreed that people infected with candidiasis must seek for treatment from the hospital. Having a good knowledge on vaginal candidiasis [AOR=2.56 (95% CI: 1.57– 4.15),  $p<0.001$ ] and a good attitude towards its prevention [AOR=1.83 (95% CI: 1.12–2.99),  $p<0.015$ ] were positively associated with the effects of vaginal candidiasis. These participants were 3 and 2 times respectively more likely to have good attitudes towards the effects of vaginal candidiasis respectively. Also, the participants who were in a relationship with the opposite sex was statistically significant such that those who were in a relationship were 3 times more likely to be knowledgeable about candidiasis [AOR=2.96 (95% CI: 1.14 – 7.84),  $p<0.025$ ] as compared with those who were not in a relationship.

**In conclusion**, female adolescents in the Adenta Municipality had good knowledge on the causes and effects of vaginal candidiasis. Those aged 10-15 years exhibited poor knowledge and attitudes regarding the causes, effects and prevention of vaginal candidiasis. Programs aimed at increasing the knowledge, attitudes of female adolescents on vaginal candidiasis should be implemented and more attention should be given to the adolescents between the ages of 10 and 15 years. The responses given by respondents was seen to be influenced by the socio-demographic characteristics such as age, level of education, religion and ethnic group.

**Keywords:** Vaginal candidiasis, Candida, Adolescent girls, Adenta, Knowledge,

## Introduction

Vaginal candidiasis is one of the Reproductive Tract Infections (RTIs) that are frequently community-acquired and responsible for considerable morbidity. It is regarded as a hidden pandemic and are one of the world's major public health issues (Khedr, et al, 2015). It is a real gynecological problem among women of reproductive age from 15 to 49. It is the second most common infection of the genital tract in women, right after the bacterial etiology of this inflammation (Picheta, et al., 2024). There are over 20 species of *Candida* yeasts that can cause infection in humans and some of which include *Candida Albicans*, *Candida glabrata*, *candida dubliniensis*, *candida guilliermondii*, *candida krusei*, *candida lusitanae*, *candida parapsilosis*, *Candida Tropicalis* and *Candida Kefyr*. (Ibhafidon-Momodu, et al, 2016). Yeast infections, bacterial vaginosis (BV), or trichomoniasis are three of the most common causes of vaginitis (Mizgier, et al, 2020). *Candida albicans* is the most prevalent pathogen, *Candida glabrata*, *Candida krusei*, and *Candida tropicalis* have been identified in infections. Signs and symptoms of invasive candidiasis are non-specific; candidaemia is the most diagnosed manifestation, with disseminated candidiasis affecting single or multiple organs (Lass-Flörl et al., 2024). The symptoms of vaginal Candidiasis are usually associated with production of a thick, whitish/creamy/yellowish discharge from the vaginal tract, vaginal itching or soreness, pain during sexual intercourse and pain or discomfort when urinating (Itriyeva, 2020 and Picheta, et al., 2024). Symptoms may also include smelly vagina, burning sensation, and vulva redness (Bitew et al, 2018).

A recent analysis showed that approximately 75% of female population have experienced an occurrence at least once per year, more than 50% of patients experience a second episode and about 10-15% of women are found to be asymptotically colonized by *Candida albicans* species while 5% are observed to have recurrent vaginal mycosis. These patients may become unwell four or more times a year (Picheta, et al.,

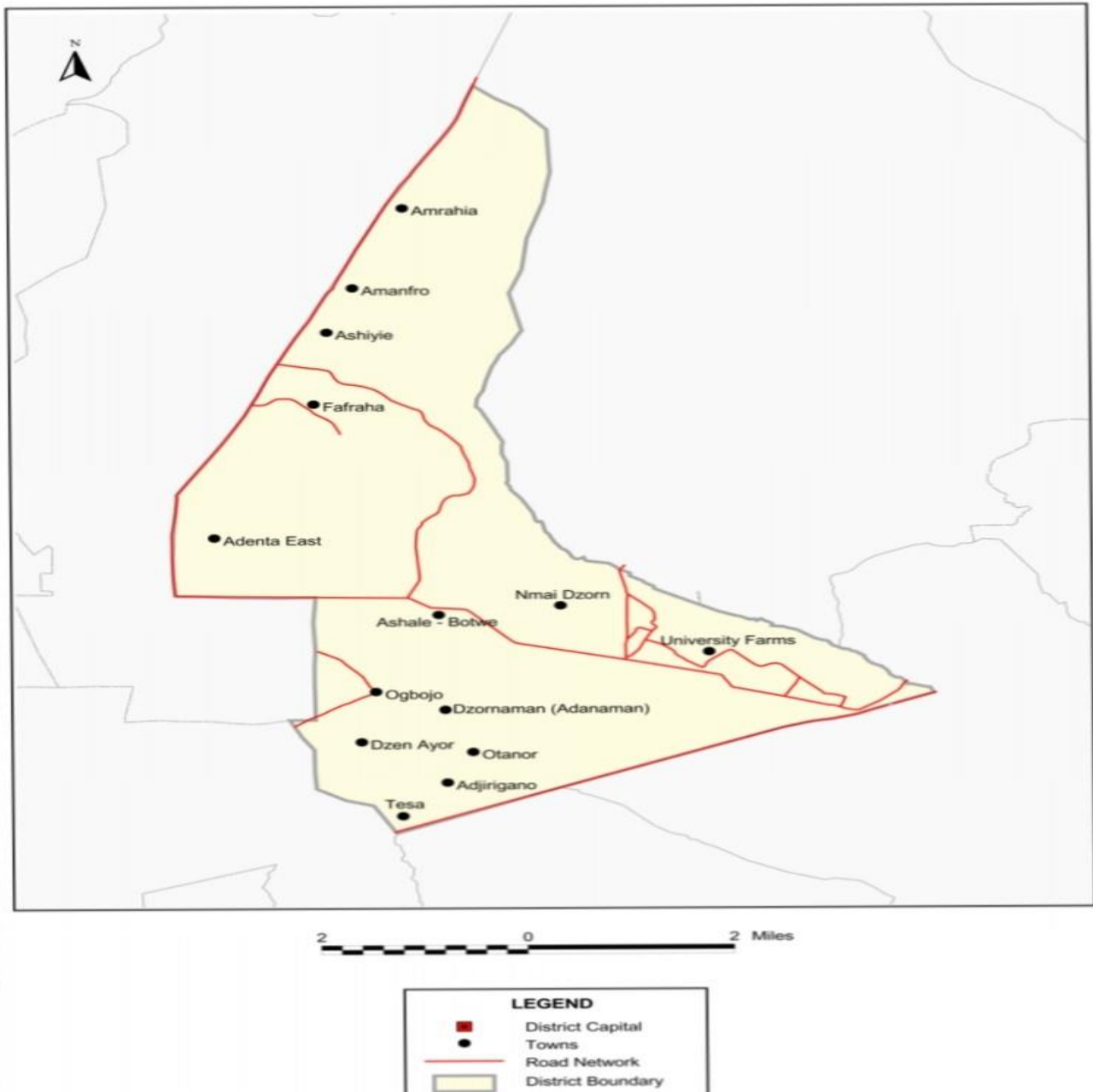
2024). As a result of this disease, patients experience increased stress, avoidance of sexual activity, and decreased self-esteem and confidence; around 53% of women with vaginal candidiasis have been diagnosed with depression (Picheta, et al., 2024). About 90% of cases of vaginal infections can lead to premature labour, preterm delivery, low birth weight, increase prenatal mortality as well as predisposing them to HIV/AIDs and cervical cancer (Shuaibu, et al, 2020). Moreover, keeping good personal hygiene is vital to prevent transmission (Venugopal, et al, 2020). In Nigeria, the prevalence of trichomoniasis were reported to be 1.5% to 20%, Gardnerella vaginalis was also reported to be 26.0% -38% and Candidiasis reported to be between 36%-42.0% (Shuaibu, et al, 2020). In Ghana, data from the DHIMS shows that 642,628 cases of vagina discharge were recorded from the year 2017 - 2019. About 25% of women are evaluated to be infected with vaginal Candidiasis (District Health Information Management System, 2017-2019). Evidence from the Adenta Municipal Health Directorate annual report shows that in the year 2017, 733 cases of vaginal discharge were recorded which represents 1.7 %. While in 2018, 596 cases of vaginal discharge were recorded which also represents 1.3% and in 2019, 855 cases of vaginal discharge were recorded representing 1.9 % of vaginal discharge cases. It can be deduced that, vaginal discharge causes was in 2017, decreased in 2018 and increased again in 2019. (Adenta Municipal Health Directorate, 2017-2019).

## Methodology

### 3.1 Study Area/Location

Adenta Municipal is in the Greater Accra region of Ghana and among one of the twenty-nine (29) districts in the Greater Accra region of Ghana. The district is among the new districts and municipalities created in 2008. According to the 2010 population census, the municipal's total population is about 96,478. The total area of the district is 92.84 square kilometers. It shears boundaries with Kpone-Katamanso and Ashaiman Municipalities in the East, Madina/LaNkwantanang Municipality in the West, Kpone-Katamanso in the North and Madina/LaNkwantanag and LedzokSuku Krowor Municipalities in the South. Adenta is mainly an urban area with most of the labour force in the public sector. Curently, Agrecultural activities are prevalent in the following electoral areas; Man Momo, New Adentan, Amrahia-Marledzor, Nmai Dzor, Otano, Man Hee, Ogbojo, and Adjiriganor. The tribes in the municipality include the Gas, and all types of tribes in Ghana. Christianity, Islam and Traditional African worship are the main form of religious expression. (Ghana Statistical Service, 2020)

### District Map Of Adenta Municipality



Source: Ghana Statistical Service, GSS.

**Figure 3.1: Map of Adenta Municipal**

### 3.2 Study Design and population

The study employed cross-sectional descriptive survey and was conducted among 403 female adolescent in the Adenta municipality.

### 3.3 Sampling Technique and Sample Size

Multi- stage sampling technique was used. There were three stages involved in using this technique. The 1<sup>st</sup> stage was the simple random sampling of sub-municipalities, the 2<sup>nd</sup> stage involved random selection of communities in the municipality, and the 3<sup>rd</sup> stage involved the selection of households using simple

random sampling. Three sub-municipalities out of the four sub-municipalities were randomly selected. The names of each of the four municipalities were written on pieces of paper where each paper was folded and then put together in a box. The box was then shaken and one piece of paper was picked from the box at random and the name of the sub-municipality was identified and noted. The same procedure was used until all the three sub-municipalities were obtained.

Within each sub-municipality, there was the selection of three communities from 17 communities in the sampling frame. Pieces of papers, which bore the names of all the communities, were folded and put together in a box. The box was shaken and three pieces of papers were picked at random in order to obtain the communities selected. With the number of communities selected, the populations were summed up and the total population of selected communities were multiplied by the total sample size in order to know the number of participants to be selected which was proportionate to the sampling size, which was used to divide each community population.

Randomly, Ashiyie, Amanfrom and Amrahia communities were selected and proportionate participants of 244 were interviewed in Ashiyie, 39 participants in Amanfrom and 120 participants in Amrahia, which was equal to the sample size of 403. A landmark in each community was chosen and the first household closer to the landmark was sampled. Afterwards, every third household was selected for participants to be interviewed systematically. At least one participant and at most three were interviewed until the total sample size was attained.

### Sample Size Determination

The minimum sample size was obtained for this study using Degu & Tessema formula (Degu & Tessema, 2005).

$n = \frac{Z^2 (a/2)^2 p(1-p)}{e^2}$ , Where n= Sample size, Z = Z – score (standard normal deviation set at 95% confidence level), P = estimated proportion adolescents females assumed to be with vaginal Candidiasis. It was based on the assumption of a margin of error of 0.05, with an assumed prevalence level of vaginal Candidiasis among adolescent's females to be 50% (0.05) and (5%) non-response rate.

A sample size (n) =  $\frac{1.96^2 \times 0.50 \times (1-0.50)}{0.05^2}$ , n = 384

Adding a non-respond rate of 5%, n= (384×0.05) +384 = 403.

Therefore, 403 adolescents were recruited to take part in this study.

### Data Collection Tool and Technique

Quantitative data on socio-demographic characteristics of female adolescent's, knowledge level and attitudes regarding to the causes, effects and prevention of vaginal Candidiasis was collected using a questionnaire to collect primary data in the municipality. Some members in the municipality were recruited and trained on how to assist to collect quality data. The recruited members were taught how to ask questions in the local language to enable the participant understand what the questionnaires seek to be answered.

### Data Analysis

The data collected from respondents were entered into Epi Data Entry Client v4.0.2.4.9 and was exported into Stata 14.0 for analysis. All numerical data was analyzed using descriptive statistics. To establish the associations between variables, Chi-square, p-values and logistic regression of less than 0.05 were considered as significant statistically at 95% confidence interval. Results were presented in tables and graphs.

**Limitation of the Study**

Due to limited time and resources, not all the community was involved in the study

**Ethical Consideration**

Permission was sought from the Ghana health service ethical review and the Adenta municipal Health directorate before the commencement of the study. Copies of clearance letters and permission to proceed will be available for whom it may concern.

In addition, consent was sought from the participants with well-documented informed consent and explain to them, the benefits, risk and voluntarily participation which would not affect them in any way if they should opt-out. Completed questionnaires for the study was stored in a very safe place where any other person would not have access to and was left unattended to. The data forms with information of the participants was in the care of the principal investigator and only be used for the purpose of the study but not any other purpose

**Confidentiality**

Participants were assured of confidentiality and privacy throughout the study. All information concerning individual subjects will remain anonymous and confidential.

**Conflict of interest**

The Principal Investigator (PI) had no conflict of interest in the study.

**4.1 Study Results**

**Table 4.1: Demographic Characteristic of Participants**

Table 4.1 shows the demographic characteristic of respondents. It was conducted among 403 respondents with majority of them (75.2%) being between the aged group of 10-15 years with a mean age of 13.6 ±2.6 years. It was indicated that approximately, (96%) of the study respondents were single with (88.1%) being Christians. Majority of the respondents were Gas (36.6) and majority (74.7%) attaining Basic level education. Details can be found in table 4.1 below

**Table 4.1: Demographic Characteristic of Participants**

<b>Variables</b>	<b>Frequency (403)</b>	<b>Percentage (%)</b>
<b>Mean age in years (S.D)</b>	<b>13.6 ±2.6</b>	
<b>Age group in (years)</b>		
10-15years	304	75.2
16-19years	100	24.8
<b>Marital Status</b>		
Single	387	95.8
Cohabitating	17	4.2
<b>Religion</b>		
Christian	156	88.1
Muslim	48	11.9
<b>Ethnicity</b>		
Ga	148	36.6
Akan	104	25.7
Ewe	121	30.0
Hausa	24	6.0



Krobo/Kasena	7	1.7
<b>Educational Level</b>		
No Formal Education	16	4.0
Basic	302	74.7
SHS	86	21.3
<b>In a relationship with opposite sex</b>		
Yes	46	11.4
No	358	88.6

#### 4.2 Knowledge on the causes of Candidiasis

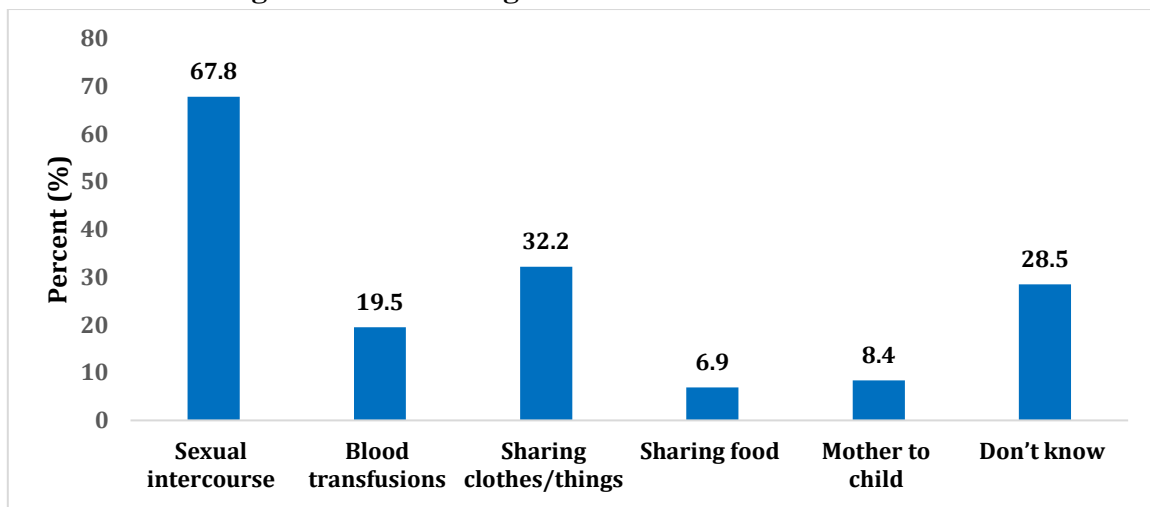
These session illustrated the knowledge level of respondents on vaginal candidiasis. The results indicated that the overall knowledge of the respondents was good (54.7%). Bad hygiene (57.7%) was said to be the major cause of vaginal candidiasis. Most of the respondents did not know the causative organism that causes organism causing the vaginal candidiasis. 22.8% of people proposed that it was caused by bacteria while only 7.4% knew the causative organism to be virus. Majority (97.6%) stated the intake of excess sugar to be the main risk factor for vaginal candidiasis. Details can be found in table 4.2 below

**Table 4.2: Knowledge on the causes of Candidiasis**

Variables	Frequency (403)	Percentage (%)
<b>Possible Causes of Vaginal Candidiasis Infections</b>		
<b>Bacteria</b>		
Yes	92	22.8
No	312	77.2
<b>Virus</b>		
Yes	30	7.4
No	374	92.6
<b>Fungus</b>		
Yes	54	13.4
No	350	86.6
<b>Bad Hygiene of women</b>		
Yes	233	57.7
No	171	42.3
<b>Using unclean water</b>		
Yes	96	23.8
No	308	76.2
<b>Sex during menstruation</b>		
Yes	17	4.2
No	387	95.8
<b>Having sex soon after giving birth</b>		
Yes	9	2.2
No	395	97.8
<b>Blood transfusion</b>		

Yes	6	1.5
No	398	98.5
<b>Infected swimming pool water</b>		
Yes	38	9.4
No	366	90.6
<b>Possible risk factors</b>		
<b>Sugar</b>		
Yes	168	97.6
No	4	2.4

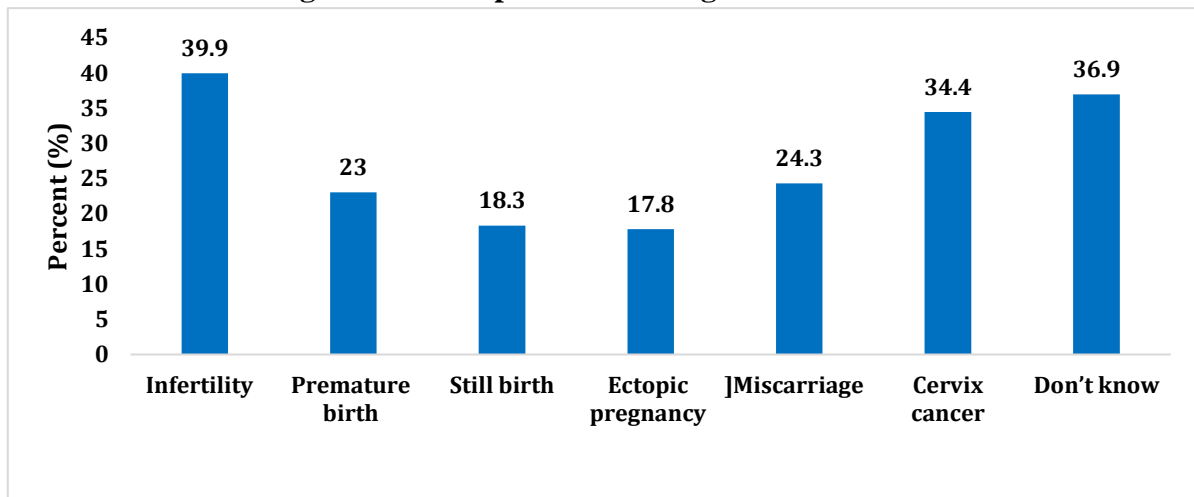
**Figure 4.1: Knowledge on the Routes of transmission**



Source: field work 2022

Figure 4.1 above illustrates findings from the participants’ knowledge on the route of transmission. Most of them also believe that the route of transmission of vaginal candidiasis is through sexual intercourse (67.8%) followed by the shearing of clothing (32.2%) and quite a number of people did not know the cause of vaginal candidiasis.

**Figure 4.2: Complications of vaginal Candidiasis**

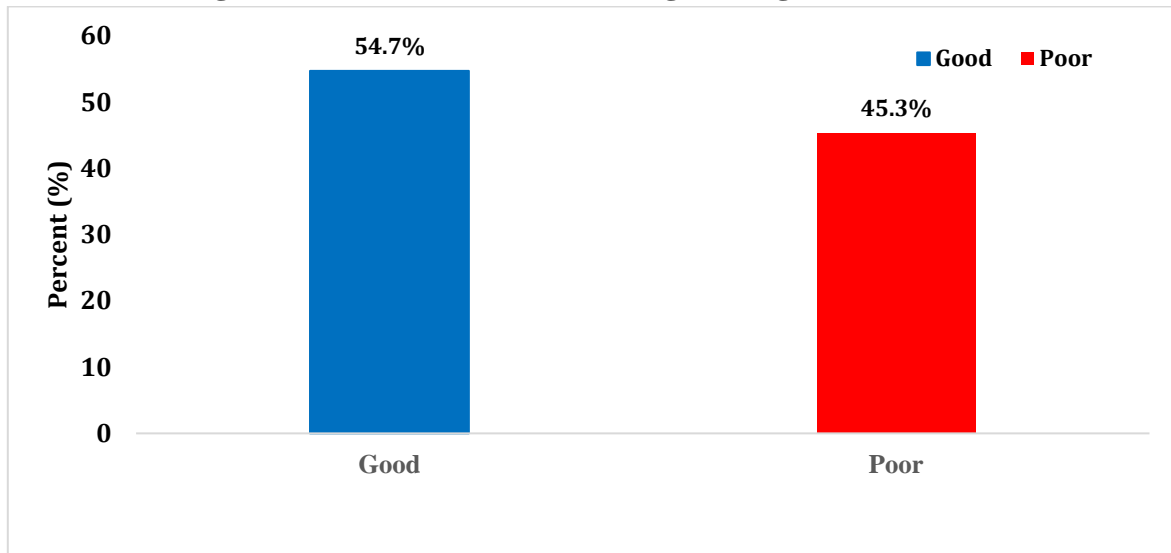


Source: field work 2022



From the figure 4.2 above, (39.9%) of the participants said infertility was the effects of vaginal candidiasis, if not treated. Moreover, (36.9%) of the participants said, they do not know the complications of vaginal candida if untreated.

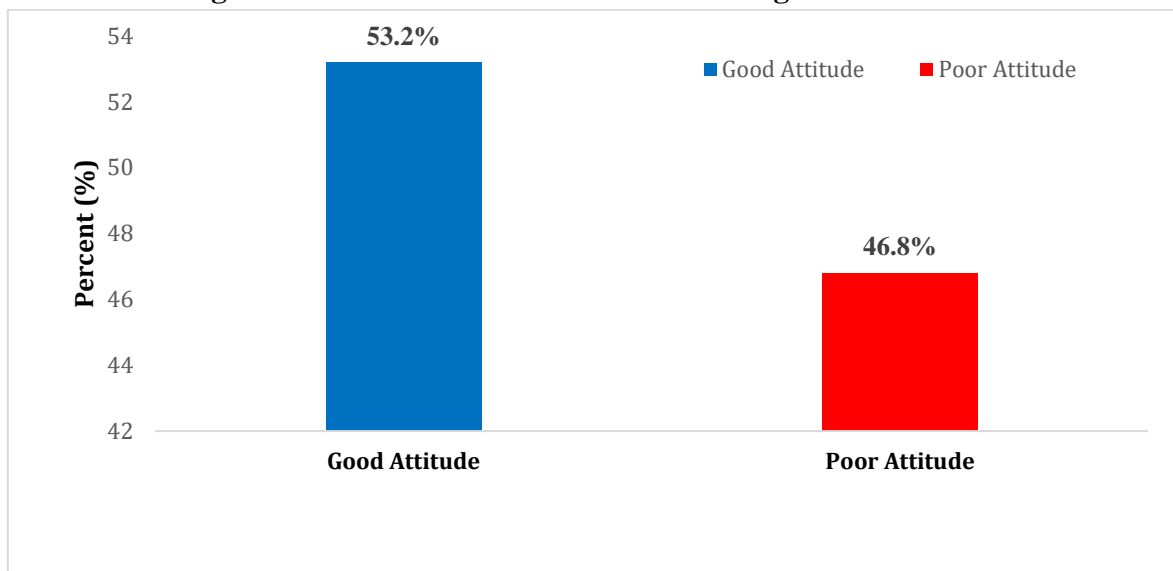
**Figure 4.3 Overall level of knowledge on vaginal candidiasis**



**Source: field work 2022**

Figure 4.3 above illustrates findings from the participants’ overall knowledge about vaginal candidiasis. More than half (54.7%) of the participants had good knowledge about the infection.

**Figure 4.4: Overall Attitude towards the vaginal Candidiasis**



**Source: field work 2022**

Figure 4.4 above illustrates findings from the participants’ overall attitudes towards vaginal candidiasis. More than half (53.2%) of the participants had good attitude towards the infection.

**Table 4.3: Predictors of knowledge on candidiasis among female adolescents.**

Table 4.3 below shows the predictors of knowledge on candidiasis among female adolescents. The results revealed that ethnicity, being in a relationship with opposite sex, having a good attitudes towards the

effects and its prevention had positive relationship with the knowledge on candidiasis. It further reveals that participants who are of the Hausa ethnicity were 6 times more likely to be knowledgeable about candidiasis as compared to other ethnic groups [AOR=5.90 (95% CI:1.07 – 32.46), p<0.041]. Then again, participants who are in a relationship with the opposite sex are 3 times more likely to be knowledgeable about candidiasis [AOR=2.96 (95% CI: 1.14 – 7.84), p<0.025]. Furthermore, those who have a good attitude towards the effects of candidiasis [AOR=2.59 (95% CI: 1.26 – 3.23), p<0.001] and its prevention [AOR=2.02 (95% CI: 1.26 – 3.22), p<0.003]. These participants were 3 and 2 times more likely to have good knowledge regarding candidiasis respectively. Details can be found in table 4.3 below.

**Table 4.3: The predictors of knowledge level on Candidiasis among female adolescents**

Variables	Knowledge level		Chi-Square	P-Value	COR (95% CI), p-value	AOR (95% CI), p-value
	Poor	Good				
<b>Age</b>						
10-15 years	162 (88.5)	142 (64.3)	31.66	0.001	REF	
16-19years	21 (11.5)	79(35.7)	17.3	0.08	<b>4.29 (2.52, 7.30), 0.001</b>	1.59 (0.82, 3.08), 0.168
<b>Marital Status</b>						
Single	181 (98.9)	206 (93.2)	8.05	0.005	REF	
Cohabiting	2 (1.1)	15 (6.8)			<b>6.59 (1.49, 29.21), 0.013</b>	4.02 (0.73, 22.12), 0.110
<b>Religion</b>						
Christian	178 (97.3)	178 (80.5)	26.75	0.001	REF	
Muslim	5(2.7)	43(19.5)			<b>8.60 (3.33, 22.22), 0.001</b>	2.37 (0.80, 7.05), 0.121
<b>Ethnicity</b>						
Ga	76 (41.5)	72(32.6)	15.87	0.003	REF	
Akan	46 (25.1)	58(26.1)			<b>133 (0.80, 2.20), 0.266</b>	1.09 (0.61, 1.95), 0.771
Ewe	55 (30.1)	66(29.9)			<b>1.27 (0.78, 2.05), 0.336</b>	1.16 (0.67, 2.02), 0.596
Hausa	2 (1.1)	22(10.0)			<b>11.61 (2.64, 51.16), 0.001</b>	<b>5.90 (1.07, 32.46), 0.041</b>
Krobo/Kasena	4 (2.2)	3 (1.4)			<b>0.79 (0.17, 3.66), 0.765</b>	0.64 (0.11, 3.58), 0.611
<b>Educational Level</b>						
No Formal Education	3 (1.6)	13 (5.9)	48.35	0.001	REF	
Basic	167 (91.3)	135 (61.1)			<b>0.19 (0.05, 0.67), 0.010</b>	0.42 (0.10, 1.75), 0.233

SHS	13 (7.1)	73(33.0)			1.30 (0.32, 5.19), 0.714	0.95 (0.20, 4.51), 0.611
<b>Relationship with opposite sex</b>						
No	7 ( 3.8)	39(17.6)	18.95	0.001	REF	
Yes	176 (96.2)	182 (82.4)			<b>5.39 (2.35, 12.37), 0.001</b>	<b>2.96 (1.14, 7.84), 0.025</b>
<b>Attitude towards effects of Candidiasis</b>						
Poor	124 (67.8)	65(29.4)	59.13	0.001	REF	
Good	59 (32.2)	156 (70.6)			<b>5.04 (3.30, 7.71), 0.001</b>	<b>2.59 (1.60, 4.22), 0.001</b>
<b>Attitude towards Prevention</b>						
Poor	99 (5.2)	67(30.3)	23.39	0.001	REF	
Good	84 (45.9)	154 (69.7)			<b>2.71 (1.80, 4.08), 0.001</b>	<b>2.02 (1.26, 3.22), 0.003</b>

Source: field work 2022

**Table 4.4: Predictors of the attitude towards effects of vaginal candidiasis among female adolescents.**

The session below shows the predictors of the attitude towards effects of vaginal candidiasis among female adolescents. The results revealed that ethnicity, having knowledge and attitudes towards its prevention significantly affect ones attitude towards the effects of vaginal candidiasis. It indicate that Ewe participants were 2 times more likely to have good attitudes towards the effects of vaginal candidiasis [AOR=1.90 (95% CI: 1.08– 3.35), p>0.027]. Also, participants having a good knowledge on vaginal candidiasis [AOR=2.56 (95% CI: 1.57– 4.15), p<0.001] and a good attitude towards its prevention [AOR=1.83 (95% CI: 1.12–2.99), p<0.015] were 3 and 2 times more likely to have good attitudes towards the effects of vaginal candidiasis respectively. Details can be found in table 4.4 below.

**Table 4.4: The predictors of the attitude towards the effects of vaginal Candidiasis among female adolescents**

Variables	Attitude towards effects of candidiasis		Chi-Square	P-Value	COR (95% CI), p-value	AOR (95% CI), p-value
	Poor	Good				
Age						
10-15 years	167 (87.2)	134 (62.3)	41.2	0.001	REF	
16-19years	22(12.8)	81 (37.7)			<b>5.41 (3.13, 9.36), 0.001</b>	1.60 (0.80, 3.17), 0.181
<b>Marital Status</b>						
Single	181 (95.8)	201 (93.5)	6.05	0.014	REF	

Cohabiting	8(4.2)	14(6.5)			<b>4.32 (1.22, 15.27), 0.023</b>	2.11 (0.51, 8.75), 0.304
<b>Religion</b>						
Christian	177 (93.6)	173 (80.5)	25.71	0.001	REF	
Muslim	12(6.3)	42 (19.5)			<b>7.40 (3.07, 17.85), 0.001</b>	2.43 (0.80, 7.40), 0.199
<b>Ethnicity</b>						
Ga	82(43.4)	69 (32.1)	11.00	0.027	REF	
Akan	58(30.6)	52 (24.2)			<b>1.14 (0.69, 1.89), 0.597</b>	0.89 (0.48, 1.65), 0.706
Ewe	33(17.5)	71 (33.0)			1.63 (1.00, 2.64), 0.050	<b>1.90 (1.08, 3.35), 0.027</b>
Hausa	20(10.6)	19 (8.8)			<b>4.35 (1.54, 12.27), 0.005</b>	1.47 (0.36, 5.99), 0.592
Krobo/Kasena	22(11.6)	4 (1.9)			1.53 (0.33, 7.06), 0.588	2.25 (0.41, 12.32), 0.349
<b>Education</b>						
No Formal Education	9 (4.7)	13 (6.1)	75.55	0.001	REF	
Basic	74(39.2)	123 (57.2)			<b>0.16, (0.04, 0.57), 0.005</b>	0.31 (0.08, 1.23), 0.094
SHS	106(56.1)	79 (36.7)			2.60 (0.60, 11.38), 0.203	2.55 (0.52, 12.62), 0.250
<b>Relationship with opposite sex</b>						
No	77(40.7)	38 (17.7)	18.01	0.001	REF	
Yes	112 (59.3)	177 (82.3)			<b>4.86 (2.20, 10.70), 0.001</b>	2.02 (0.75, 5.44), 0.163
<b>Knowledge</b>						
Poor	75(39.7)	59 (27.4)	59.13	0.001	REF	
Good	114 (60.3)	156 (72.6)			<b>5.04 (3.30, 7.71), 0.001</b>	<b>2.56 (1.57, 4.15), 0.001</b>
<b>Attitude towards Prevention</b>						
Poor	88(46.6)	66 (30.7)	20.50	0.001	REF	
Good	101 (53.4)	149 (69.3)			<b>2.54 (1.69, 3.81), 0.001</b>	<b>(1.12, 2.99), 0.015</b>

Source: field work 2022

**Table 4.5: Predictors of attitudes towards the prevention of vaginal candidiasis among female adolescents**

These session below shows the predictors of attitudes towards the prevention of vaginal candidiasis among female adolescents. It indicate that participants with good knowledge on vaginal candidiasis and good attitudes towards the effects were positively associated with the attitude towards the prevention of vaginal candidiasis. Respectively, they were 1.89 and 1.68 times more likely to have good attitudes towards the prevention of vaginal candidiasis. That’s [AOR=1.68 (95% CI: 1.05– 2.68), p<0.030] and [AOR=1.68 (95% CI: 1.05–2.68), p<0.030] respectively. Details can be found in table 4.5 below

**Table 4.5: The predictors of the attitude towards the prevention of vaginal Candidiasis among female adolescents**

Variables	Attitude towards prevention of candidiasis		Chi-Square	P-Value	COR (95% CI), p-value	AOR (95% CI), p-value
	Poor	Good				
<b>Age</b>						
10-15years	139 (83.7)	165 (69.3)	10.90	0.001	REF	
16-19years	27 (16.3)	73 (30.7)			<b>2.28 (1.39, 3.74), 0.001</b>	1.45 (0.80, 2.65), 0.224
<b>Marital Status</b>						
Single	164 (98.8)	223 (93.7)	6.30	0.012	REF	
Cohabiting	2 (1.2)	15 (6.3)			<b>5.52 (1.24, 24.45), 0.025</b>	3.78 (0.82, 17.44), 0.089
<b>Religion</b>						
Christian	151 (91.0)	205 (86.1)	2.18	0.140	<b>REF</b>	
Muslim	15 (9.0)	33 (13.9)			1.62 (0.85, 3.09), 0.143	
<b>Ethnicity</b>						
Ga	65 (39.2)	83 (34.9)	2.72	0.605	REF	
Akan	37 (22.3)	67 (28.2)			1.42 (0.85, 2.38), 0.185	
Ewe	51 (30.7)	70 (29.4)			1.07 (0.66, 1.75), 0.771	
Hausa	9 (5.4)	15 (6.3)			1.31 (0.54, 3.17), 0.557	
Krobo/Kasena	4 (2.4)	3 (1.3)			0.59 (0.13, 2.72), 0.496	
<b>Educational Level</b>						
No Formal Education	3 (1.8)	13 (5.5)	14.07	0.001	REF	
Basic	140 (84.3)	162 (68.1)			<b>0.28 (0.07, 0.96), 0.042</b>	0.46 (0.12, 1.78), 0.263

SHS	23 (13.9)	63 (26.4)			0.63 (0.16, 2.42), 0.503	0.52 (0.13, 2.13), 0.363
<b>Relationship with opposite sex</b>						
No	150 (90.4)	208 (87.4)	0.85	0.356	REF	
Yes	16 (9.6)	30 (12.6)			1.35 (0.71, 2.57), 0.357	
<b>Knowledge</b>						
Poor	99 (59.6)	84 (35.3)	23.39	0.001	REF	
Good	67 (40.4)	154 (6.7)			<b>2.70 (1.80, 4.07), 0.001</b>	<b>1.89 (1.21, 2.97), 0.006</b>
<b>Attitude towards effects</b>						
Poor	100 (60.2)	89 (37.4)	20.50	0.001	REF	
Good	66 (39.8)	149 (62.6)			<b>2.54 (1.69, 3.81), 0.001</b>	<b>1.68 (1.05, 2.68), 0.030</b>

## 5.0 Discussion

### 5.1 Demographic Characteristic of Adolescents

Respondents of this study were all females between the ages of 10 and 19 years. From the survey, it revealed that, the mean age was 13.6 years with a standard deviation of  $\pm 2.6$  years and majority (75.2%) were aged 10-15 years. This study is similar to a cross-sectional study carried out in Saudi Arabia on Gynecological complaints and seeking medical help among female adolescents in living in Jeddah, Saudi Arabia, which reported that its participants were female’s teenagers between the ages of 10-19 years (Gouse et al, 2021). Academically, majority of them had attained Basic level of education (74.7%). This is similar to a cross-sectional study conducted by Rakhmilla et al, (2016) on knowledge, attitude and practice about vaginal discharge on school aged girls in Jatinangor Senior High School, which reported that school aged girls in different educational status (elementary school, Junior High School and Senior High School) had different knowledge about vaginal discharge. Girls in Senior High School had higher knowledge as compared to girls in elementary Schools.

### 5.2 Knowledge of adolescents regarding the causes and effects of vaginal Candidiasis

Results from this study showed that, (97.6%) of the respondents said excess sugar intake could lead to vaginal candidiasis. This is consistent with a cross-sectional study conducted by Xianling Zeng et al (2018) on where approximately (25%) agreed that, regularly drinking of sweet drinks and eating sweet foods could increase the susceptibility of VVC as sugar can increase glucose concentration in vaginal secretions leading to the adherence of candida *albicans* to the epithelial cells and further stimulate its development (Xianling Zeng et al., 2018).

The results of this study had shown that, more than half (57.7%) of the participants believed that bad hygiene is the main cause of vaginal candidiasis. This is in agreement with a cross-sectional descriptive study conducted by Sumarah and widyasih, (2017) in Slemanregency, Yogyakarta, Indonesia on “Effect of Vaginal Hygiene Module to Attitudes and Behavior of Pathological Vaginal Discharge Prevention among Female Adolescents”, where (52.5%) of the respondents believe that, poor hygiene practices could



increase vaginal candidiasis infection. Again, majority of the respondents (63.6%) said that, itchy vagina is the major sign and symptom for vaginal candidiasis followed by burning sensation during urination (37.6%) and vaginal discharge (37.10%). This finding is in line with a study conducted by Potokoué Mpia, Sékangué Obili & Ossibi Ibara, (2021) which reported vulva pruritus (itching of the vulva) and burning sensations as the major symptoms of vaginal candidiasis (Potokoué Mpia, Sékangué Obili & Ossibi Ibara., 2021). In this current study, most of the respondents agreed that vaginal candidiasis could lead to infertility (39.9%), cervix cancer (34.4%) and miscarriage (24.3%) if not treated. This is in agreement with a descriptive cross sectional survey carried out by Farokhzadian et al (2014) who discovered that, vaginal candidiasis is a serious gynecological condition, which if not well treated, can lead to abortion, premature labor and infertility in women (Farokhzadian et al,2014). The overall knowledge on the causes and effects of vaginal candidiasis showed that, (54.7 %) had good knowledge. This contradict with the descriptive cross-sectional study conducted by Ilankoon, Goonewardena, Fernandopulle & Perera, (2017) in Colombo district, Sri Lanka, which revealed that, the overall knowledge for vaginal candidiasis in their study was poor (98.5%) (Ilankoon, Goonewardena, Fernandopulle & Perera, 2017). The results presented in this study showed a significant relationship between ethnicity, those in a relationship with the opposite sex, attitudes towards the effects, attitudes towards the prevention of vaginal candidiasis among female adolescents in the Adenta municipality. This contradict with the cross-sectional study conducted by Kelčíková et al, (2016) which confirmed a significant influence of age on knowledge level of respondents (Kelčíková et al, 2016).

### **5.3 Attitudes of female adolescents regarding vaginal candidiasis in the Adenta municipality**

More than half of the participants (50.7%) in this study agreed that vaginal candidiasis is not dangerous because it is curable. This agrees with a descriptive cross-sectional study conducted by (Khedr et al, (2015) who reported that, more than one third of its participants see candidiasis infection to be a minor condition, which does not cause any fear in them (Khedr et al, (2015).

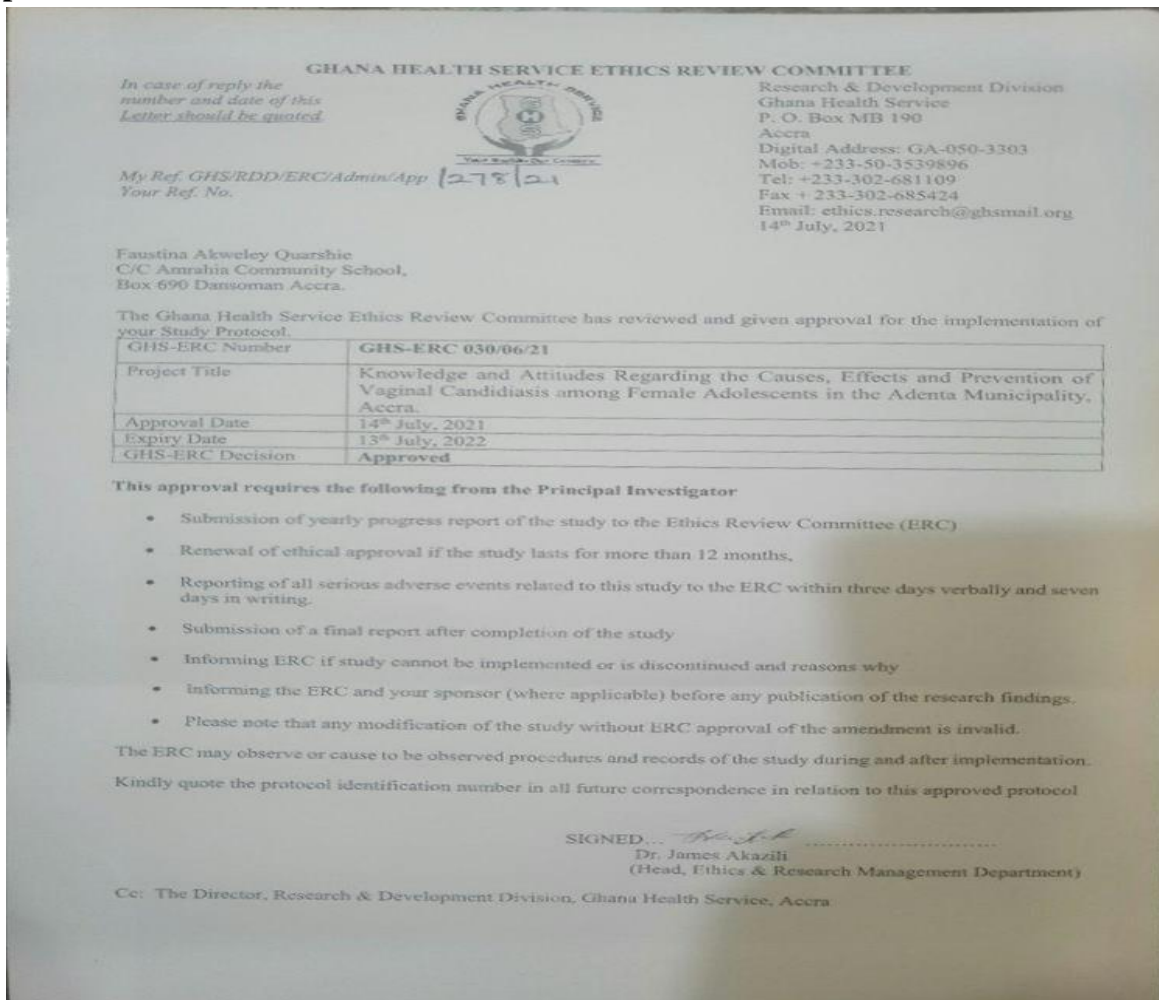
Most of the participants (86.6%) agreed that young girls should be informed about the infection in order not to be infected. In contrast, (Ilankoon et al (2017) on Women's Knowledge and Experience of Abnormal Vaginal Discharge Living in Estates in Colombo District, Sri Lanka reported that, most of their participants agreed that vaginal candidiasis is a normal condition and therefore did not seek for information (Ilankoon et al (2017). The overall attitude level in this study shows that, (53.2%) had good attitude on vaginal candidiasis. This is consistent with a cross-sectional descriptive study conducted by (Balqis et al (2016), on Knowledge, attitude and practice of menstrual hygiene among high school students in Jatinangor, whose findings reported that (78.15%) had good attitudes on vaginal hygiene (Balqis et al, 2016). There was a significant association between ethnicity, knowledge on vaginal candidiasis and attitudes towards the prevention of vaginal candidiasis in this study. This contradict with a cross-sectional study descriptive study conducted by Balqis et al (2016) in Jatinangor, whose study showed that there was a significant relationship between age and attitudes regarding vaginal infections (Balqis et al, 2016).

### **5.4 Attitude toward Prevention of vaginal candidiasis among female adolescents in the Adenta Municipality**

The current study presented that, (73.3%) of the population who had vaginal candidiasis sought for treatment among which (41.4%) practiced self-medication as a form of treatment. This agrees with a descriptive cross-sectional study conducted by Ilankoon et al, (2017) which revealed that, most of its respondents (73.6%) thought that any type of vaginal discharge is normal and therefore, did not seek for medical treatment (Ilankoon et al, 2017). The result of this study shows that respondents had good attitudes

in the cleanliness of the genital organ and also have good lifestyle to prevent vaginal discharge. In relation to attitude towards prevention of vaginal candidiasis, the overall attitude towards the prevention (53.2%) shows good attitude towards the prevention. This is not different from a cross-sectional study conducted by Balqis et al, (2016) on knowledge, attitude and practice about vaginal discharge on school aged girls (13-19) years in Jatinangor Senior High School revealed that, (58.9%) of its participants had good attitude regarding prevention of vaginal candidiasis (Balqis et al, 2016). There was a significant relationship between knowledge on vaginal candidiasis and the attitude towards prevention of vaginal candidiasis. This is not consistent with a study conducted by Sumarah et al, (2017) on Effects of vaginal hygiene and behavior of pathological vaginal discharge prevention among female adolescents in Slemanregency, Yogyakarta, Indonesia, whose findings reported that there was a significant association between attitudes towards prevention and age. The consistency between the studies might be because of awareness programs on reproductive health in both countries (Sumarah et al, 2017).

### 6.1 Appendix 1: Ethical Clearance



### 6.2 Appendix 2: Informed Consent Form Participant Information Sheet

My name is Quarshie Faustina Akweley, an MPH student of the Catholic University College of Ghana, Fiapre. I am conducting a study to assess the Knowledge and Attitudes Regarding the Causes Effects and

Prevention of Vaginal Candidiasis among Female Adolescents in the Adenta Municipality. The exercise may take 15-20 minutes to complete. Kindly note that, there are no potential risk associated with taking part in the study except your time taken in answering the questions. Also, there will not be any physical compensation associated in taking part in the study. However, the research findings will go a long way to help health system decision-making to improve health service delivery. The responses to the questionnaires will only be for the purpose of the study. The study will ensure that information gathered from the participants will be treated as private and confidential, good storage practices will be employed. The data would be kept in a Quattro envelope, sealed and put in a locker under lock and keys. The study will guide against participants spending their money and resources for the purpose of the study. The Principal Investigator will visit participant at the various study sites. The participants reserve the right to withdraw from the interview or participation in the process. The findings from the study will be shared with all stakeholders who have the right to access it and address issue that challenge the generation of quality data. The funding or sponsoring the study/research would be by principal investigator. The study will be conducted in English and any other local language depending on the language that the respondent understands. A copy of the Information sheet and Consent form will be given to you after it has been signed or thumb-printed to keep. The study will ensure anonymity of study respondents and institutions involved in the study using coding system. For further information, please contact the Department of Public Health, School of Graduate Studies, Catholic University College of Ghana, Fiapre or my primary supervisor on 0204615200. You can also contact the Administrator of the Ghana Health Service Ethics Committee; Nana Abena Apatu on 0503539896 or on email [ethics.research@gmail.org](mailto:ethics.research@gmail.org) for ethical issues only.

### 6.3 Appendix 3: Voluntary Agreement

#### 6.3.1 Consent Form and 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, Ga and Twi). 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 voluntarily agree to be part of this research.

Name of Participant..... Participants' Signature .....OR Thumb Print..... Date.....

#### 6.3.2 Interpreters' Statement

I interpreted the purpose and contents of the Participants' Information Sheet to the named participant to the best of my ability in the (English, Ga and Twi) 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..... OR Thumb Print ..... Date: ..... Contact Details .....

#### 6.3.3 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 (English, Ga and Twi)

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: .....

### 6.3.4 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.....

## 6.4 Appendix 4: Questionnaire

Knowledge and Attitudes Regarding the Causes, Effects and Prevention of Vaginal Candidiasis among Female Adolescent in the Adenta Municipality, Accra Ghana.

Please Answer Every Question In The Questionnaire By Ticking At The Answer You Choose.

### 6.4.1 Section A: Demographic Characteristics

A1. Age: ..... A2. Place of residence (Location) .....

A3. Religion; a. Christian [ ] b. Muslim [ ] c. Traditionalist [ ] d. Other Specify [ ]

A4. Educational background:

A5. Are you into any relationship with the opposite sex? : Yes/No

A6. Marital status; a. Married [ ] b. Single [ ]

### 6.4.2 Section B: Knowledge on the Causes of Vaginal Candidiasis

B1. What do you think are the possible “causes” of vaginal Candidiasis infections (You can mark more than one alternatives?) [ ] Bacteria [ ] Virus [ ] Fungus [ ] Bad hygiene of women [ ] Using unclean water [ ] Sex during menstruation [ ] having sex soon after giving birth [ ] Blood transfusion [ ] Infected swimming pool water [ ] don't know.

B2. What are the routes of transmission of vaginal Candidiasis? (You can mark more than one alternative) [ ] Sexual intercourse [ ] Blood transfusions [ ] Sharing clothes/things [ ] Sharing food [ ] Mother to child [ ] Don't know [ ] Others (please specify) .....

B3. What are signs and symptoms of vaginal Candidiasis? (You can mark more than one alternative) [ ] Abdominal pain [ ] Discharge from penis/vulva [ ] Itching in genital area [ ] Burning pain on urination [ ] Pain during intercourse [ ] Genital ulcers or open sores [ ] Swelling in genital area [ ] Blood in urine [ ] Failure to urinate [ ] Loss of weight [ ] Weakness [ ] Don't know [ ] Others (please specify): .....

B4. Do you think it is possible for a woman to have vaginal Candidiasis infection without having symptoms? (Choose one option) [ ] Yes [ ] No [ ] Don't know

B5. What are complications of vaginal Candidiasis if untreated? (You can mark more than one alternative) [ ] Infertility [ ] Premature birth [ ] Still birth [ ] Ectopic pregnancy [ ] Miscarriage [ ] Cervix cancer [ ] Don't know [ ] Others (please specify):.....

B6. From where have you received information on vaginal Candidiasis? (You can mark more than one alternative) [ ] Friends [ ] Family [ ] Youth club [ ] School/College [ ] Television [ ] Radio [ ] Magazine [ ] Internet [ ] Hospital/Clinic [ ] Others (please specify): .....

B7. Have any of the following people told you that they have/have had candidiasis? (You can mark more than one alternative) [ ] Friend, [ ] Parent, [ ] Sister [ ] Other family member [ ] Other, [ ]

### 6.4.3 Section C: Attitude towards the Effects of Vaginal Candidiasis (Choose One Option from This Section)

C1. Candidiasis infection are not dangerous because they can be cured

Agree  Disagree  Don't know

C2. It is necessary to avoid a person who has contracted candidiasis because they can transmit it to other people  Agree  Disagree  Don't know

C3. People who are infected with candidiasis must seek for treatment  Agree  Disagree  Don't know

C4. If a person believes that she is infected with vaginal Candidiasis and is unsure about the symptoms she should directly contact a health personnel.  Agree  Disagree  Don't know

C5. Young girls should get information/knowledge about candidiasis in order to prevent these diseases  Agree  Disagree  Don't know

C6. Young girls should be educated on the knowledge of candidiasis at school to prevent these diseases  Agree  Disagree  Don't know

C7. A person who does not want to become infected with candidiasis infection should use condom when having sexual intercourse.  Agree  Disagree  Don't know

C8. How worried are you that you might contract candidiasis infection?

Not worried at all  Worried a little  Worried a lot  Don't know

**6.4.4 Section D. Attitudes towards Prevention of Vaginal Candidiasis (Choose One Option from This Section)**

D1. Have you ever had vaginal Candidiasis or white before? Yes , No

D2. If yes, did you seek for treatment? Yes , No

D3. If yes, which form of treatment did you seek? Hospital treatment , Herbal treatment , Self-medication

D4. When you had this disease, did you inform your parent(s)? Yes , No

D5. What daily hygiene practices do you use when washing your genitalia?

Front to back cleaning of genital area , Back to front cleaning of genital area

Douching , Using perfume after washing the genital area

D6. How many times do bath during menstruation?

Three or more times in a day , twice in a day , once in a day , I never take a bath during menstruation

D7. Which methods do you use in drying your underwear..?

Dry on the sunshine , Dry inside room , Ironing underwear before use

D8. What type of perinea pads do you use during menses..?

Disposable sanitary pad only , Cotton pad , Both

D9. How many times do you change sanitary pad during menses per day..?

One , Two , Three , As needed

D10. What methods do you use to removal hair around genital area..? Shaving cream , Using hair cutting machine , Multiple responses are allowed , Razors

D11. Do you rinse the outside part of vulva with only warm water...? Yes , No , Others

D12. It is good to wear only cotton underwear to avoid candidiasis? Yes , No , Don't know

D13. How often do you normally wear tight underwear? Always , Sometimes , Not at all

D14. How often do you change your underwear? Daily , Weekly , Monthly , As needed

D15. It is advisable to avoid wearing jeans trousers because they cause a rise in body temperature and stimulate the growth of fungus. Yes , No , Don't know

D16. Do you use scented sprays around your genital area? Yes , No , Others



D17. Maintaining a diet low in carbohydrates and sugars, will limit the proliferation of microbes.

Yes [ ], No [ ], Don't know [ ]

### 7.0 Conflict of interest

The Principal Investigator (PI) had no conflict of interest in the study.

### 8.0 Acknowledgement

I thank God Almighty for making it possible for me to go through this program successfully. My heartfelt gratitude goes to Dr. Benjamin Mensah (my project supervisor) and Mr. Isaac Nseibi for their unflinching support and guidance. Their patience, kindness and encouragement helped me immensely in carrying out this project work. My gratitude also extends to all my colleagues, teaching and non-teaching staff of Catholic University college of Ghana. May God bless all those who supported and encouraged me through my program of study.

### 9.0 Conclusion

In conclusion, this study has revealed that most of the participants had good knowledge on vaginal candidiasis. The level of knowledge and attitudes of female adolescents on the causes, effects and prevention therefore cannot be attributed to the cause of high rate of vaginal candidiasis among female adolescents as shown in the study. Age though was seen as a factor to knowledge level and attitude towards the causes, effects and prevention of vaginal candidiasis, it was not significant.

Moreover, the higher the knowledge level of the respondent, the higher they practiced good attitudes towards the effects and prevention. Those between the ages of 10-15 years had lower knowledge on the causes, effects and prevention of vaginal candidiasis as compared to those within the ages of 16-19 years. It was discovered that bad personal hygiene was the cause of vaginal candidiasis, which could lead to infertility if not treated.

### 10.0 Recommendations

Since it was discovered that those between the aged groups of 10-15 years exhibited poor knowledge and attitudes regarding the causes, effects and prevention of vaginal candidiasis. We therefore call on the relevant stakeholders and benevolent organizations like Youth action movement, Planned Parenthood Association of Ghana and Youth Alive Organization to embark on programs aimed at increasing the knowledge, attitudes of female adolescents on vaginal candidiasis most especially the adolescents between the ages of 10 and 15 years.

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