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Comparative Analysis on the Rate of Sexually Transmitted Diseases in Ekiti State

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A B S T R A C T

This work focused on the rate of sexually transmitted diseases in Ekiti State using Ekiti State University Teaching Hospital Ado - Ekiti, Ekiti State as a case study. The methodology employed in the analysis of the data collection was chi- square test and descriptive statistics. Important issues raised are that the age range 20-29 has the highest reported cases and based on gender the females have the higher rate of STDs than male as reported in the data collected. live has the highest frequency of 1463 and death with 135 of the reported cases The year with the highest reported cases is 2018 under study. There is no significant difference between life status and year, life status and type of diseases, life status and gender, Life status and age since their p-values are less than 0.05 and accept null hypothesis, while there's a significant difference between age group and gender since the p-value is greater than 0.05 and reject the null hypothesis.

Keywords: Sexually Transmitted Diseases, Descriptive statistics, Chi-square

1. Introduction

Here Sexually transmitted diseases, known as STDs or venereal diseases, are of global concern. STD is a severe disease that is caused by pathogens. The pathogens, bacteria, viruses or parasites enter the body through many means, such as person-to-person in blood, semen, or vaginal and other bodily fluids. It is a global menace with an alarming rate of incidence (World Health Organization, 2013). Sexually transmitted diseases are also known as sexually transmitted infections (STIs). Sexually transmitted disease first begins as a sexually transmitted infection, an infection which occurs with the sexually transmitted bacteria or virus that enters the body and begins to multiply. Once the sexually transmitted bacteria or viruses have entered the body, the infection may become a disease. The disease occurs when this foreign presence officially disrupts the body's normal functions and processes. Sexually transmitted diseases can be categorized into three groups: Bacterial STDs such as chlamydia, gonorrhoea, and syphilis. Viral STDs such as human immunodeficiency virus (HIV), genital herpes, genital wart (HPV) and hepatitis B. Parasitic STDs such as trichomoniasis. STI diagnostic tests are usually readily available in the developed world but are often unavailable in the developing world (STI fact sheet, 2014). Sexually transmitted diseases (STDs) are severe illnesses requiring treatment; some STDs, such as HIV, cannot be cured or are deadly.

The 2013 Nigeria Demographic and Health Survey (NDHS, 2013) report indicated that 4 percent of women and 2 percent of men in Nigeria experienced a sexually transmitted infection, abnormal genital discharge or soreness before the survey. Sexually transmitted diseases are common among young people. The following is a brief kind of literature review on the studies on sexually transmitted diseseases by different scholars such as [1], [2],[3],[4],[5],[6], and [7], Therefore this study seeks to investigate the rate of sexually transmitted diseases in Ekiti State.

2. Methodology

The methods used to analyze this research work are Descriptive statistics, Chi-square, logistics regression and The Friedman test. The data used for this research work was obtained from Ekiti State University Teaching Hospital, Ado Ekiti, Ekiti State, on the rate of sexually transmitted diseases for ten years (2012—2021).

CHI SQUARE TESTS

Pearson's chi-squareχ^2 tests, often referred to simply as chi-square tests, are among the most common **nonparametric tests**. A Pearson's **chi-square test** is a statistical test for categorical data. It is used to determine whether your data are significantly different from what you expected. There are two types of Pearson's chi-square tests:

- The chi-square goodness of fit test
- The chi-square test of independence

THE CHI SQUARE GOODNESS OF FIT TEST: It is used to test whether the frequency distribution of the categorical variable is significantly different from your expectations. Often, but not always, the expectation is that the categories will have equal proportions.

THE CHI SQUARE TEST OF INDEPENDENCE: is used to test whether two categorical variables are related to each other. If two variables are independent (unrelated), the probability of belonging to a certain group of one variable isn't affected by the other variable.

Chi-square is often written as $\boldsymbol{\chi^2}$. Both of Pearson's chi-square tests use the same formula to calculate the test statistic**,** chi-square $\boldsymbol{\chi^2}$.

$$\boldsymbol{\chi^2} = \sum\left(\frac{(O_i - E_i)^2}{E_i}\right) \qquad (1)$$

here

χ^2= chi squared
O_i = observed value
E_i = expected value

LOGISTIC REGRESSION

Logistic regression is used to obtain odds ratio in the presence of more than one explanatory variable. The procedure is quite similar to multiple linear regressions, with the exception that the response variable is binomial. The result is the impact of each variable on the odds ratio of the observed event of interest. The main advantage is to avoid confounding effects by analyzing the association of all variables together. Logistic regression works very similar to linear regression, but with a binomial response variable.

Logistic regression sometimes called the logistic model or longitudes, analyzes the relationship between multiple independent variables and a categorical dependent variable, and estimates the probability of occurrence of an event by fitting data to a logistic curve. There are two models of logistic regression, binary logistic regression and multinomial logistic regression. The logistic model is popular because the logistic function, on which the logistic model is based, provides estimates in the range 0 to 1.

The following equation represents logistic regression:$y = \frac{1}{1+e^{(b_o+b_1X)}}$

Where,

- x = input value

1) y = predicted output

i. b_o= bias or intercept term

- b_1= coefficient for input (x)

THE FRIEDMAN TEST

The Friedman test is a non – parametric alternative to the one-way ANOVA with repeated measures. It is used to test for differences between groups when the dependent variable being measured is ordinal. It can also be used for continuous data that has violated the assumptions necessary to run the one-way ANOVA with repeated measures (e.g., data that has marked deviation from normality). The null hypothesis for the test is that the treatments all have identical effects while the alternative hypothesis for the test is that the treatments do have different effects. The test statistic is given by:

$$\boldsymbol{F} = \frac{12n}{k(k+1)}\sum_{j=1}^{k}\left(\bar{\boldsymbol{r}}_{\cdot j} - \frac{k+1}{k}\right)^2 \qquad (2)$$

Where $\bar{\boldsymbol{r}}_{\cdot j} = \frac{1}{n}\sum_{i=1}^{n}\boldsymbol{r}_{ij}$

3. Data Analysis and Interpretation of Results

TABLE 4.1 YEARLY REPORTED CASES OF SEXUALLY TRANSMITTED DISEASES

YEAR	Frequency	Percent
2012	**95**	**5.9**
2013	**156**	**9.8**
2014	**133**	**8.3**
2015	**96**	**6.0**
2016	**183**	**11.5**
2017	**199**	**12.5**
2018	**231**	**14.5**
2019	**210**	**13.1**
2020	**127**	**7.9**
2021	**168**	**10.5**
Total	**1598**	**100.0**

INTERPRETATION: Table 4.1 above reveal that 2018 has the highest frequency of sexually transmitted diseases with 231 followed by 2019 with 210, 2017 with 199, 2016 with 183, 2021 with 168, 2013 with 156, 2014 with 133, 2020 with 127, 2015 with 96 and 2012 has the Lowest frequency of sexually transmitted diseases with 95 reported cases.

TABLE 4.2 MONTHLY REPORTED CASES OF SEXUALLY TRANSMITTED DISEASES

MONTH	Frequency	Percent
January	114	7.1
February	121	7.6
March	141	8.8
April	129	8.1
May	120	7.5
June	125	7.8
July	153	9.6
August	147	9.2
September	132	8.3
October	160	10.0
November	149	9.3
December	107	6.7
Total	1598	100.0

INTERPRETATION: Table 4.2 above shows that October has the highest frequency of 160 followed by July 153, November 149, August 147, March 141, September 132, April 129, June 125, February 121, May 120, January 114 and December has the Lowest frequency of 107.

TABLE 4.3 REPORTED CASES OF SEXUALLY TRANSMITTED DISEASES BASED ON LIFE STATUS

LIFE STATUS	Frequency	Percent
Live	1463	91.6
Death	135	8.4
Total	1598	100.0

INTERPRETATION: Table 4.3 above reveals that live has the highest frequency of 1463 while death has 135 reported cases from the period

TABLE 4.4REPORTED CASES OF SEXUALLY TRANSMITTED DISEASES BASED ON TYPE OF DISEASE

TYPES OF DISEASES	Frequency	percent
HIV	130	8.1
AIDS	55	3.4
Hepatitis	270	16.9
Gonorrhea	2	0.1
RVD	384	24.0
STI	175	11.0
UTI	582	36.4
Total	1598	100.0

KEY: HIV= human immune virus, AIDs= acquired immunodeficiency syndrome, RVD= retrovirus diseases, STI= sexually transmitted infection, UTI= urinary tract infection

INTERPRETATION: Table 4.4 above shows that UTI has the highest frequency of 582 followed by RVD 384, hepatitis 270, STI 175, HIV 130, AIDS 55 and Gonorrhea has the lowest frequency of 2 reported cases.

TABLE 4.5 REPORTED CASES OF SEXUALLY TRANSMITTED DISEASES BASED ON GENDER

GENDER	Frequency	Percent
Male	702	43.9

Female	**896**	**56.1**
Total	**1598**	**100.0**

INTERPRETATION: Table 4.5 above shows that female has the highest number of 896 while male has 702 reported cases from the period.

TABLE 4.6 REPORTED CASES OF SEXUALLY TRANSMITTED DISEASES BASED ON AGE GROUP

AGE GROUP	Frequency	Percent
0 – 9	**138**	**8.6**
10 – 19	**113**	**7.1**
20 – 29	**432**	**27.0**
30 – 39	**373**	**23.4**
40 – 49	**249**	**15.6**
50 – 59	**114**	**7.1**
60 +	**179**	**11.2**
TOTAL	**1598**	**100.0**

INTERPRETATION: Table 4.6 above shows 20 – 29 as the highest frequency of sexually transmitted diseases with the total of 432, followed by 30 – 39 with 373, 40 – 49 with 249, 60 + with 179, 0 – 9 with 138, 50 – 59 with 114 and 10 – 19 has the lowest frequency of sexually transmitted diseases with the total of 113 reported cases.

TABLE 4.7 LIFE STATUS * YEAR

H_0: There is no significant difference between the life status across the year

H_1: There is a significant difference between the life status across the year

Friedman Test

Ranks

	Mean Rank
Year	1.99
Life Status	1.01

Test Statistics[a]

N	1598
Chi-Square	1579.000
Df	1
Asymp. Sig.	.000

a. Friedman Test

INTERPRETATION: Since the p - value is less than 0.05; we fall to reject the null hypothesis and conclude that there is no significant difference between Life status across the Year.

LIFE STATUS * TYPE OF DISEASE

H_0: There is no significant dependency between life status and type of disease

H_1: There is a significant dependency between life status and type of disease

TABLE 4.8 LIFE STATUS * TYPE OF DISEASE CROSSTABULATION

			Type of Disease							Total
			HIV	AIDS	Hepatitis	Gonorrhea	RVD	STI	UTI	
Life Status	Live	Count	98	41	256	2	313	171	582	1463
		Expected Count	119.0	50.4	247.2	1.8	351.6	160.2	532.8	1463.0
	Death	Count	32	14	14	0	71	4	0	135
		Expected Count	11.0	4.6	22.8	0.2	32.4	14.8	49.2	135.0

Total	**Count**	130	55	270	2	384	175	582	1598
	Expected Count	130.0	55.0	270.0	2.0	384.0	175.0	582.0	1598.0

INTERPRETATION: Table 4.8 above shows that live has the highest frequency of sexually transmitted diseases with 1463 reported cases than death with 135 reported cases. While UTI has the highest frequency of 582 followed by RVD 384, hepatitis 270, STI 175, HIV 130, AIDS 55 and Gonorrhea has the lowest frequency of 2 reported cases.

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	180.760[a]	6	.000
Likelihood Ratio	202.065	6	.000
Linear-by-Linear Association	86.945	1	.000
N of Valid Cases	1598		

INTERPRETATION: Since the p - value is less than 0.05; we fail to reject the null hypothesis and conclude that there is no significant dependency between Life status and type of disease.

LIFE STATUS * GENDER

H_0: Life status does not depend on gender

H_1: Life status depends on gender

TABLE 4.9 LIFE STATUS * GENDER CROSSTABULATION

			Gender		**Total**
			Male	**Female**	
Life Status	**Live**	**Count**	654	809	1463
		Expected Count	642.7	820.3	1463.0
	Death	**Count**	48	87	135
		Expected Count	59.3	75.7	135.0
Total		**Count**	702	896	1598
		Expected Count	702.0	896.0	1598.0

INTERPRETATION: Table 4.9 above shows that live has the highest frequency of sexually transmitted diseases with 1463 reported cases than death with 135 reported cases. While female has the highest frequency of sexually transmitted diseases with the total of 896 more than male 702.

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.198[a]	1	.040		
Continuity Correction[b]	3.835	1	.050		
Likelihood Ratio	4.271	1	.039		
Fisher's Exact Test				.046	.024
Linear-by-Linear Association	4.196	1	.041		
N of Valid Cases	1598				

INTERPRETATION: Since the p -value is less than 0.05, we fail to reject the null hypothesis and conclude that Life status does not depend on gender.

LIVE STATUS * AGE GROUP

H_0: Live status does not depend on age group

H_1: Live status depends on age group

TABLE 4. 10 LIVE STATUS * AGE GROUP CROSSTABULATION

			AGE GROUP							Total
			0-9	10-19	20-29	30-39	40-49	50-59	60 +	
LIFE STATUS	Live	Count	130	100	400	350	230	110	143	1463
		Expected Count	126.3	103.5	395.5	341.5	227.9	104.4	163.9	1463.0
	Death	Count	8	13	32	23	19	4	36	135
		Expected Count	11.7	9.5	36.5	31.5	21.1	9.6	15.1	135.0
Total		Count	138	113	432	373	249	114	179	1598
		Expected Count	138.0	113.0	432.0	373.0	249.0	114.0	179.0	1598.0

INTERPRETATION: Table 4.10 above shows that live has the highest frequency of sexually transmitted diseases with 1463 reported cases than death with 135 reported cases While 20 – 29 has the highest frequency of sexually transmitted diseases with the total of 432, followed by 30 – 39 with 373, 40 – 49 with 249, 60 + with 179, 0 – 9 with 138, 50 – 59 with 114 and 10 – 19 has the lowest frequency of sexually transmitted diseases with the total of 113 reported cases.

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	41.030[a]	6	.000
Likelihood Ratio	28.349	6	.000
Linear-by-Linear Association	31.260	1	.004
N of Valid Cases	1598		

INTERPRETATION: Since the p value is less than 0.05, we fail to reject the null hypothesis and conclude that there is no significant relationship between life status and age group.

AGE GROUP * GENDER

H_0: There is no significant difference between age group and gender

H_1: There is a significant difference between age group and gender

TABLE 4.11 AGE GROUP * GENDER CROSSTABULATION

	GENDER		
	MALE	FEMALE	TOTAL
0-9 Count	78	60	138
Expected count	77.4	60.6	138.0
10-19 Count	65	48	113
Expected count	63.4	49.6	113.0
20-29 Count	255	177	432
Expected count	242.2	189.8	432.0
30-39 Count	191	182	373
Expected count	209.1	163.9	373.0
40-49 Count	140	109	249
AGE GROUP Expected count	139.6	109.4	249.0
50 – 59 Count	66	48	114
Expected count	63.9	50.1	114.0
60 + Count	101	78	179
Expected count	100.4	78.6	179.0
Total Count	896	702	1598
Expected count	896.0	702.0	1598.0

INTERPRETATION: Table 4.11 above shows that 20 – 29 as the highest frequency of sexually transmitted diseases with the total of 432, followed by 30 – 39 with 373, 40 – 49 with 249, 60+ with 179, 0 – 9 with 138, 50 – 59 with 114 and 10 – 19 has the lowest frequency of sexually transmitted

disease with the total of 113 reported cases While female has the highest frequency of sexually transmitted diseases with the total of 896 more than male 702.

Chi-square test

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.390[a]	6	.495
Likelihood Ratio	3.221	6	.000
Linear-by-Linear Association	4.447	1	.000
N of Valid Cases	1598		

INTERPRETATION: Since the p -value is greater than 0.05, we reject the null hypothesis and conclude that there is a significant difference between age group and gender.

LOGISTIC REGRESSION

Table 4.12 Classification Table[a]

Observed		**Predicted**		
		Life Status		**Percentage Correct**
		Death	**Live**	
Life Status	**Death**	0	135	.0
	Live	1	1462	99.9
Overall Percentage				91.5

a. The cut value is .500

Table 4.13 Variables in the Equation

Parameter	**B**	**S.E.**	**Wald**	**Df**	**Sig.**	**Exp(B)**	**95% C.I. for EXP(B)**	
							Lower	**Upper**
Disease-type	.614	.1043	2.148	1	.035	.671	.557	.692
Gender	-.538	.0591	7.596	1	.016	.726	0.743	1.245
Age	.682	.1156	3.564	1	.018	.737	.614	.895
Constant	1.421	.1428	78.475	1	.000	1.584		

INTERPRETATION: Regression analysis carried out was used to determine the comparative rate of sexually transmitted diseases according to age, gender, and disease type category. It includes B, standard error, wald chi-square, DF, significant value, Exp(B) which is the odd ratio, lower and upper boundaries at 95% confident interval. Comparing rate of sexually transmitted diseases according to gender categories, the equation Y =1.421 + 0. 682 age + 0.614 disease type - 0.538 gender + ε tells that there was 16.4% gap rate of sexually transmitted diseases among gender categories and 32.2% gap rate of sexually transmitted diseases among disease type and 25.1 % gap rate of sexually transmitted diseases among age. With significant values, 0.035 which is less than 0.05, we accept null hypothesis, and conclude that, sexually transmitted diseases does not depends significantly on disease type, with 0.016 which is less than 0.05, we accept null hypothesis and conclude that sexually transmitted diseases does depend significantly on gender and also with 0.018 which is less than 0.05, we accept null hypothesis and conclude that sexually transmitted diseases does not depend significantly on age. The odd ratio for life status as the dependent variable is 1.

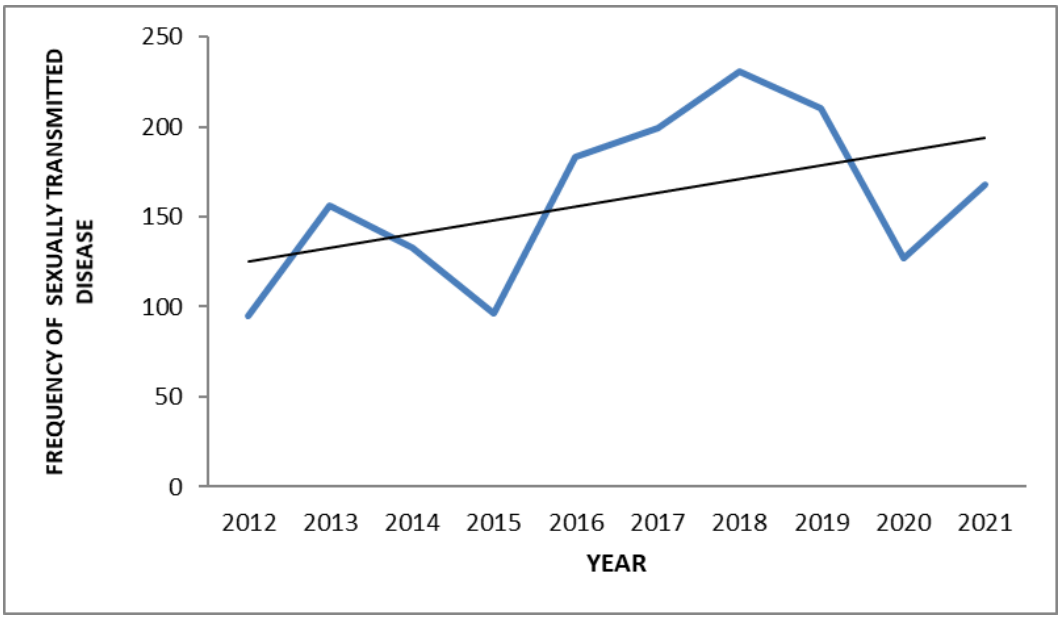

FIG 4.1 GRAPHICAL REPRESENTATION OF REPORTED CASES OF STDs BY YEAR

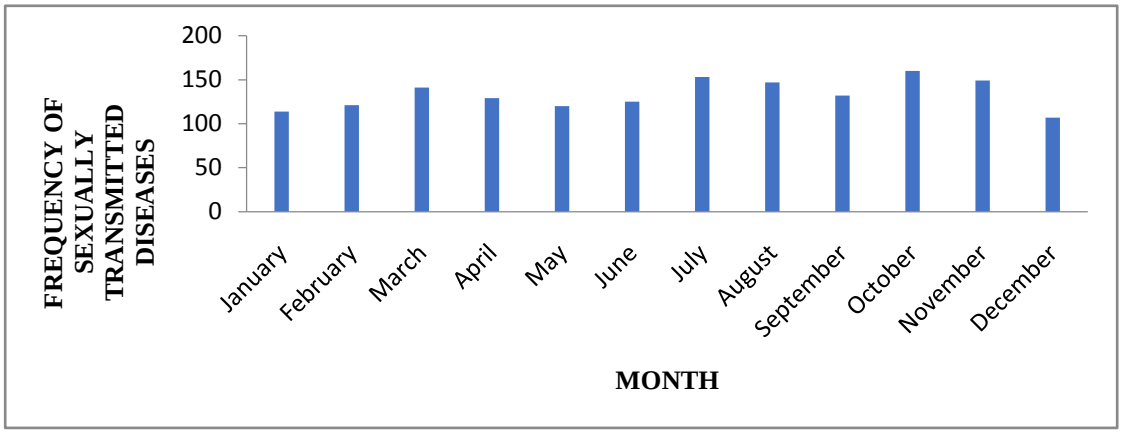

FIG 4.2 GRAPHICAL REPRESENTATION OF REPORTED CASES OF STDs BY MONTH

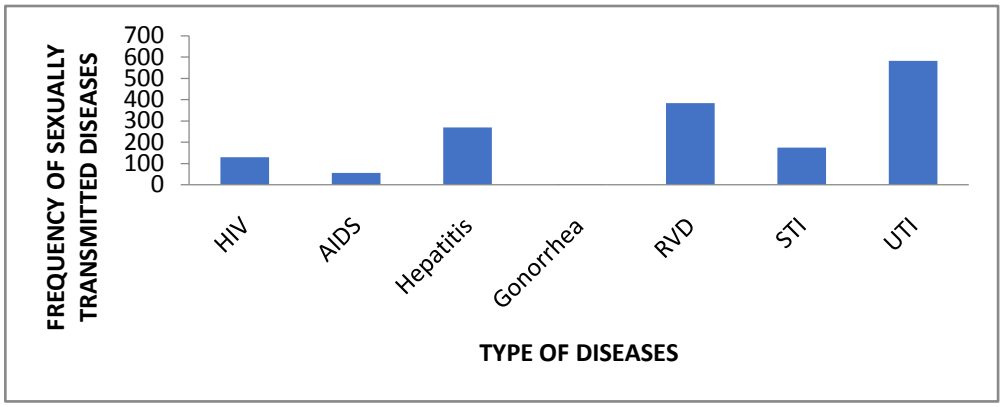

FIG 4.3 GRAPHICAL REPRESENTATION OF REPORTED CASES OF STDs BY TYPE OF DISEASES

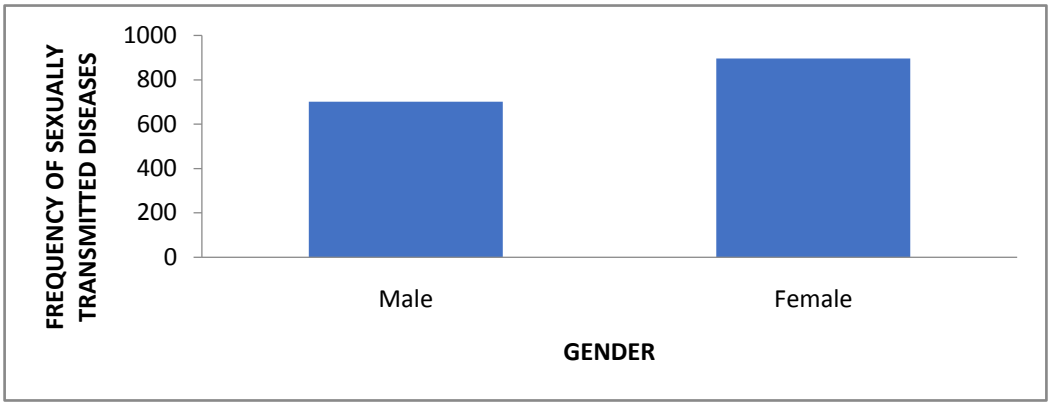

FIG 4.4 GRAPHICAL REPRESENTATION OF REPORTED CASES OF STDs BY GENDER

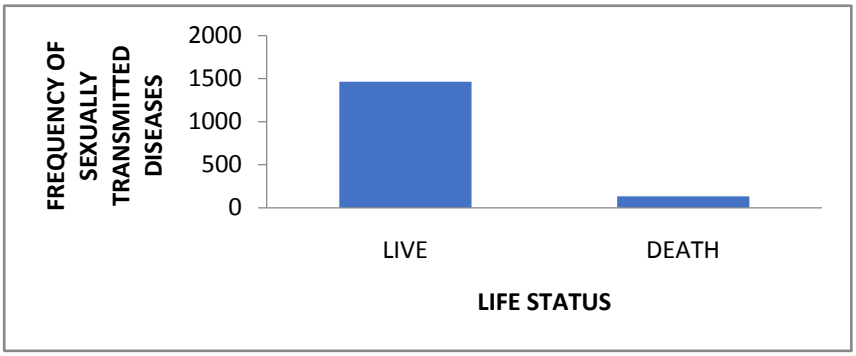

FIG 4.5 GRAPHICAL REPRESENTATION OF REPORTED CASES OF STDs BY LIVE STATUS

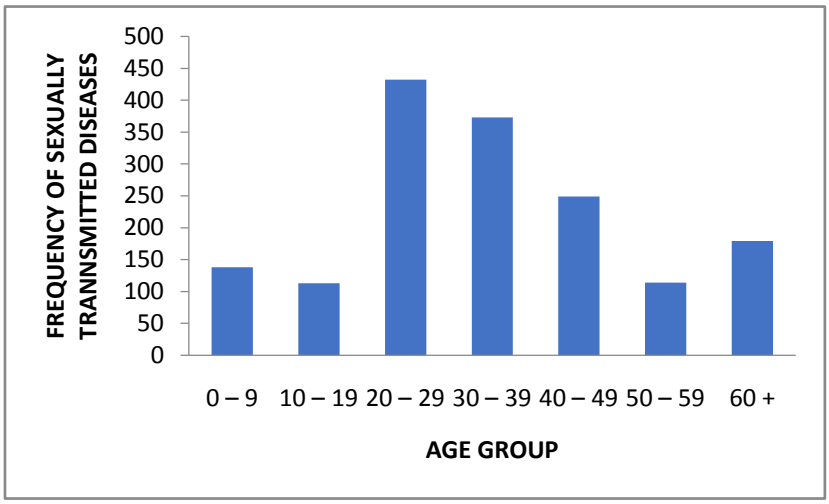

FIG 4.6 GRAPHICAL REPRESENTATION OF REPORTED CASES OF STDs BY AGE GROUP

4. Conclusion

The study results for this study are specific for EKSUTH. However, the views from the data collected cut across the year, month, gender, type of disease, age and life statuses of patients understudied. RVD, which is the new AIDS, was discovered as sexually transmitted disease among the

patients. Their rate or level of transmission after the UTI (Urinary Tract Infection) is RVD (Retro virus disease), Hepatitis, STI (Sexually Transmitted Infection), HIV (Human Immune Deficiency Virus), AIDS (Acquired Immune Deficiency Syndrome) and Gonorrhea.

Important issues raised are that the age range 20-29 has the highest reported cases and based on gender the females have the higher rate of STDs than male as reported in the data collected. live has the highest frequency of 1463 and death with 135 of the reported cases The year with the highest reported cases is 2018 under study. There is no significant difference between life status and year, life status and type of diseases, life status and gender, Life status and age since their p-values are less than 0.05 and accept null hypothesis, while there's a significant difference between age group and gender since the p-value is greater than 0.05 and reject the null hypothesis.

The results of this study can be used to propagate the awareness of the major sexually transmitted diseases and the prevention. This when pursue can help the populace to become healthier and also help the government to channel its results properly to where they are needed.

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