

1 **PREVALENCE AND RISK FACTORS OF INFECTION WITH**
2 **GONORRHEA AND SYPHILIS BETWEEN 2010 AND 2015 IN**
3 **SELECTED HEALTH FACILITIES IN BUEA HEALTH DISTRICT,**
4 **CAMEROON**

5
6
7
8
9 **ABSTRACT**
10

Background: Gonorrhoea and syphilis are common STIs in most developing countries, particularly among the reproductive age group. Their control is important considering the high incidence of acute infections, complications and their socioeconomic impact and a means of effecting control measures against Human Immunodeficiency Virus (HIV). Knowledge of the prevalence and risk factors of these infections in a student residential area will enable development of better strategies for STI control.

Methods: A health facility based historical study design was conducted where laboratory records of patients screened for Syphilis and/or Gonorrhoea and HIV in selected primary health care (PHC) facilities in Buea Health District (BHD) between 2010 and 2015 were reviewed. Data analysis was done using EPI Info version 3.5.4. with a level of error set at 5%.

Results: A total of 1106 records were reviewed. Majority 472(42.7%) were between 21-30 years old, while 923(83.4%) were females. A significant proportion 78 (8.1%) were HIV positive. The prevalence of the both STIs was highest in 2015. The prevalence of gonorrhoea was 12.9% and that of syphilis was 16.9%. The odds of testing positive for syphilis for female compared to males was 0.33 (95% CI: 0.18-0.62); p-value of 0.001, while that for gonorrhoea was 0.22 (95%CI: 0.11, 0.44); p-value of 0.0001. Patients between 21 and 30 years were 2.46 times as likely to be syphilis positive compared to those below 21. Patients who were screened for gonorrhoea were 3.33 (95%CI 1.66-6.69) times as likely to test negative for HIV with a p value of 0.001.

Conclusion: The study revealed a high prevalence of gonorrhoea and syphilis. Although these infections have similar risk factors, there are distributed differently in the sexually active student residential area. This thus calls for the implementation of targeted screening and to revise control measures for STIs in the population.

11
12 *Keywords: Prevalence, Risk Factors, Gonorrhoea, Siphilis, Buea Health District, Cameroon*
13
14

15 **1. INTRODUCTION**
16

17 Sexually Transmitted Infections (STIs) are a group of infectious or communicable diseases
18 whose primary mode of transmission is through sexual contact[1]. There are among the
19 major causes of illnesses in the world especially in the developing countries [2]. The
20 diseases caused by STIs are classified according to the type of organism causing the
21 infection, which could be bacterial, fungal, viral or of parasitic origin [3]. More than 25
22 infectious organisms are transmitted primarily through sexual activity and studies reveal that
23 STIs are among the many related factors that affect the broad continuum of reproductive
24 health [4].

25 STIs are characterized as hidden epidemics of tremendous health and economic
26 consequences that can lead to pains, organs damage, and serious disabilities such as

27 blindness, deafness, infertility, insanity, paralysis and even death [5, 6]. Its effects have
28 overlying economic and health burden at the community, household and individual levels.
29 Probably of concern to all is that STIs, especially in pregnant women, have been associated
30 with a number of adverse pregnancy outcomes including spontaneous abortion, stillbirth,
31 prematurity, low birth-weight, post-partum endometritis, early onset of labour including
32 premature rupturing of membranes, cervical and other cancers, chronic hepatitis, pelvic
33 inflammatory diseases and various sequelae in surviving neonates while in non-pregnant
34 women, STIs can lead to chronic infertility. In addition, these infections have been shown to
35 facilitate transmission of HIV [7].

36 It is estimated that the number of pregnant women with STDs is increasing by about 250
37 million a year in the developed countries and double that number in the developing countries
38 [3]. Infections with gonorrhoea and syphilis amongst other STIs are widely distributed in
39 Africa [8–10] and Cameroon [11] and constitute a public health problem especially as
40 prevalence is unexpectedly high even among married women in Cameroon[12].

41 The prevalence of these infections is an indicator of the level of compliance with safe sex in
42 the population and a means of effecting control measures against HIV. In spite of the
43 sequelae of these infections, there is inadequate statistical data on the prevalence of
44 common STDs (Syphilis and Gonorrhoea) in Cameroon in general and South West Region in
45 particular. To develop strategies of prevention and control of gonorrhoea and syphilis and
46 STDs in general, it is imperative to know their prevalence and associated risk factors.

47

48 2. MATERIAL AND METHODS

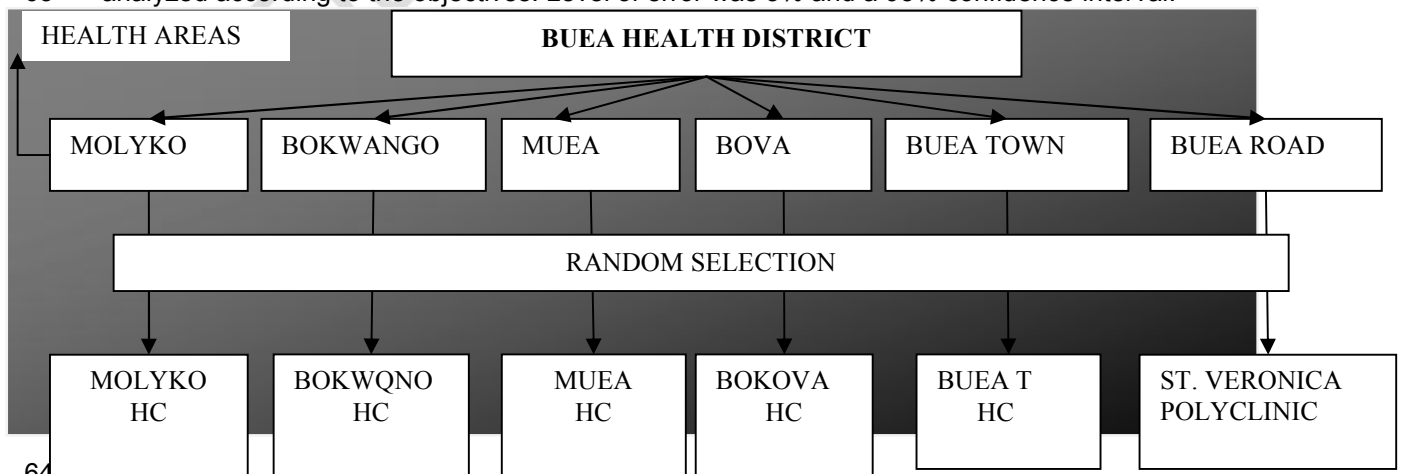
49

50 2.1. Study design

51 This was a health facility based historical study designed where records of patient screened
52 for Syphilis and Gonorrhoea in selected primary health care (PHC) facilities in Buea Health
53 District (BHD) between 2010 and 2015 were reviewed to identify risk factors.

54 2.2. Study setting and procedure

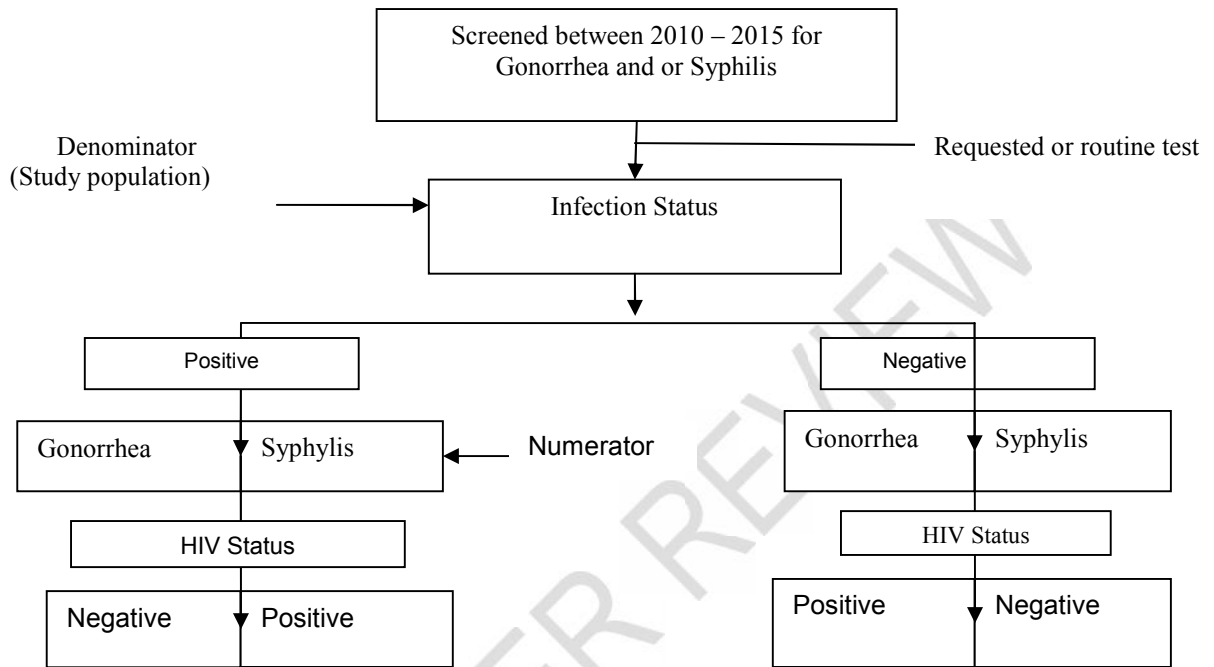
55 The BHD has six (6) Health Areas served by twenty nine (29) health facilities of which 26 are
56 PHC facilities. One PHC facility was randomly selected from each of the health areas as
57 indicated in figure 1. At the selected health facility, laboratory registers corroborated with
58 consultation registers were reviewed with the aid of the technicians working in the health
59 facilities to identify predictors. We also found out if the patient did an HIV test and the results
60 noted as demonstrated in figure 2. This was done with the help of a questionnaire. Data
61 analysis was done using EPI Info version 3.5.4. Data collected was cross checked for
62 accuracy and completeness before being entered into EPI Infos statistical software and
63 analyzed according to the objectives. Level of error was 5% and a 95% confidence interval.



65

Figure 1: selection of health facilities

66



67

68

Figure 2: Procedure of data collection (study flow chart)

69

2.3. Data analysis

70

Data analysis was done using EPI Info version 3.5.4. Data collected was cross checked for accuracy and completeness before being entered into EPI Infos statistical software and analyzed according to the objectives. Level of error was 5% and a 95% confidence interval.

71

72

73

2.4. Ethical approval

74

75

76

Ethical review was done and approved by the Faculty of Health Sciences Institutional Review Board (FHS-IRB). Administrative authorization was gotten from the Regional Delegation of Public and from the DMO for the Buea Health District.

77

78

3. RESULT AND DISCUSSION

79

3.1. Results

80

81

82

83

84

85

86

A total of 1106 patient's laboratory records were reviewed for either syphilis or gonorrhoea or both infections in the selected health facilities within the Buea Health District (2010 to 2015). Of the 1106 patients, majority 472(42.7%) were between 21-30 years old, while 923(83.4%) were females. A significant proportion 78 (8.1%) were HIV positive while the rest had either negative or undetermined HIV status. The Bokwango Health Area (HA) registered the greatest number of patients 301 (27.2%) while the Bova HA registered the least number of patients, 58(5.2%).

87

88

3.1.1. Hospital based Prevalence of Syphilis and Gonorrhoea in the Buea Health District

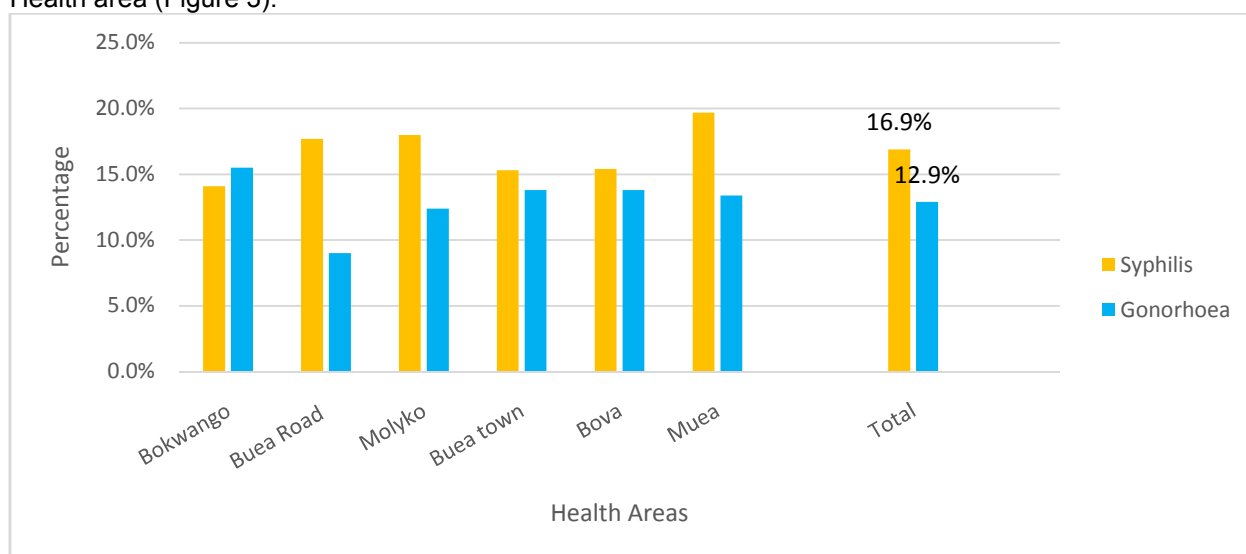
89

90

91

The prevalence of Syphilis in the buea health district was 16.9% with its highest contributor being the Muea Health Area and its lowest contribution coming from the Buea Town Health Area. For gonorrhoea, its prevalence in the district was 12.9% with most of its contribution

92 coming from the Bokwango Health Area and its least contributor being the Buea Road
 93 Health area (Figure 3).



94

95 Figure 3: The prevalence of syphilis and gonorrhoea in the sampled health areas of the Buea

96 **3.1.2. Prevalence of Gonorrhoea and Syphilis across predictors in the study**
 97 **population.**

98 Of the patients screened for gonorrhoea in the Buea health area between 2010 - 2015,
 99 majority of those who tested positive were females 90(65.2%) and 58(42.0%) were above
 100 31years of age. Also, 16(16.5%) of the patients who tested positive for gonorrhoea were also
 101 positive for syphilis. Again, 16(14.4%) of those who tested positive for gonorrhoea were
 102 tested positive for HIV.

103 Of the patients screened for syphilis, 136 (80.5%) of those who tested positive were females
 104 and 85(50.3%) were between the ages 21-30 years. Of the patients tested positive for
 105 syphilis, 16(10.3%) also tested positive for gonorrhoea. Again, 15(10.7%) of those tested
 106 positive for syphilis were HIV infected as can be seen in table 1.
 107

108 Table 1: Prevalence of syphilis and gonorrhoea across predictors

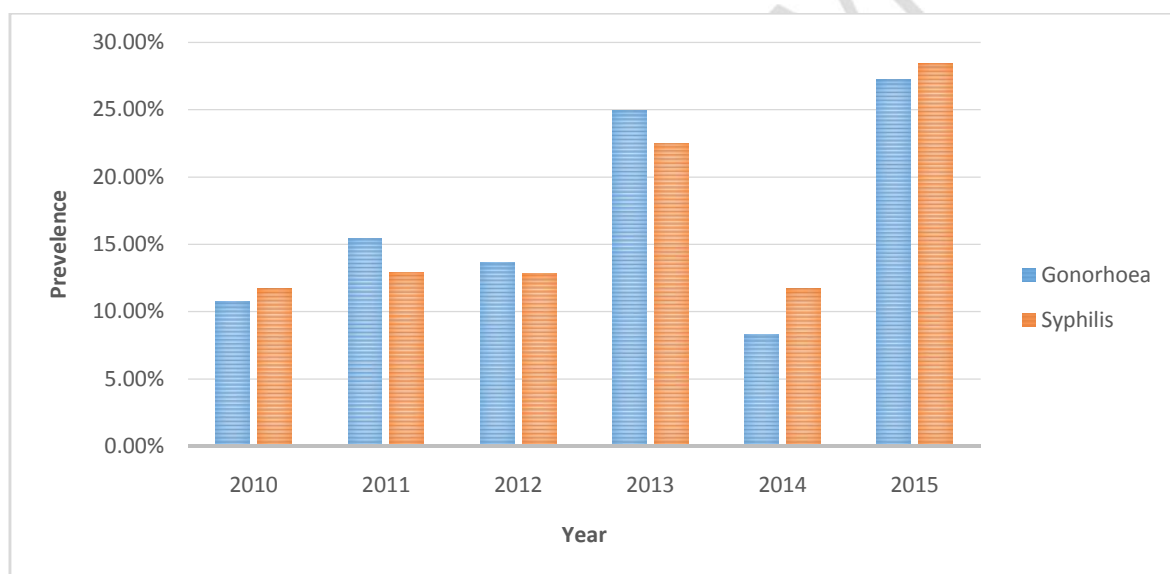
Variable		Syphilis		Gonorrhoea	
		Positive, n(%)	Negative, n(%)	Positive, n(%)	Negative, n(%)
Sex	Male	33 (19.5)	88 (10.1)	48 (34.8)	114 (12.2)
	Female	136 (80.5)	741 (89.9)	90 (65.2)	818 (87.8)
Age categories	Below 21 years	21 (12.4)	163 (19.8)	26 (18.8)	162 (17.4)
	21-30 years	85 (50.3)	338 (41.0)	54 (39.1)	406 (43.6)
	Above 31 years	63 (37.3)	323 (39.2)	58 (42.0)	364 (39.1)
Health Area	Bokwango	40 (23.8)	244 (29.6)	45 (32.6)	245 (26.3)
	Buea Road	34 (20.2)	158 (19.2)	20 (14.5)	203 (21.8)
	Molyko	32 (19.0)	146 (17.7)	24 (17.4)	169 (18.2)

	Buea town	9 (5.4)	50 (6.1)	9 (6.5)	56 (6.0)
	Bova	8 (4.8)	44 (5.1)	8 (5.8)	50 (5.4)
	Muea	45 (26.8)	183 (22.2)	32 (23.2)	207 (22.3)
HIV Infection	Positive	15 (10.7)	54 (7.3)	16 (14.4)	61 (7.4)
	Negative	125 (89.3)	686 (92.7)	95 (85.6)	768 (92.6)
The other STI	Positive	16 (10.3)	81 (10.1)	16 (16.5)	140 (16.3)
	Negative	140 (89.7)	720 (89.9)	81 (83.5)	720 (83.7)

109
110
111
112
113
114
115
116

3.1.3. Annual prevalence of gonorrhoea in the BHD (2010–2015)

The highest prevalence of gonorrhoea and syphilis was in 2015 which were 27.2% and 28.4% respectively and lowest prevalence were in 2014 and stood at 8.3% for gonorrhoea and 11.7% for syphilis. As demonstrated in figure 4, the prevalence of the two STIs have been less variable between 2010 and 2012



117

Figure 4: Prevalence of syphilis and gonorrhoea from 2010 to 2015 in the BHD

118

3.1.4. Association between predictors and the STIs

119

Compared to male, females were 0.33 times as likely to be positive for syphilis which was statistically significant with a p-value of 0.001(95%CI: 0.18, 0.62). Although not statistically significant, patients who were between the 21 and 30 were 2.46 times as likely to be syphilis positive compared to patients who were below the age of 21, and compared to syphilis positive patient who tested positive for HIV, Patient who tested positive for syphilis were 1.38 (95%CI 0.72-2.62) times as likely to test negative for HIV with a p value of 0.332.

120
121
122
123
124
125

126

The odds of testing positive for gonorrhoea in female compared to male, was 0.22 which is statistically significant with a p-value of 0.0001(95%CI:0.11, 0.44). Although not statistically significant, patients who between the 21 and 30 were 0.65 times as likely to be gonorrhoea positive compared to patients who were below the age of 21. Compared to gonorrhoea positive patient who tested positive for HIV, gonorrhoea positive patients were 3.33 (95%CI 1.66-6.69) times as likely to test negative for HIV with a p value of 0.001 (table 2).

127
128
129
130
131

132
133

Table 2: Association between syphilis, gonorrhoea and predictors in the BHD

Predictors		Syphilis		Gonorrhoea	
		Odd ratio, (95% CI)	P value	Odd ratio, (95% CI)	P value
Sex	Male	1			
	Female	0.33 (0.18-0.62)	0.001*	0.22(0.11-0.44)	0.000*
Age categories (years)	Below 21	1			
	21-30	2.46(0.37-4.44)	0.503*	0.65(0.36-1.19)	0.163
	Above 31	1.41(0.18-2.65)	0.285	0.50(0.27-1.97)	0.041*
Health Area	Bokwango	1			
	Buea Road	1.44(0.81-2.57)	0.209	0.44(0.20-0.96)	0.039
	Molyko	1.28(0.69-2.33)	0.427	0.46(0.20-1.03)	0.06
	Buea town	0.60(0.19-1.84)	0.376	0.35(0.08-1.57)	0.17
	Bova	1.68(0.98-2.87)	0.759	1.06(0.37-3.03)	0.908
	Muea	1.38(0.72-2.87)	0.057	0.79(0.43-1.46)	0.465
The other STI	Positive	1			
	Negative	0.74(1.37-1.49)	0.408	0.73(0.36-1.49)	0.397
HIV Infection	Positive	1			
	Negative	1.38(0.72-2.62)	0.332	3.33(1.66-6.69)	0.001*

134
135
136
137
138
139
140
141
142
143
144
145
146

3.2. Discussions

STIs have a direct impact on reproductive and child health through infertility, cancers and pregnancy complications, and they have an indirect impact through their role in facilitating transmission of HIV and thus they also have an impact on national and individual economies. Reported disease rates underestimate the true burden of infection because the majority of STDs are asymptomatic [13]. This study provides the prevalence and risks factors of infections with gonorrhoea and syphilis.

The prevalence of gonorrhoea was found to be high among the study participants. This study found a prevalence of 12.5%. This figure is higher when compared to a study by Buve and collaborators [14] which found a prevalence of 2.5% among men in Yaoundé. This can be explained by the fact that only men were targeted in the above mentioned study. This study

147 however compares well with a study conducted by Ryan and collaborators [15] within Douala
148 and Yaoundé which targeted commercial sex workers. The study found a prevalence of 11% for
149 gonorrhoea.

150 The prevalence of syphilis was also found to be high in this study. The study points to a
151 prevalence of 16.9%. This is way higher than previous studies conducted in Cameroon and
152 surrounding sub Saharan countries for example it is slightly higher than that from a similar study
153 carried out in Yaoundé, Cameroon. A study conducted in 2005 [12] found out a prevalence of
154 6% among woman attending family planning clinic. Possible reasons for this disparity could be
155 that, the study was concentrated on woman and more to that only those who were attending
156 family planning clinic.

157 Prevalence across the years (2010-2015) showed the highest prevalence of both gonorrhoea and
158 syphilis in 2015 that is (27.2%) and (37.0%) respectively. Possible reasons for this high
159 prevalence in 2015 could be that the number of persons screened was more compared to the
160 other years. Also majority screened could have been men who were requested the tests and
161 were more likely to be positive compare to women who took the tests as routine during ANC or
162 that in 2015 there was success in control measures. The prevalence for both infections was
163 lowest prevalence in 2014 (8.3%) and (9.4%) respectively. This could be due to a drop in in the
164 total number of persons screened.

165 Compared to male, females were 0.33 times as likely to be positive for syphilis which was
166 statistically significant with a p-value of 0.001(95%CI: 0.18, 0.62) this means that female were
167 less likely to be tested positive for syphilis. This is in line with findings from a study carried out
168 by Fichtner and collaborators who discover too that male are more likely to be tested positive to
169 syphilis than women [16]. This disparity is likely due to the fact that, females many females were
170 routinely tested during ANC where men went to the health facility on request and with signs and
171 symptoms.

172 Although not statistically significant, patients who between the 21 and 30 were 2.46 times as
173 likely to be syphilis positive compared to patients who were below the age of 21. This is not to
174 be unexpected since syphilis is an STI and so a less sexually active group should not be too
175 vulnerable for the disease. Compared to the Bokwango health area, with the exception of Buea
176 Town Health Area, all other health areas were more likely to be tested positive for syphilis.
177 Thought this association were not statistically significant at the bivariate level, it is worth nothing
178 that the Buea Town and Bokwango health areas are the only health area that harbor the least
179 number of university (Sexually active) students.

180 Like with Siphilis, females were less likely to be tested positive for gonorrhoea compared to men
181 with an odd ratio of 0.22 which is statistically significant with a p-value of 0.0001(95%CI: 0.11,
182 0.44). Again, this is in line with findings from a study carried out by Fichtner and collaborators
183 who discover too that male are more likely to be tested positive to syphilis than women [16].
184 Possible explanations for this finding include the facts that women may be less likely to see
185 primary lesions than men because they are internal and that men may have lower rates of
186 secondary syphilis due to higher rates of diagnosis and treatment of primary cases [17].

187 Although not statistically significant, patients who between the 21 and 30 were 0.65 times as
188 likely to be gonorrhoea positive compared to patients who were below the age of 21. This
189 relationship is peculiar and not expected since this is a sexually active age group and should be
190 exposed to gonorrhoea.

191 With respect to health areas, compared to the Bokwango health area, with the exception of Bova
192 Health Area, Buea Road, Molyko, Buea Town and Muea Health Areas were less likely to be
193 tested positive for gonorrhoea with odds ratios of 0.44, 0.46, 0.35, and 0.79 respectively.

194 Compared to gonorrhoea patients who tested positive for HIV, the odds of testing negative for
195 HIV for these gonorrhoea patients was 3.33 (95%CI: 1.66, 6.69). This relationship though not
196 statistically significant is comparable to the finding by [18]. Both diseases are transmitted

197 sexually but HIV positive patients are likely to watch over their sexual behavior. Hence they are
198 unlikely to contract gonorrhoea.
199

200 **4. CONCLUSION**

201
202 Although these infections have similar risk factors, the prevalence of syphilis was higher than
203 that of gonorrhoea. The high prevalence of these infections is disturbing because they are
204 preventable and also curable. The diseases have similar risk factors but are not similarly
205 distributed in the BHD.
206

207

208 **COMPETING INTERESTS**

209

210 Authors have declared that no competing interests exist.
211

212

213 **CONSENT**

214

215 Not Applicable
216

217

218 **ETHICAL APPROVAL**

219

220 All authors hereby declare that the study have been examined and approved by the
221 appropriate ethics committee and have therefore been performed in accordance with the
222 ethical standards laid down in the 1964 Declaration of Helsinki. Ethical approval was granted
223 by the University of Buea Faculty of Health Science Ethical Review Board (FSH IRB).
224 Administrative authorization was gotten from the Regional Delegate of Public Health and the
225 District Medical Officer of the Buea Health District.
226

227

228 **REFERENCES**

229

230 1. Gilson RJC, Mindel A. Sexually transmitted infections. *BMJ*. 2001;322:1160–4.

231 2. Usanga V, Abia-Basse L, Inyang-etoh P, Udoh S, Ani F, Archibong E. Prevalence Of
232 Sexually Transmitted Diseases In Pregnant And Non-Pregnant Women In Calabar, Cross
233 River State, Nigeria. *The Internet Journal of Gynecology and Obstetrics*. 2010;14.
234 doi:10.5580/27f1.

235 3. Edem A, Ntekpe M, Umoekam N. Prevalence of Syphilis and Gonorrhoea in Patients
236 Attending General Hospital, Calabar, Nigeria. 2013;:14.

237 4. Io O, Po O, Ao A, Cc O. Prevalence of sexually transmitted infections (stis) among
238 attendees of lead city university medical centre in Ibadan, Southwestern, Nigeria. 2012;:8.

239 5. Division of STD Prevention. 2019. <https://www.cdc.gov/std/dstdp/default.htm>. Accessed
240 29 May 2019.

241 6. Institute of Medicine (US) Committee on Prevention and Control of Sexually Transmitted
242 Diseases. *The Hidden Epidemic: Confronting Sexually Transmitted Diseases: Summary*.
Washington (DC): National Academies Press (US); 1997.

<http://www.ncbi.nlm.nih.gov/books/NBK233453/>. Accessed 29 May 2019.

- 243 7. van de Wijgert JHHM, Morrison CS, Cornelisse PGA, Munjoma M, Moncada J, Awio P, et
244 al. Bacterial vaginosis and vaginal yeast, but not vaginal cleansing, increase HIV-1
245 acquisition in African women. *J Acquir Immune Defic Syndr*. 2008;48:203–10.
- 246 8. Francis SC, Mthiyane TN, Baisley K, Mchunu SL, Ferguson JB, Smit T, et al. Prevalence
247 of sexually transmitted infections among young people in South Africa: A nested survey in a
248 health and demographic surveillance site. *PLOS Medicine*. 2018;15:e1002512.
- 249 9. N WC, A S. Associated Risk Factors of STIs and Multiple Sexual Relationships among
250 Youths in Malawi. *PLOS ONE*. 2015;10:e0134286.
- 251 10. Duncan ME, Tibaux G, Kloos H, Pelzer A, Mehari L, Perine PL, et al. STDs in women
252 attending family planning clinics: A case study in Addis Ababa. *Social Science & Medicine*.
253 1997;44:441–54.
- 254 11. Zekeng L, Yanga D, Trebucq A, Sokal D, Salla R, Kaptue L. HIV prevalence in patients
255 with sexually transmitted diseases in Yaounde, (Cameroon) in 1989 and 1990: necessity of
256 an STD control programme. *Sexually Transmitted Infections*. 1992;68:117–9.
- 257 12. Mbu RE, Mbopi-Keou FX, Alemnji G, Alemnji G, Meli C, Eteki N, et al. Unexpectedly high
258 prevalence of sexually transmitted diseases in married women attending family planning
259 clinics in Yaounde, Cameroon. *Int J STD AIDS*. 2005;16:270–1.
- 260 13. World Health Organization. WHO guidelines for the treatment of treponema pallidum
261 (Syphilis). 2016. <http://www.ncbi.nlm.nih.gov/books/NBK384904/>. Accessed 29 May 2019.
- 262 14. Buvé A, Weiss HA, Laga M, Van Dyck E, Musonda R, Zekeng L, et al. The epidemiology
263 of gonorrhoea, chlamydial infection and syphilis in four African cities. *AIDS*. 2001;15 Suppl
264 4:S79-88.
- 265 15. Ryan KA, Zekeng L, Roddy RE, Weir SS. Prevalence and prediction of sexually
266 transmitted diseases among sex workers in Cameroon. *Int J STD AIDS*. 1998;9:403–7.
- 267 16. Fichtner RR, Aral SO, Blount JH, Zaidi AA, Reynolds GH, Darrow WW. Syphilis in the
268 United States: 1967-1979. *Sex Transm Dis*. 1983;10:77–80.
- 269 17. Nakashima AK, Rolfs RT, Flock ML, Kilmarx P, Greenspan JR. Epidemiology of syphilis
270 in the United States, 1941--1993. *Sex Transm Dis*. 1996;23:16–23.
- 271 18. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and
272 practice: the contribution of other sexually transmitted diseases to sexual transmission of
273 HIV infection. *Sex Transm Infect*. 1999;75:3–17.