1   **PUBLIC HOSPITALS PREPAREDNESS IN THE PROVISION OF BREAST AND**

2   **CERVICAL CANCER SERVICES IN BUSIA AND TRANS-NZOIA COUNTIES IN**

3   **KENYA.**

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22   **Running head:** *Facilities preparedness to provide cervical and breast cancer services.*

23

Abstract

24

25 **Purpose:** To assess the preparedness of public health care facilities in the provision of breast and
26 cervical cancer services. Specifically, healthcare provider's knowledge on risk factors, screening,
27 symptoms, diagnosis and treatment as well as availability of medical equipment required for
28 breast and cervical cancer management.

29 **Methods:** A cross-sectional service provision assessment (SPA) survey conducted in Busia and
30 Trans-Nzoia counties of Western Kenya between October and December 2018. Interviewer
31 assisted questionnaires were used to collect data from healthcare workers while a structured
32 facility questionnaire was used to assess the level of preparedness of the selected public
33 healthcare facilities stratified by their level of care. Statistical analysis was done using STATA
34 version 15.

35 **Results:** We enrolled 73 healthcare workers 37 (50.6%) of whom were nurses, followed by
36 clinical officers and medical officers. The highest proportion of knowledge on risk factors and
37 screening of breast and cervical cancer was reported among medical officers or consultant
38 physicians, followed by clinical officers. Nurses scored highly on the symptoms of breast and
39 cervical cancer. The medical equipment required for breast and cervical cancer screening and
40 diagnosis were found in most facilities; however, there were no core-biopsy needles or
41 mammograms found. A single LEEP equipment was found in a health center within Trans Nzoia
42 while two LEEP equipment were stationed at the Busia county hospital.

43 **Conclusion:** A below average level of knowledge on breast and cervical cancer among the
44 healthcare workers attending to patients in public healthcare facilities was found in both Busia
45 and Trans Nzoia counties. Furthermore, there was a disparity in the distribution and quantity of
46 priority medical equipment for the screening, diagnosis and treatment of breast and cervical
47 cancer in the two county hospitals.

48 **Keywords:** *Cervical Cancer, Breast Cancer, Preparedness, Service Provision Assessment*
49 *(SPA), Public Healthcare Facilities, Western Kenya, Busia, Trans Nzoia.*

Introduction

51   Cancer is a major cause of morbidity and mortality across the globe. According to the

52   International Agency for Research on Cancer global cancer observatory report (1),

53   approximately 1 in 5 people develop cancer during their lifetime. Of these, 1 in 8 men and 1 in

54   11 women die from the disease. With a rising proportion of the ageing populations globally,

55   coupled with other socio-economic risk factors, the prevalence of cancer is on the rise. The most

56   common forms of cancer among women globally are breast, colorectal, lung, cervical, and

57   thyroid cancers (2). The likelihood of breast cancer is 1 in 4 cancers diagnosed among women

58   globally (1,2). In Africa the incidence for breast cancer in 2020 was estimated at 16.8% followed

59   by cervical cancer at 10.6% (3).   In Kenya, the incidence of breast cancer in 2020 was estimated

60   at 16.1% followed by second placed cervical cancer at 12.4% of all women diagnosed with

61   cancer (2). With a greater transition to a more modernized lifestyle in Kenya and many other

62   sub-Saharan African countries, the incidence of breast and cervical cancer have been steadily

63   rising (4). These low- and medium-income countries (LMIC) have been shown to have a great

64   burden of various forms of cancer despite advancements in screening, diagnosis and

65   management options (5). To adequately address the disease burden attributed to these two

66   cancers, there is need to have effective and adequately prepared health service delivery systems.

67   The level of preparedness and effectiveness of these health systems can be assessed using

68   multiple dimensions to assess the progress in addressing the disease burden. Although various

69   tools could be used in this assessment, a Service Provision Assessment (SPA) survey could be

70   used to provide a comprehensive understanding of the health service delivery system in a

71   particular country (6). This is because they support the strengthening of health systems in

72   developing countries by collecting information on the availability of different resources based in

73   the health facilities within a country. The SPA survey describes the facility-types with the ability

74   to offer specific health services. It also describes the infrastructural and human resource

75   preparedness to offer the said services in the health charters (6). Furthermore, it assesses

76   adherence to the set quality standards for healthcare service provision and whether the clients

77   and service providers are content with the service delivery environment.

78   The World Health Organization's Global action plan for the prevention and control of

79   noncommunicable diseases between 2013-2020 targeted a 25% reduction in risk of premature

80   death attributed to non-communicable diseases including cancer (7). Furthermore, the United

81   Nations Agenda for Sustainable Development recommends a one-third reduction in the

82   proportion of premature death associated with non-communicable diseases such as cancer by the

83   year 2030 using multiple approaches such as prevention, treatment and promotion of mental

84   health and well-being (8). The public and private health care service delivery institutions should

85   have an 80% availability of the affordable basic technologies and essential medicines for the

86   management of these noncommunicable diseases. Furthermore, the report (7) recommends

87   periodic needs assessment and evaluation of resource need such as workforce, institutional and

88   research capacity to address the non-communicable diseases. The eight key indicators include a

89   comprehensive range of health services provided to the target population, the services should be

90   directly and permanently accessible without barriers of entry, they should adequately cover the

91   defined target population and provide continuity of care across the network of services, health

92   conditions, levels of care, and over the life cycle. The quality of these services should be high as

93   evidenced by their effectiveness and safety as well as being organized around the person and not

94   the disease or the financing mechanism. They should be properly coordinated at the local level

95   and across the different types of providers, types of care and levels of service delivery with

96   adequate accountability and efficiency (7).

97   In Kenya, the healthcare service delivery system is stratified into four tiers as (9): Tier 1

98   (Community Health Services), Tier 2 (primary healthcare facilities such as dispensaries and

99   health centers), Tier 3 (secondary referral facilities such as sub county and county hospitals) and

100   Tier 4 (Tertiary facilities such as national referral hospitals). The primary care for cancer

101   involves prevention of risk factors and screening, enhancing health promotion through public

102   awareness, social mobilization and community engagement which are carried out in all the four

103   tiers of healthcare service provision. Specifically, screening services begin from dispensaries and

104   health centers towards higher tier facilities (10). On the hand, cancer diagnosis and treatment is

105   predominantly offered in secondary and tertiary referral facilities (10). According Kenya's

106   National Cancer Policy for 2019-2030, it is argued that nearly half (40%) of the cancers can be

107   prevented by mitigating the risk factors and implementing already established evidence-based

108   prevention strategies (9). The common risk factors include being overweight or obese (27.9%),

109   inadequate consumption of fruits and vegetables (94%), tobacco and alcohol use among 13.3%

110   and 19.3% of the newly diagnosed individuals respectively (9). It is estimated that many women

111   harbor human papilloma virus (HPV) types 16 (9.1%) and 18 (63.1%) strains that is attributed to

112   invasive cervical cancer (11). However, it has been previously reported that there is a low

113   awareness of cancer and its risk factors in Kenya (12) both in the general population and among

114   health care service providers (13,14). There are also gaps in the implementation of some of the

115   policies and guidelines for prevention of cancer. This necessitates a local study to determine

116   healthcare workers knowledge on screening, diagnosis and treatment of breast and cervical

117   cancer.

118   The Kenya Government set medium term plans for the implementation of vision 2030. The

119   current third medium-term plan (2018-2022) set the universal healthcare coverage (UHC) policy

120   to ensure the provision of high quality and affordable healthcare for all its citizens (15). To

121   achieve this, the government noted an insufficiency of medical equipment in both county and

122   national hospitals. The government rolled-out the managed equipment scheme (MES) as a

123   private-public partnership (PPP) between the government and private medical equipment service

124   providers (16). For the diagnosis and management of cancer, the government supplied medical

125   imaging equipment such as X-rays, Ultrasounds, CT-Scans and MRI machines (9). Although this

126   project was noble, it was noted that the managed equipment scheme was not properly

127   implemented due to inadequate personnel (17) to operate them and the backbone supporting

128   infrastructure such as availability of electricity (16). Because of this challenge, this study aimed

129   to assess the preparedness of health care facilities in provision of Breast and Cervical Cancer

130   services in Trans Nzoia and Busia Counties in Kenya. It established the level of healthcare

131   workers knowledge on the screening, diagnosis and treatment of breast and cervical cancers as

132   well the availability of medical equipment and supplies for screening, diagnosis and management

133   of the two diseases in selected two counties of Western Kenya.

134   **Methods**

135   This cross-sectional study was conducted in Busia and Trans Nzoia counties in Western Kenya,

136   whose breast and cervical cancer oncology programmes are supported by the Academic Model

137   Providing Access To Healthcare – AMPATH (18,19). Trans Nzoia County is in the former Rift

138   Valley Province of Kenya. The county borders Bungoma to the west, Uasin Gishu and

139   Kakamega to the south, Elgeyo Marakwet to the east and the republic of Uganda to the

140   Northwest. Trans Nzoia covers an area of 2495.5 Km^2 with a population of 956,559 of whom

141   49.7% are male. Approximately 50% of Trans-Nzoia population is aged 18 to 64 years and 2.8%

142   aged above 65 years. The life expectancy in this County is 60.5years which is lower than the

143   national average at 63.4 years. Trans-Nzoia County has a high poverty rate of 50.1%. Trans

144   Nzoia County has 198 community units served by 38 dispensaries, 8 health centers, 6 sub-

145   County health facilities and 1 County level hospital a total 53. Busia County borders Kakamega

146   county to the east, Bungoma to the north, Lake Victoria and Siaya county to the South and

147   Uganda to the west. It is 1628.4 Kilometer Squared (Km^2) with a population of 953,337 people

148   of whom 52% are above 18 years, and 47.8% are males. Life expectancy is low at 47years.

149   Poverty levels are high at 64.2% compared to the national levels at 45.9%. Busia has 184

150   community units served by 65 healthcare facilities namely: 47 dispensaries, 12 health centers, 5

151   sub-county and 1 County hospital. The two counties have been reported to have a significantly

152   high prevalence of breast and cervical cancer.

153   The study adopted service provision assessment (SPA) survey technique to assess the healthcare

154   providers level of knowledge on breast and cervical cancer as well as determine the availability

155   of medical equipment as per the WHO priority list between September to December 2018. An

156   interviewer assisted questionnaire was used to collect socio-demographic, knowledge of breast

157   and cervical cancer risk factors, screening strategies, symptoms, diagnosis and treatment of the

158   disease among the healthcare workers enrolled. A structured facility questionnaire was used to

159   explore the selected institutions' preparedness to screen, diagnose and treat breast and cervical

160   cancer. Specifically, the facility questionnaire assessed level of care provided and availability of

161   specific equipment as per the WHO priority list. Data collection was done by trained research

162   assistants who administered questionnaires which had been   pre-programmed into the Research

163   Electronic Data capture (REDCap) database as well as a mobile application which allowed for

164   direct data entry, daily cleaning and validation by the team. Healthcare workers responses from

165   the questionnaire were scored to assess knowledge on breast and cervical cancer and weighted

166   means computed with their corresponding standard deviations. Descriptive statistical analysis of

167   frequency with corresponding proportions were used to compare the availability of medical

168   equipment in the two counties under review. All analysis were computed using standard

169   statistical (STATA) version 15. This study received ethical approval from the Institutional

170   Research and Ethics Committee (IREC) of MTRH/Moi University (approval number 0002090).

171   This was followed by a research permit from the National Commission for Science technology

172   and Innovation (NACOSTI) of Kenya (approval number NACOSTI/P/18/74238/24329) and the

173   two County Health Management Teams (CHMTs). A written informed consent was obtained

174   from all healthcare workers prior to enrollment. Data confidentiality was ensured by

175   deidentifying participants responses while privacy was enhanced through used of password

176   protected database and limited access to the datasets.

177   **Results**

178   **Healthcare workers' knowledge on breast and cervical cancer**

179   This study enrolled 73 healthcare service providers in two counties (Busia and Trans Nzoia) in

180   Western Kenya. They were stratified based on the level of training as either clinical officers

181   (m=29), nurses (n=37), medical officers or consultants (n=7) and assessed on their knowledge of

182   risk factors, symptoms, screening, diagnosis and treatment of breast and cervical cancer. The

183   mean number of correct answers were scored based on the probable total correct responses.

184   On Breast cancer there were varying responses on the probable risk factors for breast cancer.

185   Most clinical officers thought that a history of alcohol consumption was a major risk factor

186   followed by using contraceptive pills. On the other hand, most of the nurses also thought that

187   alcohol consumption and having a first child at an older age were the major risk factors for breast

188   cancer. Similarly, more than half of medical officers and consulting clinicians considered alcohol

189   consumption as a risk factor for breast cancer. All the healthcare workers enrolled described

190   mastectomy alone as the treatment for breast cancer. There were higher levels of knowledge on

191   breast cancer risk factors and screening among medical officers or consultant physicians

192   compared to clinical officers and nurses. However, nurses appeared to have a higher mean

193   knowledge score on the symptoms for breast cancer.

194   Regarding cervical cancer, the overall mean knowledge score was highest among medical

195   officers or consultant and lowest among nurses across all domains assessed namely: risk factors,

196   screening, diagnosis and treatment) Notably nurses had more knowledge on symptoms of both

197   cervical and breast cancers compared to other cadres (Table 1).

198   **Medical equipment distribution**

199   During the initial baseline survey conducted in both counties (Busia and Trans Nzoia), it was

200   noted that Busia county only had 6 ultrasound machines available for breast cancer screening and

201   with half of them (3) in sub-county hospitals, one in a health center while the county referral

202   hospital had two available. It was striking that 35 (87.5%) of the 40 healthcare facilities in the

203   county did not have a single ultrasound machine. Furthermore, x-ray equipment that would

204   support in further screening was only available in 5 (12.5%) healthcare facilities within Busia

205   County, with the county hospital and one-subcounty having two x-ray equipment each. For

206   cervical cancer screening, speculum availability was nearly evenly distributed in the healthcare

207   facilities in Busia County with 25% (n=10) of the facilities having between 6-10 speculums

208   while 22.5% (n=9) having more than 21. Gynecological beds were only available in 12 (30%) of

209   all the healthcare facilities assessed in Busia county with most of the gynecological beds being

210   concentrated in County and sub-County hospitals. No public healthcare facility in Busia county

211   had a biopsy needle for cervical cancer diagnosis while sterilization equipment were found in

212   90% of all the public healthcare facilities. There were seven (17.5%) had cryotherapy equipment

213   available in the public healthcare facilities in Busia County, however nearly all (97.5%) of the

214   healthcare facilities did not have a LEEP equipment for the management of cervical lesions with

215   the only available ones (n=2) being in Busia County referral hospital (Table 2).

216   In Trans Nzoia County, there were 7 ultrasound machines serving 33 public healthcare facilities

217   within the county for the screening of breast cancer. There was only one out of the six sub-

218   county hospitals with an ultrasound machine, while 2 of the 15 health centers had 2 ultrasound

219   machines each and the county referral hospital equally had 2 machines. This study noted that

220   there were 9 x-ray machines that could support in cancer screening within Trans Nzoia county

221   where a county and sub-county hospital having 2 each while a health center having three x-ray

222   machines. Most (36.4%; n=12) of the facilities assessed had a 1-5 speculum for cervical cancer

223   screening followed by those with 6-10 speculum in 11 (33.3%) facilities. However, a single

224   dispensary did not have any speculum. Public healthcare facilities in Trans Nzoia county had 44

225   gynecological beds distributed among 27 of the 33 facilities with most of the gynecological beds

226   being concentrated in County (4) and sub-County (12) hospitals. Similar to Busia County, no

227   public healthcare facility in Trans Nzoia county had a biopsy needle for cervical cancer

228   diagnosis. However, only 4 (12.1%) of the facilities surveyed in Trans Nzoia county lacked a

229   sterilization equipment. There were 13 (39.4%) cryotherapy equipment available in the public

230   healthcare facilities within Trans Nzoia County, where majority (8) of these were in health

231   centers. This study reports the availability of a single LEEP equipment stationed at a health

232   center in Trans Nzoia county (Table 3).

Discussion

Knowledge on breast and cervical cancer

In this study there was a low level of knowledge among health care providers on the risk factors, symptoms, screening, diagnosis and treatment of both breast and cervical cancer. This finding is consistent with a previous study conducted in Kenya (20) which found low level of knowledge among healthcare workers on breast and cervical cancer. This finding was across various cadres and level of training of the healthcare workers. This low level of knowledge could directly influence the kind of care patients with both cancers could receive in public healthcare facilities located in the devolved governance units of Kenya. In a community study conducted in the coastal region of Kenya (12), the key barriers affecting access breast cancer care were lack of awareness on breast and cervical cancer risk factors, signs and symptoms among the community members enrolled. In addition to stigma towards patients seeking cervical cancer treatment and the overall negative attitudes towards patients with cancer, cultural beliefs and personal discomfort were some of the other reasons for given low access to cancer care. Among the health care workers who were interviewed, it was noted that they too had limited knowledge on breast cancer (12). The Kenya Cancer Policy of 2019 to 2030 further acknowledges that there exist a knowledge-gap in the level of knowledge on various forms of cancer among human resources for health (9). The Ministry of Health in Kenya has instituted various mechanisms to train more healthcare workers on by conducting capacity building activities and mentorship to primary care providers in counties by coordinating specialist outreach programs in collaboration with tertiary facilities. Furthermore, Kenya has initiated diploma, masters and oncology fellowship programs in addition to ongoing pre-service and in service training for primary care workers to strengthen cancer care service delivery (9,10).

256   Low levels on knowledge in cancer are not limited to healthcare workers practicing in public

257   hospitals in Kenya. In Rwanda (21), it was reported that cancer care is mainly offered by

258   physicians who work in collaboration with colleagues in USA and Canada through virtual tumor

259   boards. The authors (21) further noted that in Rwanda, there are gaps in prevention and early

260   detection of breast and cervical cancer despite introduction of mitigation measures such as breast

261   surgery fellowship at the national military hospital.

262   **Medical Equipment**

263   This study based its assessment on the availability and distribution of medical equipment for the

264   management of cancer on the World Health Organization's priority list of medical devices for

265   cancer management of 2017 (22). This priority list provides an implementation reference to be

266   adopted based on the needs of the healthcare system in the specific country and serves as a

267   standard by which we can assess preparedness to provide cancer care. The guideline stipulates

268   the minimum requirements for prevention, diagnosis, treatment, follow up and palliative care for

269   all cancers. For breast cancer prevention, physical examination through bimanual palpation of

270   breasts and locoregional lymph nodes as well as mammography is recommended in low resource

271   healthcare settings, while an MRI breast may be used in combination with mammography in

272   certain high-risk patients. Among the 73 facilities assessed, none of them had a mammogram or

273   MRI to support breast cancer screening. This is because most of these facilities are available in

274   national teaching hospitals as well as a few tier – four hospitals in some counties in Kenya. This

275   finding is consistent to that reported in Rwanda (21) where MRI machines were available in one

276   national public and one private hospital. The diagnosis of breast cancer involves thorough

277   bimanual palpation of the breasts and locoregional nodes, blood testing that includes complete

278   blood count and blood chemistries (liver and renal function tests, alkaline phosphatase and

279 calcium), breast imaging initially bilateral mammography followed by an ultrasound of the

280 breast and locoregional nodes. Following imaging, an ultrasound-guided core needle biopsy, a

281 stereo-static guided or manual biopsy sampling is done for histopathological diagnosis and

282 biomarker analysis of the sample. In the facilities assessed in this study, ultrasound services were

283 available in 5 of the 40 public healthcare facilities in Busia County while in Trans Nzoia only 4

284 out of the 33 facilities in the county. However, none of these counties reported having biopsy

285 needles to support ultrasound-guided core needle biopsy for breast cancer diagnosis. This is

286 because only a few county hospitals in Kenya have the capacity to offer histopathology services

287 contributing to diagnostic delays (9). Computerized tomography scanning of the chest as well as

288 a chest x-Ray in low resource settings could be used in the staging of breast cancer. In this study,

289 x-ray services were not available in many facilities in both Trans Nzoia and Busia counties with

290 only 9 and 5 machines available respectively. The current cancer Policy in Kenya (9) highlights

291 that a major challenge in the adequate distribution of diagnostic equipment to healthcare

292 institutions in Kenya is a mismatch between human resource capacity to operationalize the

293 equipment and supplies. Furthermore, the policy notes a lack of clear policy guideline on

294 distribution, placement, monitoring and evaluation of medical equipment. That is why this study

295 noted a lack of consistency in the distribution of ultrasound and x-ray machines across the

296 various tiers of the healthcare facilities in the counties reviewed. All these equipment availability

297 challenges in both counties could be a major contributor to the late diagnosis of breast cancer

298 currently being witnessed in Kenya (2,9,10).

299 The current cervical cancer screening and prevention strategies (11,23) involve preventive

300 immunization against human papilloma virus (HPV) for girls, screening of pre-cancerous lesions

301 using a speculum or vaginal examinations and inspection with acetic acid (VIA), conducting of a

302   HPV test and treating of pre-cancerous lesions using cryotherapy and large loop excision of

303   transformation (LEEP). In this study, most facilities assessed in Trans Nzoia had a minimum of

304   1-5 speculums to support screening and a single gynecological bed available, however only a

305   single sub-county facility had LEEP and a cryotherapy equipment. In Busia county, most

306   facilities had 11-15 specula available, with two LEEP equipment in the county hospital and five

307   cryotherapy equipment. A biopsy needle is needle is needed in the definitive diagnosis of

308   invasive cervical cancer in the second care level (22). However, no facility in both counties had

309   a core biopsy needle. An abdominal ultrasound is often used in the staging of cervical cancer as

310   well as chest x-ray. However, there were limited ultrasound and x-ray facilities in the studies

311   sampled.

312   **Conclusions and Recommendations**

313   A below average level of knowledge on breast and cervical cancer among the healthcare workers

314   attending to patients in public healthcare facilities was found in both Busia and Trans Nzoia

315   counties. Furthermore, there was a disparity in the distribution and quantity of priority medical

316   equipment for the screening, diagnosis and treatment of breast and cervical cancer in the two

317   county hospitals. From the findings of this study, there is need for targeted in-service training

318   among nurses on breast and cervical cancer risk factors and screening modalities as they are the

319   first contacts with suspected cancer patients and are also involved patient medical education.

320   Advanced cancer diagnostic equipment such as core-biopsy needles and mammograms should be

321   provided in these public healthcare facilities to support breast and cervical cancer staging and

322   risk assessment. Specialized training of healthcare workers is needed to reduce the mismatch

323   between human resource capacity to operationalize the medical equipment and their supply.

324   Finally, there is need for proper guidelines to guide the distribution of medical equipment by

325   facilities level of care and human resource availability.

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395   **Table 1: Level of Provider Knowledge**

Knowledge Indicators	Mean score Knowledge on breast cancer			Expected Score	Mean score Knowledge on cervical cancer			Expected Score
	Provider Training level				Provider Training level			
	CO N= 29	Medic/ Consultant N =7	Nurse N= 37		CO N= 29	Medic/ Consultant N =7	Nurse N= 37	
Risk Factors	3.48(1.81)	3.71(1.89)	2.27(1.35)	**11**	3.79(1.29)	4(1))	1.05(1.05)	**10**
Symptoms	1.57(1.57)	1.5(1.5)	1.74(1.74)	**10**	1.25(1.25)	1.35(1.35)	2.65(0.79)	**7**
Screening	2.62(0.86)	2.71(0.95)	1.97(0.76)	**4**	2.93(0.84)	3(0.58)	0.89(0.61)	**4**
Diagnosis	0.93(0.53)	0.86(0.69)	0.51(0.56))	**2**	1.07(0.53)	1.71(0.76)	1.05(1.05)	**3**
Treatment	1	1	1	**6**	2.72(1.03)	3.29(0.95)	2.46(0.96)	**8**

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397 **Table 2: Medical equipment availability by healthcare facility's level of care in Busia County**

Variable name	Value	Total (N=40)	Sub County **n**=7 (18%)	Health Centre n=10 (25%)	Dispensary n=22 (55%)	County Referral n=1 (2%)
Ultrasounds machines						
	0	35 (87.5%)	4 (57.1%)	9 (90%)	22 (100%)	0 (0%)
	1	4 (10%)	3 (42.9%)	1 (10%)	0 (0%)	0 (0%)
	2	1 (2.5%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)
X-ray machine						
	0	35 (87.5%)	3 (42.9%)	10 (100%)	22 (100%)	0 (0%)
	1	3 (7.5%)	3 (42.9%)	0 (0%)	0 (0%)	0 (0%)
Speculum available						
	0	1 (2.5%)	0 (0%)	0 (0%)	1 (4.5%)	0 (0%)
	1-5	10 (25%)	0 (0%)	2 (20%)	8 (36.4%)	0 (0%)
	6-10	10 (25%)	1 (14.3%)	2 (20%)	7 (31.8%)	0 (0%)
	11-15	7 (17.5%)	4 (57.1%)	2 (20%)	1 (4.5%)	0 (0%)
	16-20	3 (7.5%)	1 (14.3%)	0 (0%)	1 (4.5%)	1 (100%)
	Above 21	9 (22.5%)	1 (14.3%)	4 (40%)	4 (18.2%)	0 (0%)
Gynecological beds						
	0	28 (70%)	4 (57.1%)	6 (60%)	18 (81.8%)	0 (0%)
	1	6 (15%)	0 (0%)	3 (30%)	3 (13.6%)	0 (0%)
	2	6 (15%)	3 (42.9%)	1 (10%)	1 (4.5%)	1 (100%)
Biopsy needles						
	0	40 (100%)	7 (100%)	10 (100%)	22 (100%)	1 (100%)
Sterilization Equipment						
	0	4 (10%)	0 (0%)	0 (0%)	4 (18.2%)	0 (0%)
	1	23 (57.5%)	3 (42.9%)	6 (60%)	14 (63.6%)	0 (0%)
	2	10 (25%)	3 (42.9%)	4 (40%)	2 (9.1%)	1 (100%)
	3	2 (5%)	0 (0%)	0 (0%)	2 (9.1%)	0 (0%)
	4	1 (2.5%)	1 (14.3%)	0 (0%)	0 (0%)	0 (0%)
Cryotherapy equipment						
	0	33 (82.5%)	5 (71.4%)	9 (90%)	19 (86.4%)	0 (0%)
	1	6 (15%)	2 (28.6%)	1 (10%)	3 (13.6%)	0 (0%)
	4	1 (2.5%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)
LEEP equipment						
	0	39 (97.5%)	7 (100%)	10 (100%)	22 (100%)	0 (0%)
	2	1 (2.5%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)

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Table 3: Medical equipment availability by healthcare facility's level of care in Trans Nzoia County

Variable name	Value	Total (N=40)	Sub County n=7 (18%)	Health Centre n=10 (25%)	Dispensary n=22 (55%)	County Referral n=1 (2%)
Ultrasounds machines						
	0	29 (87.9%)	5 (83.3%)	13 86.7%)	11 (100%)	0 (0%)
	1	1 (3%)	1 (16.7%)	0 (0%)	0 (0%)	0 (0%)
	2	3 (9.1%)	0 (0%)	2 (13.3%)	0 (0%)	1 (100%)
X-ray machine						
	0	28 (84.8%)	4 (66.7%)	14 (93.3%)	10 (90.9%)	0 (0%)
	1	2 (6.1%)	1 (16.7%)	1 (6.7%)	0 (0%)	0 (0%)
	2	2 (6.1%)	1 (16.7%)	0 (0%)	0 (0%)	1 (100%)
	3	1 (3%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)
Speculum available						
	0	1 (3%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)
	1-5	12 (36.4%)	0 (0%)	5 (33.3%)	7 (63.6%)	0 (0%)
	11-15	4 (12.1%)	1 (16.7%)	3 (20%)	0 (0%)	0 (0%)
	16-20	2 (6.1%)	0 (0%)	1 (6.7%)	1 (9.1%)	0 (0%)
	6-10	11 (33.3%)	3 (50%)	6 (40%)	2 (18.2%)	0 (0%)
	> 21	3 (9.1%)	2 (33.3%)	0 (0%)	0 (0%)	1 (100%)
Gynecological beds						
	0	6 (18.2%)	0 (0%)	1 (6.7%)	5 (45.5%)	0 (0%)
	1	14 (42.4%)	2 (33.3%)	8 (53.3%)	4 (36.4%)	0 (0%)
	2	11 (33.3%)	3 (50%)	6 (40%)	2 (18.2%)	0 (0%)
	4	2 (6.1%)	1 (16.7%)	0 (0%)	0 (0%)	1 (100%)
Biopsy needles						
	0	33 (100%)	6 (100%)	15 (100%)	11 (100%)	1 (100%)
Sterilization Equipment						
	0	4 (12.1%)	0 (0%)	0 (0%)	4 (36.4%)	0 (0%)
	1	20 (60.6%)	5 (83.3%)	10 66.7%)	5 (45.5%)	0 (0%)
	2	6 (18.2%)	1 (16.7%)	3 (20%)	2 (18.2%)	0 (0%)
	3	2 (6.1%)	0 (0%)	2 (13.3%)	0 (0%)	0 (0%)
	5	1 (3%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)
Cryotherapy equipment						
	0	20 (60.6%)	4 (66.7%)	7 (46.7%)	9 (81.8%)	0 (0%)
	1	13 (39.4%)	2 (33.3%)	8 (53.3%)	2 (18.2%)	1 (100%)
LEEP equipment						
	0	32 (97%)	6 (100%)	14 93.3%)	11 (100%)	1 (100%)
	1	1 (3%)	0 (0%)	1 (6.7%)	0 (0%)	0 (0%)

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