

1 **Predictors of unmet supportive care needs of adult cancer patients**  
2 **in Ethiopia**

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4 **Unmet supportive care needs of adult cancer patients**

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23 **Data availability**

24 The data that support the findings of this study are available from the corresponding author upon  
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26 **Conflict of interest**

27 The authors declare that they have no competing interests

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30 **Authors contribution**

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32 AW - writing (reviewing & editing);

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36 the manuscript.

37 **Disclosure**

38 The author(s) declare no conflict of interest

39 **Abstract**

40 **Background:** Cancer is a global public health issue that continues to increase because of aging  
41 and adoption of cancer-causing behaviors. In Ethiopia, cancer belongs to the second most common  
42 non-communicable disease. Cancer patients face a range of unmet needs in multiple aspects of  
43 their lives. Supportive care is defined as essential care that helps patients to cope with cancer.

44 **Objective:** This study aims to assess the predictors of unmet supportive care needs in adult cancer  
45 patients in Ethiopia.

46 **Methods:** Institution-based cross-sectional study was done from February to March 2019 in adult  
47 cancer patients. 371 patients were interviewed using convenience sampling. Supportive care needs  
48 were used as outcome variables, dichotomized as ‘no need’ and ‘unmet needs’. Variables with a *p*  
49 value of  $< 0.2$  were candidates for multivariable logistic regression.

50 **Results:** From 371 patients, 69.8% were females with a mean age of 47 years; the commonest type  
51 of cancer was gynaecological cancer. Information about diagnosis, stage of cancer, time since  
52 diagnosis, age, wealth index, employment status, gender, type of treatment, history of recurrence,  
53 type of cancer, and information about diagnosis modified by the source of information were  
54 predictors of unmet supportive care needs.

55 **Conclusions:** The study emphasized the importance of considering sociodemographic, clinical,  
56 and information-related factors when dealing with cancer patients. Programmes, guidelines, and  
57 services that focus on supportive care needs should be established and/or implemented.

58 **Keywords:** predictors; unmet needs; supportive needs; cancer; Ethiopia.

## 59 **Introduction**

60 Cancer is a major public health and economic issue and its burden is set to spiral. With  
61 over 18 million cases in 2018, by 2030, the number of new cases of cancer in low and middle  
62 income countries is expected to be 21.6 million per year. Generally, cancer is an increasing health  
63 burden for Sub-Saharan Africa and particularly for Ethiopia (Stefan, 2015). In Ethiopia, cancer  
64 belongs to the second most common non-communicable disease (NCD) group next to  
65 cardiovascular disorders. (Misganaw, Mariam, Ali, & Araya, 2014) Based on the 2018 World  
66 Health Organization report, cancer in Ethiopia was estimated to account for 7% of the 39% of  
67 deaths from NCDs. (WHO, 2018)

68 Unmet needs assessment distinguishes how well needs have been met and identifies those that  
69 remain unmet.(Bonevski et al., 2000) The term ‘supportive care needs’ is an umbrella term that  
70 covers physical, informational, psychological, and psychosocial sequelae (e.g., anxiety and  
71 feelings of isolation) of an individual diagnosed with cancer. (Harrison, Young, Price, Butow, &  
72 Solomon, 2009) As a result of being diagnosed with cancer, patients have to deal with diminished  
73 physical functioning, emotional instability, difficulty concentrating, overall dissatisfaction with  
74 care, a higher level of unmet needs, and reduced quality of life. (Okediji, Salako, & Fatiregun,  
75 2017) As the burden of cancer increases, the need for supportive care prevails. (Boyle & Ferlay,  
76 2005)

77 Cancer survivors report a range of unmet needs in multiple areas of their life, including physical  
78 health and activities of daily living; psychological, emotional, sexuality, and financial problems  
79 are some of the mentioned areas. (Harrison et al., 2009) In the Supportive Care Needs Survey  
80 (SCNS), variables such as age, gender, treatment received, remission status, type of cancer, site of  
81 cancer, and duration of diagnosis were recommended to be studied as predictors for unmet needs.

82 (McElduff, Boyes, Zucca, & Girgis, 2004) One clinical characteristic identified from various  
83 studies is the time since diagnosis, which is a consistent predictor of greater unmet needs and is  
84 associated with changes in physical/daily living, psychological and health system, and information  
85 unmet needs over time. (McDowell, Occhipinti, Ferguson, Dunn, & Chambers, 2010) Stage of the  
86 disease is significantly associated with the presence and magnitude of unmet needs. In addition,  
87 the number of cancer sites has been shown to predict patient care and support, as those who have  
88 the disease in multiple sites were found to have higher levels of unmet needs. (Sanson & Girgis,  
89 2000)

90 The Federal Ministry of Health of Ethiopia has developed national NCD guidelines for cancer  
91 control and recommended that palliative care should be strategically linked to cancer prevention,  
92 early detection and treatment services by providing pain/symptom management and  
93 spiritual/psychosocial support from diagnosis to the end of life and bereavement. (FMOH, 2015)  
94 In Ethiopia, one study in 2018 found that the unmet needs of cancer patients were the main  
95 predictors of health-related quality of life. (Abegaz & Ayele, 2018) However, to our knowledge,  
96 there are a limited data on the factors associated with the unmet needs of these cancer patients.  
97 Therefore, this study aimed to fill the information gap and identify the predictors of unmet needs  
98 of adult cancer patients.

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## 104 **Material and methods**

### 105 **Study area**

106 This study was conducted in a teaching hospital oncology unit. The hospital is major referral centre  
107 from all corners of the country, especially for cancer patients. The hospital covers a variety of  
108 specialty and subspecialty training in various fields of study and has the only oncology unit in the  
109 nation that provides radiation therapy. There are 21 beds devoted to cancer care and the oncology  
110 clinic sees a minimum of 120 patients per day: 30 new cases, 30 attending for results, 30 for follow-  
111 up, and another 30 for diagnostics). ("The International Network for Cancer Treatment and  
112 Research (INCTR). Partner Profile in Cancer Medicine. Tikur Anbessa (Black Lion), Addis Ababa,  
113 Ethiopia Specialized Hospital," 2014)

### 114 **Study design and study period**

115 This study used an institution facility-based cross-sectional study design and was conducted from  
116 February 01 to 30 March 2019.

### 117 **Study population**

118 The study population comprised patients aged  $\geq 18$  years diagnosed with cancer who had a follow-  
119 up appointment in the oncology unit at the time of the study period.

### 120 **Eligibility criteria**

121 Cancer patients above 18 years of age who started follow-up at the oncology unit at least 3 months  
122 ago, either as an inpatient or outpatient, were included in the study, and those patients in acute pain  
123 and unable to respond were excluded from the study for ethical reasons.

124 **Sample size determination**

125 The sample size was determined using Epi Info Version 7.2.0.1 with the assumption of single  
126 population proportion in the formula. The assumptions taken to determine the sample size were:  
127 two-sided significance level ( $\alpha = 5\%$ ), 67.9% proportion of unmet need, (Fazeli A, Bahrami M,  
128 Mahmoodzadeh M, & Hasanzadeh A, 2017) 95% confidence level, 5% absolute precision and  
129 10% non-response rate. Accordingly, the sample size was 373.

130 **Sampling procedure**

131 Cancer patients who attended the oncology unit were consecutively included until the required  
132 sample size was achieved.

133 **Data collection technique**

134 Data regarding the patient's sociodemographic characteristics, information-related factors, and  
135 supportive care needs were assessed using an interviewer-administered structured questionnaire.  
136 Data regarding the patient's clinical cancer-related factors were extracted from the patient's card.  
137 The data was collected by one oncology nurse and two clinical nurses; the data was collected while  
138 patients were either waiting for their turn to go inside to the doctor or after, they were also  
139 contacted in the wards were they were admitted while taking their chemotherapy. The data was  
140 collected on paper based and coded and entered in to Epi Info software.

141 Informational status/score: In this study, informational status was assessed as a total rank score  
142 composed of 10 different questions, which are basic information patients should be informed  
143 about. Information received on their diagnosis, prognosis, treatment is taken, medication benefit  
144 and side effects, duration of medication, sequence of treatment, medical and tests a patient undergo

145 the value might range from 0 to 10 maximum response (Arbabi et al., 2014) (Samimi Ardestani  
146 et al., 2015) (Zahedi, 2011) (Stanley, 1998).

### 147 **Supportive care needs assessment tool**

148 The SCNS was obtained from the Centre for Health Research and Psycho-oncology (CHeRP) at  
149 the Cancer Council of New South Wales. The tool was validated in Ethiopia and found to be a  
150 valid and reliable tool that possesses a relatively high internal consistency (kappa for all five  
151 domains ranging from .79 to .99). (Afework, Wondimagegnehu, Alemayehu, Kantelhardt, &  
152 Addissie, 2021) The validated short form of the SCNS (SCNS-26) assesses cancer-specific  
153 perceived needs across five domains: physical and daily living; psychological; health system and  
154 information; patient care and support; and sexuality. The participants were asked to indicate the  
155 level of their need for help over the last month in relation to having cancer based on a five-point  
156 Likert scale consisting of 26 items; for each item, participants could choose either ‘not applicable’  
157 or ‘satisfied’ under the heading ‘no need’ or ‘low’, ‘moderate’ or ‘high’ under the heading ‘unmet  
158 needs’. (McElduff et al., 2004)

### 159 **Data quality control technique**

160 Prior to study commencement, the SCNS-26 was translated into the local language of the patients  
161 (i.e., Amharic) and then back-translated into English to ensure the quality of the translation and  
162 maintain the consistency of the questionnaire.

163 All collected data were examined for completeness and consistency by the immediate supervisor  
164 of the field and by the principal investigator. Experienced clinical nurses were trained for data  
165 collection by the principal investigator.



## 166 **Data management and analysis**

167 Data were checked for completeness, consistency, and outliers by the principal investigator and  
168 then cleaned and entered into the Epi Data Version 4.4.2.1 software package. The data were then  
169 exported to SPSS Version 25 for analysis, which included simple descriptive statistics and  
170 multivariable logistic regression.

171 Needs were dichotomized as having unmet needs and no needs. If a patient reports having at least  
172 one low to high need in a domain, then it is considered as ‘unmet need’ in that specific domain,  
173 and if a patient reports no need in all items of a single domain, it is considered as ‘no need’.  
174 (McElduff et al., 2004) The independent variables were sociodemographic, clinical characteristics,  
175 and information-related factors. The informational status of patients was measured as one variable,  
176 taking a total score of 10 basic information questions related to patient diagnosis. The questions  
177 concerned information received about diagnosis, prognosis of the disease, treatment taken, benefits  
178 and side effects, duration, sequence of treatment, and medical tests. The value for this variable lies  
179 in the range 0–10. (Arbabi et al., 2014; Samimi Ardestani et al., 2015; Stanley, 1998; Zahedi,  
180 2011)

181 The descriptive statistics were summarized using frequency distributions and proportions for  
182 categorical variables. Continuous variables such as age, time since diagnosis, and informational  
183 status were described using means and standard deviation (SD) for those normally distributed and  
184 medians and interquartile range (IQR) for those not normally distributed. The association between  
185 independent variables and needs (no and unmet needs) was first examined using binary logistic  
186 regression analyses. To identify associated factors of supportive care needs, multivariable logistic  
187 regressions were used. Any variable with a  $p$  value of  $< 0.2$  on binary regression was a candidate  
188 for the multivariable model, along with variables that were clinically significant. (W.Hosmer &

189 Lemeshow, 2000) After inserting the candidate variables into each model, interaction among the  
190 variables in each model was checked.

191 After model building, the goodness of fit of each model was checked using the Hosmer and  
192 Lemeshow test; (W.Hosmer & Lemeshow, 2000) in addition, the omnibus test was used to  
193 compare the new models with the baseline models. Existence of multicollinearity was checked  
194 using the assumption of the variance inflation factor (VIF) being  $< 10$  (W.Hosmer & Lemeshow,  
195 2000). A  $p$  value of  $< 0.05$  was used to declare statistical significance and a 95% confidence  
196 interval (CI) was constructed.

## 197 **Results**

### 198 **Sociodemographic characteristics of respondents**

199 From the 373 patients approached, only two refused to participate in the study, leaving 371  
200 participants, of which 259 (69.8%) were females. The sociodemographic characteristics are  
201 described in Table 1.

### 202 **Information about diagnosis and related issues**

203 Overall, the median informational status was  $6 \pm (4-8)$ . A total of 320 (86.3%) participants claimed  
204 that they were fully informed about their cancer diagnosis. Almost a quarter of participants  
205 (19.9%) learned about their disease by reading different sources from their own previous  
206 experience and from other cancer patients (Table 2).

### 207 **Clinical characteristics of participants**

208 Gynaecological cancers accounted for 107 (28.8%) of the cases. Two-thirds of the patients were  
209 diagnosed at advanced stages of cancer (III and IV) and one-third and one-sixth had a history of

210 distant metastasis and recurrence, respectively. The median time since cancer diagnosis was 13.00  
211 (7–24) months (Table 3).

212 Among the domains of supportive care needs, the first dimension with a higher frequency of unmet  
213 needs was, physical and daily living 296 (79.8%) followed by health system and information  
214 domain 281 (75.7%). The rest were psychological domain 240 (64.7%), patient care and support  
215 187 (50.4%) and sexuality domain 93 (25.1%) in order of their magnitude in descending order.

### 216 **Multivariable logistic regression of each domain with sociodemographic,** 217 **clinical, and information-related variables**

218 Table 4 gives the results of five logistic regression models, with each of the supportive care needs  
219 of the SCNS-26 (needs vs. no need) as the dependent variable and sociodemographic, clinical  
220 characteristics and information-related factors as predictor variables. No variable had a  
221 multicollinearity issue; after checking for interactions, the only interaction that became significant  
222 was between the source of information and informational status ( $p = 0.019$ ), which is in the patient  
223 care and support domain.

### 224 **Psychological needs**

225 Less information about cancer diagnosis, type of treatment, history of recurrence, and advanced  
226 stage of cancer were significantly associated with the unmet psychological needs of cancer patients  
227 (Table 4). There was a significant difference in the odds of unmet psychological needs for early-  
228 stage versus advanced-stage cancer patients: adjusted odds ratio (AOR) = 0.549 and 95%  
229 confidence interval (CI) = 0.320–0.541. The odds of unmet psychological needs were lower in  
230 patients undergoing radiotherapy and hormonal therapy (AOR 0.312, CI 95%=0.022-0.792)  
231 compared to patients undergoing chemotherapy (AOR =0.154; 95%CI = 0.028–0.852). The odds

232 of developing unmet psychological needs were lower for those who had more information about  
233 their diagnosis and related factors (AOR = 0.896; 95%CI = 0.807–0.995) (Table 4). When all  
234 variables were held constant, the odds of unmet need of psychological support were doubled for  
235 patients who had a history of recurrence of the disease compared with those whose cancer had not  
236 returned (AOR = 2.039; 95%CI = 1.016–4.091) (Table 4).

### 237 **Health system and information needs**

238 Older age, male gender, higher wealth index, longer time since diagnosis, and more information  
239 about diagnosis status were significantly associated with the health system and information  
240 dimension (Table 4). For every 1-year increase in age, the odds of unmet health information needs  
241 decreased (AOR = 0.956; 95%CI = 0.933–0.980). Compared to females, males were three times  
242 more likely to have unmet health system and information needs (AOR = 2.771; 95%CI = 1.153–  
243 6.663). There was a significant difference between those who came from the Southern Nations,  
244 Nationalities and Peoples' Region (SNNPR) compared to those in Addis Ababa (AOR = 0.386;  
245 95%CI = 0.159–0.936). The odds of unmet health information needs decreased among patients  
246 found on the fourth quantile compared to those in the first quintile (from poorest to richest) (AOR  
247 = 0.394; 95%CI = 0.157–0.986). For every 1-month increase in time since diagnosis, the odds of  
248 unmet health information needs decreased (AOR = 0.986; 95%CI = 0.973–0.999). With a 1-unit  
249 increase in the total score of the informational status of the patient, the chance of unmet health  
250 information needs decreases by 34% after controlling for the other variables in the model (AOR =  
251 0.661; 95%CI = 0.564–0.774) (Table 4).

### 252 **Physical and daily living needs**

253 After we fitted the candidates' independent variables, the only significantly associated variable  
254 with unmet physical and daily living needs was the employment status of the patient at  $p < 0.05$

255 (Table 4). After holding all other variables in the model constant, the odds of unmet physical and  
256 daily living needs were 67% lower among self-employed versus unemployed patients (AOR =  
257 0.327; 95%CI = 0.153–0.701).

### 258 **Patient care and support needs**

259 The significant factors associated with unmet patient care and support needs were age, type of  
260 treatment currently taken, and informational status modified by source of information at  $p < 0.05$   
261 (Table 4). Among the sociodemographic variables, unmet patient care and support were associated  
262 with age. As age increases by 1 year, the unmet needs decrease by 2% (AOR = 0.982; 95%CI =  
263 0.946–1.000). The odds of developing unmet need for patient care and support were five times  
264 higher among patients on hormonal therapy compared to patients undergoing chemotherapy (AOR  
265 = 5.004; 95%CI = 1.126–22.260). For every 1-unit score increase in informational status, the odds  
266 of unmet need for patient care and support increased for those who had mixed sources of  
267 information compared to those who had information from the physician only (AOR = 1.380;  
268 95%CI = 1.054–1.806).

### 269 **Sexuality needs**

270 Marital status was the only variable that was significantly associated with unmet sexuality needs  
271 at  $p < 0.05$  (Table 4). There were decreased odds of unmet sexuality needs for patients with no  
272 partner compared to patients who had a partner (AOR = 0.211; 95%CI = 0.100–0.446).

## 273 **Discussion**

274 This study aimed to assess the predictors of unmet supportive care needs of adult cancer patients;  
275 we found that the more information a patient had received, older age, male gender, longer time

276 since cancer diagnosis, patients not currently married, higher wealth, self-employment, mixed  
277 sources of information, advanced stage of cancer at diagnosis, history of recurrence and type of  
278 treatment were factors for patients to experience more unmet needs and these factors showed  
279 significant differences in one or more of the supportive care needs dimensions.

280 When adjusting for confounders and with all other factors kept constant, the score for information  
281 received (informational status) positively influenced patients' unmet health system information  
282 needs. This shows that the provision of adequate information to patients about their disease and  
283 related factors is an essential component of care, especially for patients with chronic illnesses such  
284 as cancer. In this study, 74 (20%) patients had their information from mixed sources (i.e., from  
285 reading through on the Internet), from other patients or from their own previous experience. Those  
286 who had a mixed source of information were more likely to experience unmet patient care and  
287 support needs, regardless of the total informational score. This was an interesting finding that  
288 might imply that having information about aspects of the disease, treatment and prognosis was not  
289 enough for patients to avoid unmet needs because the source of information still mattered.

290 As well as the information received, several sociodemographic variables (age, gender, wealth  
291 index, marital, and employment status) were significantly related to more than one supportive care  
292 needs domain. In our study, an inverse relationship was found between age and unmet health  
293 system and information needs (on getting older, the needs tend to decrease), in line with a 2016  
294 study in Iran. (Jabbarzadeh Tabrizi, Rahmani, Asghari Jafarabadi, Jasemi, & Allahbakhshian,  
295 2016) The association between age and unmet health information needs might be due to younger  
296 patients being more curious, eager to know about their condition, and having higher expectations,  
297 thus expecting more from the health system and experiencing more unmet needs compared with  
298 older patients. We found that older patients' care/support needs tend to decrease, but findings in

299 Australia and Iran contradict this. (Jabbarzadeh Tabrizi et al., 2016; Jorgensen, Young, Harrison,  
300 & Solomon, 2012) Such discrepancy between studies can be due to a difference in participant age  
301 (most of our patients were younger), comorbidity status, clinical care setting and cultural factors.  
302 Identifying the basis for these disparities is critical for improving care. Cross-cultural and  
303 international comparisons of supportive care needs can reveal key cultural and health care system  
304 influences that can be efficiently targeted to improve comprehensive cancer care (Arafat,  
305 Chowdhury, Qusar, & Hafez, 2016; Moreno et al., 2019). Such influences are not straightforward.  
306 For example, while Japanese breast cancer patients prioritize psychological unmet supportive care  
307 needs comparable to Caucasian women (Akechi et al., 2011). Chinese breast cancer patients  
308 prioritize different needs and information (Lam et al., 2011). Latina American women desire more  
309 treatment and survivorship-related information, and minority American women with breast cancer  
310 report more social isolation compared to their Caucasian counterparts (Costas-Muniz et al., 2013).  
311 Another variable associated with physical/daily living needs was being self-employed. In line with  
312 our findings, a cross-sectional study in Australia showed that patients who were not employed  
313 (retirees, pensioners, or those in charge of home duties) had four times higher odds of reporting  
314 unmet needs compared to those who were employed. (Boyes et al., 2015) This indicates that  
315 employed patients might have the ability to seek medical attention whenever they face cancer-  
316 related issues, so they feel more empowered in meeting their health needs compared to  
317 unemployed patients.

318 Regarding economic status, those who were in the fourth quintile have a lower chance of having  
319 unmet needs in the health system information domain, indicating that patients with higher  
320 economic status can meet their needs better. Supporting this, a study in Athens showed that higher  
321 income was associated with less psychological ( $p < 0.028$ ) and health system and information

322 needs ( $p < 0.029$ ). (Psychogyiou, Katsaragakis, Lemonidou, Protogiros, & Patiraki, 2018) This  
323 might be explained as follows: patients who are more economically stable are more prone to access  
324 medical treatments and/or options and thus will have an increased tendency to get more  
325 information.

326 The other variable related to unmet needs regarding the health system and information domain was  
327 male gender, which is in line with a previous Iranian study showing that Iranian cancer patients  
328 have many information needs and that these needs are more often seen in male cancer patients,  
329 with females less eager to obtain information. (Jabbarzadeh Tabrizi et al., 2016) This finding might  
330 be due to females being more interactive and able to share their stories with other female patients  
331 much faster and easily, which might help them to gain some information. However, we recommend  
332 further studies into why male patients have unmet information needs.

333 In the current study, unmet sexuality needs were related to marital status. Those who had no partner  
334 did not develop unmet sexuality needs. In contrast to our findings, Hispanic/Latino patients who  
335 are single were twice as likely to have unmet needs; (Moreno et al., 2018) the difference might be  
336 due to the fact that in our society the non-married might shy away from saying anything on this  
337 issue as it is forbidden for a person to be engaged in a sexual relationship before marriage. On the  
338 other hand, our findings were consistent with other study in Iran where being married was  
339 protective of unmet sexuality needs. (Rahmani et al., 2014)

340 Clinical factors such as stage of cancer, history of recurrence, time since diagnosis, and type of  
341 treatment were also associated with unmet needs. Advanced stage of cancer was significantly  
342 associated with psychological unmet needs, and this study was supported by a study in Malaysia  
343 where cancer survivors with an advanced-stage diagnosis had greater physical and psychological  
344 needs. (Zobaida et al., 2016) Late-stage diagnosis invariably requires a lengthy and complicated



345 course of treatment, and the unanticipated side effects and struggle through the lengthy and  
346 disruptive treatment procedure might give rise to psychological difficulties such as anxiety,  
347 depression and other psychological problems.

348 Time since diagnosis was significantly associated with unmet health system and information  
349 needs. Supporting our findings, a 2016 study in Iran found that this variable was associated with  
350 less need for health information.(Jabbarzadeh Tabrizi et al., 2016) This can be due to the fact that  
351 patients who survive longer and have repeated hospital visits and routine laboratory investigations  
352 tend to have a better understanding of what to do and therefore their unmet information needs  
353 decreased over time.

354 Patients on hormonal therapy in this study showed that they experienced unmet patient care and  
355 support needs; this domain assesses needs related to healthcare providers, showing sensitivity to  
356 physical/emotional needs, privacy, and choice. The increased patient care and support needs might  
357 be because survivors who have completed primary cancer treatment have less contact with  
358 healthcare professionals. A finding similar to ours was a Puerto Rican study using mixed types of  
359 cancers, which found that receiving a combination of radiation and hormonal therapy was related  
360 to unmet needs in the physical/daily living domain ( $p = 0.024$ ). (Velda. J et al., 2015) This implies  
361 that survivors during hormonal treatment should receive constant assessment and they need  
362 attention from healthcare providers.

### 363 **Strength and limitations**

364 This study used a standard validated tool to ensure comparability. During interpretation of the  
365 findings in this study, the following should be taken into account: participants may not have  
366 disclosed the exact experiences related to sexual characteristics due to cultural and social

367 desirability bias; the tool assesses the unmet needs that a patient encounters in the last month from  
368 the day of the interview, which might cause recall bias; and the informational status reported in  
369 this study may not reflect exactly how much the physicians (or healthcare professionals) had  
370 disclosed because the response was based on patient report, which might be affected by recall bias  
371 and/or social desirability bias. This study was conducted in one specialized centre but even though  
372 it is the main and only referral oncology centre in Ethiopia, the generalizability to private hospitals  
373 might be affected. Additionally, we have to mention that we performed multiple comparisons,  
374 which may have led to too many significant associations.

## 375 **Conclusion**

376 This study revealed the predictors of unmet supportive care needs and highlighted the importance  
377 of considering certain sociodemographic and medical characteristics associated with unmet needs.  
378 Such characteristics included older age, male gender, self-employment and patients currently not  
379 married, longer time since diagnosis, advanced stage of cancer, and type of treatment to be  
380 considered. Furthermore, the information a patient has received about cancer diagnosis and the  
381 patient's source of information also play a vital role. To address unmet needs specifically, it will  
382 be of great help to assess the supportive care needs of cancer patients in their routine care. While  
383 many aspects of the cancer experience are universal, people have varied reactions to them based  
384 on their "worldview." Because there are differences in culture, geographic areas, and clinical care  
385 services that influence patients' demands, it is critical to adopt a cross-cultural perspective. Thus  
386 assessing the supportive care needs of Ethiopian cancer patients will make research methodologies  
387 and evaluations more effective since it will be compatible with the patient culture and experiences,  
388 and assess factors associated with unmet needs that are conceptually relevant and representative

389 of the challenges encountered in the study area. In addition, appropriate physical rehabilitation  
390 programmes in the healthcare setting ought to be started for cancer patients. Lastly, patients  
391 diagnosed with advanced-stage and recurrent cancers are in greater need of psychological support  
392 and healthcare facilities need to establish this service. Future studies would benefit by using a  
393 qualitative study in this cultural context regarding sexuality needs and patients' perception of  
394 different sources of information about their diagnosis. Furthermore, as this study has shown that  
395 there is a change in unmet needs over time, a longitudinal study designed to measure unmet needs  
396 could assess causative factors.

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498 **Table 1: Sociodemographic Characteristics of Participants, 2019**

<b>Variables</b>	<b>Frequency (<i>n</i> = 371)</b>	<b>Percentage (%)</b>
<b>Gender</b>		
Female	259	69.8
Male	112	30.2
<b>Residence</b>		
Urban	289	77.9
Rural	82	22.1
<b>Religion</b>		
Orthodox	242	65.2
Muslim	70	18.9
Protestant	51	13.7
Other <sup>a</sup>	8	2.16
<b>Region</b>		
Addis Ababa	153	41.2
Oromiya	111	29.9
Amhara	55	14.8
SNNPR <sup>b</sup>	41	11.1
Other <sup>c</sup>	14	3.0
<b>Marital status</b>		
Married	240	64.7
Never married	41	11.1
Divorced/separated	39	10.5
Widowed	38	10.2
Living together	13	3.5
<b>Highest education completed</b>		
No education	87	23.5
Can read and write	32	8.6
Primary	99	26.7
Secondary	72	19.4
Diploma and degree	74	19.9
Masters and above	7	1.9
<b>Occupation</b>		
Housewife	92	24.8
Unemployed	60	16.2
Government employee	55	14.8
Farmer	52	14
Private/NGO <sup>d</sup>	49	13.2
Merchant	28	7.5
Pension	21	5.7
Other <sup>e</sup>	14	3.8
<b>Wealth index</b>		
Lowest	74	19.9
Second	74	19.9
Middle	75	20.2
Fourth	74	19.9
Highest	74	19.9
<b>Mean (SD<sup>f</sup>) age (years)</b>	<b>46.59 ± 13.18</b>	

499 <sup>a</sup> Java, <sup>b</sup> Southern Nations, Nationalities and Peoples' Region; <sup>c</sup> Afar, Dire Dawa, Tigray, and Benishangul-Gumuz; <sup>d</sup> non-governmental  
 500 organizations; <sup>e</sup> students and daily labourers; <sup>f</sup> standard deviation.

501 **Table 2:** Information Received About Diagnosis and Related Issues Claimed by Participants,  
 502 2019

Variables	Frequency ( <i>n</i> = 371)	Percentage (%)
<b>Informed about diagnosis</b>	320	86.3
<b>Informed about spread/stage/current status of the disease</b>	113	30.5
<b>Informed about possible causes for the disease</b>	93	25.1
<b>Informed about medical tests you undergo/may undergo</b>	178	48.0
<b>Informed about medical results you have received</b>	193	52.0
<b>Informed about medical treatments</b>	305	82.2
<b>Informed about the sequence of the medical treatments</b>	247	66.6
<b>Informed about the expected benefit of the treatment</b>	271	73.0
<b>Informed about possible side-effects of the treatment</b>	252	67.9
<b>Informed about the duration of the treatment</b>	229	61.7
<b>Source of information</b>		
<b>Physician</b>	254	68.5
<b>Physician and reading</b>	43	11.6
<b>Mixed sources <sup>a</sup></b>	74	19.9
<b>Informational status <sup>b</sup></b>	Median (IQR) <sup>c</sup> 6 (4–8)	

503 <sup>a</sup> reading sources from physician and patient's own experience and from other patients' previous experience; <sup>b</sup> count  
 504 variable; <sup>c</sup> interquartile range.

505 **Table 3:** Clinical Characteristics of Participants, 2019

Variables	Frequency ( <i>n</i> = 371)	Percentage (%)
<b>Admission status (<i>n</i> = 370)</b>		
Not admitted	225	60.8
Admitted	145	39.2
<b>Type of cancer</b>		
Gynaecological cancers <sup>a</sup>	107	28.8
Gastrointestinal cancers <sup>b</sup>	70	18.9
Head and neck cancers <sup>c</sup>	64	17.3
Breast cancer	75	20.2
Sarcoma	32	8.6

Thyroid cancer	23	6.2
<b>Stage of cancer</b>		
Early stage <sup>d</sup>	142	38.3
Advanced stage <sup>e</sup>	229	61.7
<b>Current treatment</b>		
Chemotherapy	149	40.2
Radiotherapy	22	5.9
Surgery	18	4.9
Hormonal therapy	69	18.6
On follow-up (anti-pain)	111	29.9
Other <sup>f</sup>	2	0.5
<b>Distance metastasis</b>		
Yes	110	29.6
No	261	70.4
<b>History of recurrence</b>		
Yes	57	15.4
No	314	84.6
<b>Other chronic illness</b>		
Yes	64	17.3
No	307	82.7
<b>Type of chronic illness (n = 64)</b>		
HIV	22	34.4
Hypertension	16	25.0
Diabetes mellitus	11	17.1
Asthma	5	7.8
Diabetes and hypertension	6	9.4
Other <sup>g</sup>	4	6.3
<b>Median (IQR<sup>h</sup>) time since diagnosis</b>		13 (7–24)

**(months)**

506 <sup>a</sup>, Cervical, ovarian and vulval ;<sup>b</sup>, colorectal and oesophageal; <sup>c</sup>, nasopharyngeal and oropharyngeal; <sup>d</sup>, I and II; <sup>e</sup>III and  
507 IV; <sup>f</sup> chemotherapy and radiotherapy combined; <sup>g</sup> HIV and hypertension, deep vein thrombosis, epilepsy, hypertension  
508 and asthma; <sup>h</sup> interquartile range.

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510 **Table 4:** Predictors of Unmet Supportive Care Needs by Domain Among Adult Cancer Patients, 2019

	Psychological needs	Health system information	Patient care support	Physical/daily living	Sexuality needs
Variables	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)
<b>Older age</b>	0.986 (0.968-1.005)	<b>0.956* (0.933-0.980)</b>	<b>0.982* (0.964-1.000)</b>	1.001(0.976-1.027)	0.978(0.954-1.003)
<b>Gender</b>					
Female	-	1	1	-	1
Male	-	<b>2.771* (1.153-6.663)</b>	1.614(0.954-2.730)	-	1.338(0.586-3.054)
<b>Marital status</b>					
With partner	-	-	-	-	1
No partner	-	-	-	-	<b>0.211* (0.100-0.446)</b>
<b>Region</b>					
Addis Ababa	-	1	-	1	-
Oromia	-	1.181(0.578-2.416)	-	1.131(0.559-2.285)	-
Amhara	-	1.893(0.755-4.745)	-	2.569(0.944-6.997)	-
SNNPR	-	<b>0.386*(0.159-0.936)</b>	-	0.519(0.211-1.274)	-
Other	-	0.490(0.088-2.711)	-	1.399(0.155-12.642)	-
<b>Residence</b>					
Urban	-	1	1	1	-
Rural	-	0.842(0.340-2.084)	1.313(0.689-2.501)	1.286(0.483-3.419)	-
<b>Religion</b>					
Christian	1	-	-	-	-
Muslim	1.527 (0.822-2.834)	-	-	-	-
<b>Educational status</b>					
Primary	-	1	1	1	1
No education	-	1.983(0.768-5.122)	0.958(0.473-1.938)	1.040 (0.399-2.706)	0.675(0.284-1.602)
Can read & write	-	0.888(0.297-2.659)	0.958(0.392-2.339)	1.732 (0.418-7.170)	1.962(0.673-5.723)
Secondary	-	0.999(0.422-2.2364)	0.930(0.468-1.848)	1.251 (0.501-3.126)	0.992(0.424-2.326)
Diploma/above	-	0.696(0.285-1.700)	0.561(0.288-1.092)	0.776 (0.307-1.962)	1.820(0.762-4.349)
<b>Wealth index</b>					
First quintile	-	1	-	1	-
Second quintile	-	0.399(0.160-1.000)	-	0.661(0.253-1.729)	-
Third quintile	-	0.971(0.381-2.473)	-	0.648(0.244-1.720)	-

Fourth quintile	-	<b>0.394<sup>o</sup>(0.157-0.986)</b>	-	0.634(0.241-1.672)	-
Fifth quintile	-	0.760(0.297-1.947)	-	0.433(0.170-1.101)	-
<b>Employment status</b>					
Unemployed	-	1	-	1	1
Employed	-	1.132(0.0489-2.621)	-	0.597(0.544-1.461)	1.819(0.874-3.786)
Self-employed	-	1.218 (0.572-2.596)	-	<b>0.327* (0.153-0.701)</b>	1.046(0.501-2.186)
<b>Admission status</b>					
Not admitted	1	-	1	1	1
Admitted	0.317(0.067-1.504)	-	2.041(0.496-8.407)	2.222(0.449-10.993)	0.594(0.129-2.729)
<b>Stage at diagnosis</b>					
Advanced	1	1	-	1	1
Early	<b>0.549* (0.320-0.541)</b>	0.889(0.482-1.673)	-	0.523(0.262-1.045)	0.673(0.368-1.232)
<b>Longer time since diagnosis</b>					
	0.992(0.981-1.004)	<b>0.986* (0.973-0.999)</b>	-	0.999(0.986-1.012)	-
<b>Type of cancer</b>					
Gynaecological	1	1	-	1	1
Thyroid	2.101(0.604-7.310)	0.781(0.182-3.339)	-	1.360(0.322-5.749)	0.128(0.013-1.294)
Gastrointestinal	0.821(0.401-1.684)	0.978(0.376-2.543)	-	2.141(0.786-5.829)	0.993 (0.383-2.574)
Head & neck	1.229(0.577-2.616)	0.917(0.312-2.695)	-	2.027(0.778-5.286)	0.794 (0.271-2.326)
Breast	0.716(0.288-1.777)	0.679(0.234-1.964)	-	1.669(0.522-5.333)	1.880 (0.687-5.144)
Sarcoma	0.696(0.281-1.725)	0.547(0.170-1.763)	-	0.566(0.190-1.682)	0.811(0.246-2.672)
<b>History of other chronic illness</b>					
No	-	-	-	1	1
Yes	-	-	-	2.084(0.878-4.945)	0.818(0.361-1.855)
<b>Type of treatment</b>					
Chemotherapy	1	1	1	1	1
Radiotherapy and/or combined	<b>0.312* (0.022-0.792)</b>	2.022(0.508-8.043)	1.761(0.331-9.354)	4.541(0.486-42.401)	0.150 (0.017-1.326)
Surgery	0.311(0.054-1.799)	0.467(0.108-2.021)	4.017(0.789-20.445)	1.406(0.190-10.420)	0.180(0.025-1.291)
Hormonal therapy	<b>0.154* (0.028-0.852)</b>	1.706(0.591-4.926)	<b>5.004* (1.126-22.260)</b>	1.415 (0.244-8.192)	0.320(0.064-1.606)
On follow-up (anti-pain)	0.210(0.042-1.053)	0.809(0.397-1.648)	4.251(0.986-18.324)	1.405 (0.267-7.386)	0.289(0.058-1.436)
<b>History of metastasis</b>					
No	1	-	-	1	-

Yes	0.982(0.539-1.791)	-	-	1.972(0.838-4.641)	-
<b>History of recurrence</b>					
No	1	1	1	-	1
Yes	<b>2.039* (1.016-4.091)</b>	2.172(0.916-5.153)	1.045(0.564-1.936)	-	1.643(0.835-3.230)
<b>Informational status</b>					
	<b>0.896* (0.807-0.995)</b>	<b>0.66* (0.564-0.774)</b>	<b>0.869* (0.771-0.979)</b>	0.933(0.809-1.075)	-
<b>Source of information</b>					
Physician	-	-	1	-	1
Physician & reading	-	-	1.614 (0.246-10.574)	-	1.345(0.595-3.041)
Mixed sources	-	-	0.491(0.091-2.655)	-	0.654(0.307-1.393)
<b>Source of information × Informational status</b>					
Informational status × Physician	-	-	1	-	-
Informational status × Physician & reading	-	-	1.073(0.806-1.427)	-	-
Informational status × Mixed sources	-	-	<b>1.380* (1.054-1.806)</b>	-	-

511 \* Statistically significant at  $p < 0.05$ . AOR, adjusted odds ratio; CI, confidence interval; SNNPR, Southern Nations, Nationalities and People

512 **Abbreviations:** AOR, adjusted odds ratio; IQR, inter quartile range; NCD, non-communicable  
513 disease; SCNS, supportive care needs; SNNPR, southern nation nationality and peoples' region;  
514 SPSS, statistical package for the social sciences; SD, standard deviation; VIF; variance inflation  
515 factor.

## 516 **Research ethics and patient consent**

517 To carry out this study, ethical approval was obtained from the Research ethics committee. Written  
518 informed consent was obtained from the study participants. Permission was granted from the tool  
519 developers to use of the SCNS tool. All methods were performed following the relevant guidelines  
520 and regulations.

521