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RESEARCH ARTICLE

# Knowledge, Attitudes and Associated Factors of Health Workers Towards Lung and other Cancers in Eswatini

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## Abstract

**Background:** Cancer is a major public health problem for both developed and developing countries, and more than 70% of cancer deaths occur in developing countries. In Eswatini, cancer is the third leading cause of morbidity and mortality among non-communicable diseases. Cancer is therefore a major health problem for the country that needs urgent attention. Amongst the major contributing factors is lack of knowledge about the disease, lack of awareness on need to screen, issues related to availability and access to screening, diagnosis and treatment services. Health workers have a direct contact with patients hence can pass information to them. This study assessed the knowledge, attitudes and associated factors of health workers towards cancer in Eswatini. **Methods:** A quantitatively designed cross-sectional study was conducted among health workers using a structured questionnaire. Health workers were enrolled from 12 health facilities countrywide which included hospitals, health centres and clinics. Data were analysed using quantitative methods and presented on tables. **Results:** A total of 748 health workers were enrolled in the study. Most of them (84.9%) had average knowledge about cancer. Their knowledge differed by age ($p<0.001$), marital status ($p=0.006$), employment position ($p<0.001$), professional qualification ($p=0.001$), level of education and years of employment ($p<0.001$). Almost all the HCWs (99.3%) had positive attitudes towards cancer. **Conclusion:** The HCWs had average knowledge and positive attitudes. There is a need for training programs for HCWs to improve their knowledge as they act a source of information for the population.

**Keywords:** cancer knowledge- cancer attitudes- health workers' cancer knowledge

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## Introduction

Cancer is a major public health problem for both developed and developing countries, and its incidence is rapidly increasing in low and middle-income countries, where resources for prevention, diagnosis and treatment are limited or non-existent. Despite robust evidence that detection and treatment of cancer at an early stage improves the prospects for long-term survival [1,3], data from the World Health Organization (WHO) suggest that more than 70% of cancer deaths occur in developing countries [3]. Eswatini is one of the developing countries in Sub-Saharan Africa. Among non-communicable disease in Eswatini, cancer is the third leading cause of morbidity and mortality and is reportedly showing an increasing incidence, with an over 30% increase of newly diagnosed cases between 2014 and 2015 [4]. Cancer is therefore a major health problem for the country that needs urgent attention. The total number of new cancer cases recorded among Swazis in 2014-2015 was 1 426 comprising 592 (41.5%) cases in men and 834 (58.5%) cases in women. The top five cancers in the country (excluding Kaposi sarcoma) are cancer of the cervix, prostate cancer, breast cancer, cancer of the liver, and lung cancer [4].

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Amongst the major contributing factors is delay in diagnosis and treatment due to lack of knowledge by patients and health providers as well as ill-equipped health systems, lacking capacity to deal with the problem, and misdiagnosis [3]. Some studies have also observed that rapidly changing lifestyles, uncontrolled urbanisation, pollution, population ageing, endemic viral infection (HBV/HIV/HPV) and an epidemic of obesity provide a lethal cocktail of infectious and lifestyle cancer risk factors in Sub-Saharan Africa (SSA) [5,6]. Although cancer can be prevented through behavioural (e.g., having a healthy diet, physical activity, not smoking and controlled alcohol consumption) and environmental modification (e.g. improving ventilation, avoiding use of coal or wood in enclosed spaces) as well as regular use of preventive screening for early detection and management, very few people utilise the screening services [7,8]. This is partly due to lack of knowledge about the disease, lack of awareness on need for and availability of screening services and scarce services for diagnosis and treatment.

Accurate knowledge about a disease among health works can significantly affect increase information sharing between health workers and patients leading to increased cancer awareness, which can subsequently influence the health seeking behaviour of patients. Measuring the health care workers' knowledge about the signs and symptoms of the different types of cancers, risk factors, benefits of prevention, screening, early diagnosis and treatment, availability of health services and prevention methods is thus very essential for informing cancer management programs. To the best of the researcher's knowledge, there has been no study conducted at population level to assess knowledge, attitudes, and practices regarding lung and the five leading cancers in Eswatini. Therefore, the purpose of this study was to ascertain cancer-related knowledge among health workers, and the factors affecting their knowledge and attitudes towards lung and the five leading cancers (prostate, cervical, breast, liver, lung cancers) in Eswatini.

## Materials and Methods

### *Study design and Setting*

A cross sectional study was used to collect quantitative data from health workers. A structured questionnaire was used to collect quantitative data on knowledge and attitudes of health workers. The study was conducted in all four regions of the country. Multi-study settings were used in the country to recruit participants from the population segments. The health workers were recruited from all major hospitals and health centres in the country and clinics located within randomly selected communities.

### *Sampling Procedure and sample size Calculation*

Health workers were sampled from major public health facilities, that is, hospitals and health centres. This is because these facilities provide cancer screening and or treatment services and act as referral facilities for clinics and therefore most likely receive people who would want to use health facilities for major illnesses such as cancer. Clinics from randomly sampled communities were selected for the study because health worker in clinics located within communities act as the first point of contact with patients who are then referred to major facilities. Within the health facilities, the outpatient department, male and female wards, oncology department, radiology, pharmacy and laboratory staff members were selected because they are most likely to work closely with cancer patients or those coming for cancer screening, diagnosis or treatment. From these departments' health workers by cadre (doctors, nurses, nurse assistants, pharmacist, pharmacy technicians, lab technicians, radiologists, radiology technicians) were enrolled in the study.

The sample sizes for health workers was calculated using Power Analysis & Sample Size (PASS) 2008 software (Hintze, 2008; PASS 2008. NCSS, LLC. Kaysville, Utah, USA). Sample size was calculated using the Eswatini Health Care Provider population from Service Availability Mapping. Assuming a response distribution of 50% (which gives the largest sample size), at 95% confidence interval, allowing a 5% margin of error, and a statistical power of 80%, a sample size of 341 participants selected from all health facilities would be necessary. This study further applied frequency weights by cadre of health workers as some cadres have very small proportions in facilities, and based on the applied weights, a sample size of 703 was required for a representative sample.

### *Data Collection*

In this study quantitative data were collected from the health workers by trained data collectors, and a pilot was conducted on two facilities before the main study was conducted. During data collection, once the participant was identified, the information sheet was read with the participant, all questions addressed, a written informed consent was obtained, and a face-to-face interview was conducted using a structured questionnaire. Study data were collected and managed using RED Cap electronic data capture tools (PA Harris, R Taylor, R Thielke, J Payne, N Gonzalez, JG. Conde, Research electronic data capture (RED Cap), 2009) hosted at University Research Co., LLC. A questionnaire previously used by Moss-Morris et al, (2001) was modified to meet the needs of the study. Collected data included socio-demographic information, knowledge and attitudes of participants about cancer prevention, screening and treatment services for various types of cancers.

### *Data Analysis*

Data were analysed using statistical package for social science version 25 (SPSSv25) (IBM SPSS Statistics for Windows. Armonk, NY: IBM Corp). Descriptive statistics were used to describe knowledge of participants and mean (95%CI) and standard deviation was computed for parametrically distributed continuous variables, while median and interquartile ranges were computed for non-parametric distributed variables. To determining the knowledge level of participants, each correct response to the knowledge assessment questions was given a score of 1 and an incorrect response a score of 0. Each participants'

total knowledge score was computed and graded out of the total possible knowledge score and reported as a rate. A score of 0-33% was defined as poor knowledge, 34-66% was defined as average knowledge, and ≥67% was defined as good knowledge. To determine attitudes, each attitude assessment statement in the attitudes section was ranked in a five-point Likert scale (Strongly disagree, Disagree, neither disagree nor agree, Agree and strongly agree), and the most desirable response per statement was given a score of 4 while the least desirable response a score of 0. Each participant score was computed and graded out of the total possible score and reported as a rate. A score of 0-33% was defined as negative attitudes, 34-66% was defined as neither bad nor good (neutral) attitude, and ≥67% was defined as positive attitudes. To identify factors associated with knowledge (dependent variable), all normally distributed continuous variables (independent variables), t-test (for 2 groups) and ANOVA (for more than two groups) was used. Association between knowledge (dependent variable) and nominal variables (independent) with a binary outcome were computed using Chi-square test. Association between knowledge (dependent) and ordinal normally distributed variables (independent) were computed using Pearson's Correlation, while non-parametric variables were computed using Spearman's Correlation. Fisher's exact test was computed in variables with groups less than 5 participants. Significant association between the dependent and independent variable was considered when $p<0.05$.

### *Ethical consideration*

Ethical clearance to conduct the study was obtained from the National Health Research Review Board of Eswatini (NHRRB), and a clearance certificate was received. Permission to conduct the survey was sought from the Ministry of Health and the enrolled health facilities. All participants were informed about their rights including the right to participate or not, right to respond or not to questions, and their right to withdraw from the study at any point when they felt so, without them suffering any disadvantage. Participants were given detailed information on the purpose, objectives processes that were to be followed throughout the survey as well as information on confidentiality and privacy. Participants were given an opportunity to ask questions or seek clarity before being asked if they wanted to take part in the study. Written informed consent was obtained from willing participants.

## Results

A total of 748 HCWs were enrolled in the study. Most of them (84.9%) had average knowledge about cancer, and only 12.7% had good knowledge. The total possible knowledge score was 72 points. The minimum score obtained was 16, and the maximum was 69 points. The mean score was 37.5±8.1 (95%CI:36.9-38.1). More than a third of the participants (38.1%) were 31-40 years, and 20.4% were 41-50 years. There was a trend of increase in knowledge mean score with increase in age, from 35.8±7.0 (95%CI:32.8-38.5) for those who are 18-24 years to 39.0±8.3; 95%CI:37.8-40.3) for those who are 41-50 years ($p<0.001$). More than two thirds of the participants (68.7%) were females, but males were more knowledgeable about cancer (38.5±8.3; 95%CI:37.4-39.6) compared to female (37.0±8.0; 95%CI:36.3-37.7; $p=0.008$). This is shown in Table 1.

More than half the participants (53.5%) were married, and participants' knowledge significantly differed by marital status ($p=0.006$). Almost half the participants (48.8%) had a basic degree and 27.9% had a diploma certificate. Knowledge significantly differed by level of education, with knowledge mean score increasing from 33.8±7.2; (95%CI:32.5-35.0) at certificate level to 44.1±9.3 (95%CI:40.8-47.3; $p<0.001$) at master's degree level. Knowledge level also differed by professional qualification ($p=0.001$) with medical doctors having the highest knowledge score (44.2±9.6; 95%CI:41.6-46.6), followed by specialist doctors (42.5±10.9; 95%CI:37.8-47.5), then double qualified nurses (38.6±7.3; 95%CI:37.9-39.4). Knowledge level also differed by participant's current employment position ($p<0.001$), and it increased with increase in years of employment, from 36.3±7.1 (95%CI:34.4-38.3) for those with less than a year to 39.0±8.5 (95%CI:37.4-40.6; $p<0.001$) for those with ≥21 years (Table 1).

### *Attitudes towards cancer*

As shown in Table 2, almost all the participants (99.3%) had positive attitudes towards cancer. The total attitudes score was 48 points. The mean score was 38.1±4.7 (95%CI:37.8-38.4), with a minimum score of 10 point, and a maximum of 48. There was no difference in attitudes scores between males (38.0±4.6; 95%CI:37.4-38.6) and females (38.1±4.7; 95%CI:37.7-38.5; $p>0.05$). There was no significant difference in attitudes by marital status ($p>0.05$), education level ($p>0.05$), professional qualification ($p>0.05$) or years of employment ($p>0.05$). Although not significant, attitudes scores increased from 35.6±4.1 (95%CI:33.7-37.6) for those with poor knowledge to 39.3±4.8 (95%CI:38.4-40.3; $p>0.05$) for those with good knowledge.

## Discussion

In this study it was observed that health workers' knowledge about cancer was average. Knowledge increase was observed with increase in the health workers' age. Even though insignificant, males had higher knowledge scores than females. Their knowledge differed by marital status, current employment position, and professional qualification with medical doctors being more knowledgeable, followed by double qualified nurses. Knowledge increased with higher level of education and years of employment. The health workers' attitudes towards cancer were positive. Their attitudes did not significantly differ by age, gender, level of education or years of employment.

The level of knowledge about cancer among health workers observed in this study is worrying as they

Table 1. Health Care Workers' knowledge about Cancer

| Characteristics | Total n (%) | X̄±SD (95%CI) knowledge scores | Good n (%) | Average n (%) | Poor n (%) | P-Value |
|---|---|---|---|---|---|---|
| Total participants | 748 (100.0) | 37.5±8.1 (36.9-38.1) | 95 (12.7) | 635 (84.9) | 18 (2.4) | |
| Age (years) | | | | | | |
| 18-24 | 25 (3.3) | 35.8±7.0 (32.8-38.5) | 1 (4.0) | 23 (92.0) | 1 (4.0) | |
| 25-30 | 206 (27.5) | 36.7±7.7 (35.5-37.8) | 17 (8.3) | 183 (88.8) | 6 (2.9) | |
| 31-40 | 285 (38.1) | 37.4±8.1 (36.5-38.3) | 35 (12.3) | 242 (84.9) | 8 (2.8) | <0.001** |
| 41-50 | 154 (20.6) | 39.0±8.3 (37.8-40.3) | 29 (18.8) | 124 (80.5) | 1 (0.6) | |
| 51-60 | 78 (10.4) | 37.3±8.8 (35.4-39.4) | 13 (16.7) | 63 (80.8) | 2 (2.6) | |
| Gender | | | | | | |
| Female | 514 (68.7) | 37.0±8.0 (36.3-37.7) | 53 (10.3) | 449 (87.4) | 12 (2.3) | 0.008** |
| Male | 234 (31.3) | 38.5±8.3 (37.4-39.6) | 42 (17.9) | 186 (79.5) | 6 (2.6) | |
| Marital status | | | | | | |
| Never married | 314 (42.0) | 36.5±8.2 (35.6-37.4) | 28 (8.9) | 275 (87.6) | 11 (3.5) | |
| Married | 400 (53.5) | 38.3±8.2 (37.6-39.1) | 64 (16.0) | 329 (82.3) | 7 (1.8) | |
| Cohabiting | 1 (0.1) | 42 | 0 (0.0) | 1 (100.0) | 0 (0.0) | 0.006** |
| Separated | 6 (0.8) | 34.7.±7.7 (28.5- 41.3) | 1 (16.7) | 5 (83.3) | 0 (0.0) | |
| Divorced | 9 (1.2) | 37.9±6.1 (33.5-41.9) | 0 (0.0) | 9 (100.0) | 0 (0.0) | |
| Widowed | 17 (2.3) | 36.2±7.9 (32.2-39.9) | 2 (11.8) | 15 (88.2) | 0 (0.0) | |
| Declined to answer | 1 (0.1) | 37 | 0 (0.0) | 1 (100.0) | 0 (0.0) | |
| Level of education | | | | | | |
| Certificate | 129 (17.2) | 33.8±7.2 (32.5-35.0) | 7 (5.4) | 116 (89.9) | 6 (4.7) | |
| Diploma | 209 (27.9) | 36.4±7.2 (35.4-37.4) | 15 (7.2) | 188 (90.0) | 6 (2.9) | |
| Basic Degree | 365 (48.8) | 38.6±8.1 (37.8-39.5) | 55 (15.1) | 304 (83.3) | 6 (1.6) | <0.001** |
| Master's Degree | 35 (4.7) | 44.1±9.3 (40.8-47.3) | 15 (42.9) | 20 (57.1) | 0 (0.0) | |
| Doctorate Degree | 9 (1.2) | 43.2±9.2 (37.7-49.3) | 2 (22.2) | 7 (77.8) | 0 (0.0) | |
| Professional qualification | | | | | | |
| Medical doctor | 53 (7.1) | 44.2±9.6 (41.6-46.6) | 21 (39.6) | 31 (58.5) | 1 (1.9) | |
| Specialist Doctor | 20 (2.7) | 42.5±10.9(37.8-47.5) | 9 (45.0) | 11 (55.0) | 0 (0.0) | |
| Double qualified nurse | 349 (46.7) | 38.6±7.3 (37.9-39.4) | 46 (13.2) | 299 (85.7) | 4 (1.1) | |
| Single qualified nurse | 94 (12.6) | 35.0±6.9 (33.7-36.4) | 5 (5.3) | 87 (92.6) | 2 (2.1) | |
| Nurse assistant | 106 (14.2) | 33.9±7.4 (32.5-35.3) | 6 (5.7) | 95 (89.6) | 5 (4.7) | |
| Pharmacist | 8 (1.1) | 34.0±4.1 (31.0-26.6) | 0 (0.0) | 8 (100.0) | 0 (0.0) | 0.001** |
| Pharmacy technician | 16 (2.1) | 35.3±6.5 (32.2-38.8) | 0 (0.0) | 16 (100.0) | 0 (0.0) | |
| Pharmacy Dispenser | 2 (0.3) | 32.0±1.4 (31.0-33.0) | 0 (0.0) | 2 (100.0) | 0 (0.0) | |
| Laboratory technician | 74 (9.9) | 35.2±7.8 (33.5-37.1) | 5 (6.8) | 65 (87.8) | 4 (5.4) | |
| Radiographer | 21 (2.8) | 36.7±11.2 (32.3-41.7) | 3 (14.3) | 16 (76.2) | 2 (9.5) | |
| Community health worker | 5 (0.7) | 37.4±6.5 (32.4-44.5) | 0 (0.0) | 5 (100.0) | 0 (0.0) | |
| Years of employment | | | | | | |
| Less than a year | 54 (7.2) | 36.3±7.1 (34.4-38.3) | 4 (7.4) | 47 (87.0) | 1 (1.9) | |
| 1-5 year | 253 (33.8) | 36.4±8.3 (35.3-37.4) | 22 (8.7) | 220 (87.0) | 11 (4.3) | |
| 6-10 years | 174 (23.3) | 37.2±8.1 (36.0-38.4) | 20 (11.5) | 151 (86.8) | 3 (1.7) | <0.001* |
| 11-20 years | 162 (21.7) | 38.9±7.7 (37.7-40.0) | 28 (17.3) | 132 (81.5) | 2 (1.2) | |
| ≥21 years | 107 (14.3) | 39.0±8.5 (37.4-40.6) | 21 (19.6) | 85 (79.4) | 1 (0.9) | |
| Current employment position | | | | | | |
| Senior Medical Officer | 1 (0.1) | 45 | 0 (0.0) | 1 (100.0) | 0 (0.0) | |
| Medical Officer | 70 (9.4) | 43.3±10.2 (40.9-45-8) | 28 (40.0) | 40 (57.1) | 2 (2.9) | |
| Matron | 1 (0.1) | 54 | 1 (100.0) | 0 (0.0) | 0 (0.0) | |
| Nursing Sister | 69 (9.2) | 40.0±7.3 (38.3-41.8) | 12 (17.4) | 57 (82.6) | 0 (0.0) | |
| State Registered Nurse | 369 (49.3) | 37.6±7.2 (36.8-38.3) | 39 (10.6) | 325 (88.1) | 5 (1.4) | |
| Nursing Assistant | 109 (14.6) | 34.1±7.6 (32.7-35.4) | 7 (6.4) | 97 (89.0) | 5 (4.6) | <0.001** |
| Pharmacist | 7 (0.9) | 33.4±2.9 (31.3-35.3) | 0 (0.0) | 7 (100.0) | 0 (0.0) | |
| Pharmacy Technician | 18 (2.4) | 35.3±6.5 (32.1-38.4) | 0 (0.0) | 18 (100.0) | 0 (0.0) | |
| Dispenser | 2 (0.3) | 32.0±1.4 (32.0-33.0) | 0 (0.0) | 2 (100.0) | 0 (0.0) | |
| Laboratory Technician | 75 (10.0) | 35.2±7.8 (33.5-37.0) | 5 (6.7) | 66 (88.0) | 4 (5.3) | |
| Radiology | 22 (2.9) | 36.5±11.0 (32.3-41.1) | 3 (13.6) | 17 (77.3) | 2 (9.1) | |
| Community Health worker | 5 (0.7) | 37.4±6.5 (32.5-44-5) | 0 (0.0) | 5 (100.0) | 0 (0.0) | |

X̄±SD (95%CI), mean± standard deviation (95% confidence interval); * significance level at p<0.05; ** significance level at p<0.001

Table 2. Health Care Workers' attitudes Towards Cancer

| Characteristics | Total n (%) | X±SD (95%CI) | Positive Attitudes n (%) | Neutral n (%) | Negative attitudes n (%) | P-Value |
|---|---|---|---|---|---|---|
| Total participants | 748 (100.0) | 38.1±4.7 (37.8-38.4) | 743 (99.3) | 3 (0.4) | 2 (0.3) | |
| Age (years) | | | | | | |
| 18-24 | 25 (3.3) | 37.8±4.9 (35.8-39.9) | 25 (100.0) | 0 (0.0) | 0 (0.0) | |
| 25-30 | 206 (27.5) | 37.6±4.9 (36.9-38.3) | 206 (100.0) | 0 (0.0) | 2 (0.0) | |
| 31-40 | 285 (38.1) | 38.4±4.5 (37.9-39.0) | 284 (99.6) | 1 (0.4) | 0 (0.0) | 0.473 |
| 41-50 | 154 (20.6) | 38.4±4.7 (37.5-39.0) | 152 (98.7) | 2 (1.3) | 0 (0.0) | |
| 51-60 | 78 (10.4) | 37.8±4.6 (36.8-38.8) | 78 (100.0) | 0 (0.0) | 0 (0.0) | |
| Gender | | | | | | |
| Male | 234 (31.3) | 38.0±4.6 (37.4-38.6) | 233 (99.6) | 1 (0.4) | 0 (0.0) | 0.21 |
| Female | 513 (68.6) | 38.1±4.7 (37.7-38.5) | 510 (99.4) | 2 (0.4) | 2 (0.4) | |
| Marital status | | | | | | |
| Single/Never married | 314 (42.0) | 37.4±4.9 (36.9-37.9) | 310 (98.7) | 2 (0.6) | 2 (0.6) | |
| Married/ | 400 (53.5) | 38.6±4.4 (38.1-39.0) | 399 (99.8) | 1 (0.3) | 0 (0.0) | |
| Cohabiting | 1 (0.1) | 41 | 1 (100.0) | 0 (0.0) | 0 (0.0) | |
| Separated | 6 (0.8) | 39.2±5.5 (34.7-43.6) | 6 (100.0) | 0 (0.0) | 0 (0.0) | 0.092 |
| Divorced | 9 (1.2) | 39.2±3.8 (36.8-42.0) | 9 (100.0) | 0 (0.0) | 0 (0.0) | |
| Widowed | 17 (2.3) | 39.2±5.0 (36.7-41.7) | 17 (100.0) | 0 (0.0) | 0 (0.0) | |
| Declined to answer | 1 (0.1) | 33 | 1 (100.0) | 0 (0.0) | 0 (0.0) | |
| Level of education | | | | | | |
| Certificate | 129 (17.2) | 37.5±4.5 (36.8-38.3) | 128 (99.2) | 1 (0.8) | 0 (0.0) | |
| Diploma | 209 (27.9) | 38.1±4.5 (37.5-38.7) | 208 (99.5) | 1 (0.5) | 0 (0.0) | |
| Basic Degree | 365 (48.8) | 38.3±4.7 (37.8-38.8) | 364 (99.7) | 0 (0.0) | 2 (0.5) | 0.087 |
| Master's Degree | 35 (4.7) | 38.1±4.1 (36.7-39.5) | 35 (100.0) | 0 (0.0) | 0 (0.0) | |
| Doctorate Degree | 9 (1.2) | 36.9±10.1 (30.0-43.0) | 8 (88.9) | 1 (11.1) | 0 (0.0) | |
| Professional qualification | | | | | | |
| Medical doctor | 53 (7.1) | 37.9±4.2 (36.7-39.0) | 53 (100.0) | 0 (0.0) | 0 (0.0) | |
| Specialist Doctor | 20 (2.7) | 37.6±7.0 (34.2-40.5) | 19 (95.0) | 1 (5.0) | 0 (0.0) | |
| Double qualified nurse | 349 (46.7) | 38.8±4.3 (38.4-39.3) | 349 (100.0) | 0 (0.0) | 0 (0.0) | |
| Single qualified nurse | 94 (12.6) | 37.3±6.4 (36.0-38.5) | 94 (100.0) | 1 (1.1) | 2 (2.1) | |
| Nurse assistant | 106 (14.2) | 37.4±4.3 (36.5-38.2) | 106 (100.0) | 0 (0.0) | 0 (0.0) | |
| Pharmacist | 8 (1.1) | 36.1±3.2 (33.8-38.3) | 8 (100.0) | 0 (0.0) | 0 (0.0) | 0.73 |
| Pharmacy technician | 16 (2.1) | 37.3±5.7 (34.5-40.0) | 16 (100.0) | 0 (0.0) | 0 (0.0) | |
| Dispenser | 2 (0.3) | 37 | 2 (100.0) | 0 (0.0) | 0 (0.0) | |
| Laboratory technician | 73 (9.8) | 37.4±4.0 (36.5-38.3) | 73 (101.4) | 0 (0.0) | 0 (0.0) | |
| Radiographer | 21 (2.8) | 38.1±4.1 (36.3-40.0) | 21 (100.0) | 0 (0.0) | 0 (0.0) | |
| Community health worker | 5 (0.7) | 39.2±2.9 (36.7-42.0) | 5 (100.0) | 0 (0.0) | 0 (0.0) | |
| Years of employment | | | | | | |
| Less than a year | 52 (7.0) | 37.4±4.4 (36.3-38.7) | 52 (100.0) | 0 (0.0) | 0 (0.0) | |
| 1-5 year | 253 (33.8) | 37.3±4.8 (36.8-39.3) | 250 (98.8) | 1 (0.4) | 2 (0.8) | |
| 6-10 years | 174 (23.3) | 38.6±4.7 (37.9-39.3) | 173 (99.4) | 1 (0.6) | 0 (0.0) | 0.463 |
| 11-20 years | 162 (21.7) | 38.8±4.2 (38.1-39.4) | 162 (100.0) | 0 (0.0) | 0 (0.0) | |
| ≥21 years | 107 (14.3) | 38.4±4.9 (37.5-39.3) | 106 (99.1) | 1 (0.9) | 0 (0.0) | |
| Level of Knowledge | | | | | | |
| Poor | 18 (0.1) | 35.6±4.1 (33.7-37.6) | 18 (100.0) | 0 (0.0) | 0 (0.0) | |
| Average | 635 (9.4) | 38.0±4.6 (37.6-38.4) | 631 (98.6) | 2 (0.3) | 2 (0.3) | 0.464 |
| Good | 95 (0.1) | 39.3±4.8 (38.4-40.3) | 94 (100.0) | 1 (1.1) | 0 (0.0) | |

X±SD (95%CI), mean± standard deviation (95% confidence interval); * significance level at p<0.05; ** significance level at p<0.001

are expected to educate the public about the disease. This suggests that strengthening knowledge about cancer needs to start with the health workers' s so they can be source of information to the public they serve. These findings, even though worrisome, are not unique to Eswatini. Studies in other countries in the region have also found low levels of comprehensive knowledge on cancer among health care workers [9,10]. It is also worth noting that none of the health workers in this study are specialist in cancer, due to that there are very limited

cancer specialist in Eswatini. In this study, health workers knowledge was influenced by their employment position, professional qualification and increased with one's level of education and years of employment. This suggests that in strengthening health workers knowledge about cancer, approaches specific to their needs, stratified by their employment position and professional qualification can be beneficiary. One's level of education and years of employment or experience should be considered in determining the knowledge needed by the health workers. This finding also shows the role played by health workers level of education in knowledge about cancer, hence continued education should be encouraged among health workers. Similar factors have been observed to influence the knowledge of health workers in other studies [11-13].

Even though their knowledge about cancer was average, their attitudes were positive. Health workers act as advocates for cancer prevention and screening and having positive attitudes towards cancer is necessary for them to positively talk about cancer services to the public. The positive attitudes among the are not surprising because they are exposed to cancer information from pre-service training and at their place of work during in-service training programs in varying degrees. Other studies have reported the positive role played by access to information on health workers' attitudes compared to the public [14,15].

In Conclusion, the health workers had average knowledge about cancer. Factors that significantly influenced their knowledge were age, marital status, employment position, professional qualification, level of education, and years of employment. Their attitudes towards cancer were positive.

In view of these results, it is recommended that training approaches to improve health workers, both pre-service and in-service be initiated. These can include workshops, short causes or exchange programs that focus on cancer, covering the various cancer care services from screening to treatment including prevention. These trainings should consider one's professional qualification, level of education, years of employment and age. Some health workers can also be trained to specialise in oncology such as nurses and medical doctors, especially nurses who are frontline providers of care in Eswatini. This can be done with an enactment of a post graduate programme with training institutions available in the country. A follow-up study to assess the knowledge of health workers post the proposed training interventions is also recommended.

### *Limitations*

This study has its limitations. Data were collected through face-to-face interviews which could induce interviewer related bias in how they conduct the interviews, and the data could suffer recall bias in participants' responses. To minimize the effects of these limitations on the study findings, the data collectors were well trained on effective methods of conducting quantitative face-to-face interviews to minimise interviewer induced biases.

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### *Conflict of interest*

The authors of this paper have no conflict of interest.

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