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Research Report

Cervical cancer screening and treatment capacity: A survey of members of the African Organisation for Research and Training in Cancer (AORTIC)

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ABSTRACT

Background: Cervical cancer is the second most common cancer among women in Africa, and in half of the sub-Saharan African countries, it is the most common cancer. Currently, there are scarce resources and limited infrastructure to support cervical cancer screening and treatment in many African countries.
Objectives: The aim of this study is to investigate the capacity of cervical cancer screening and treatment among members of the African Organization for Research and Training in Cancer (AORTIC).
Methods: Data were collected from 183 participants through online surveys over a 3-month study period in 2016.
Results: The respondents reported large variations among different African countries. This study highlights the differences between African countries in the availability of screening programs as a result of the resources allocated to healthcare development. Radiation therapy capacity remained the most limited treatment modality available, followed by the lack of gynecologists or gynecologic oncologists who can perform radical hysterectomy.
Conclusions: This information is critical for physicians, public health educators, and policymakers aiming to improve the outcomes among women with cervical cancer in Africa.

1. Introduction

In 2020, there were 604,127 cervical cancer cases and 341,831 deaths worldwide, and 84% of all new cases and 88% of all deaths occur in low- and middle- income countries (LMIC) Chuang et al., 2017; International Agency for Research on Cancer, 2020. Although screening and comprehensive treatment are widely available in the United States, Canada, Western Europe, Australia, New Zealand, and many Pacific rim countries, LMIC face unique challenges in providing women with screening and treatment for cervical cancer. Eastern Africa has the highest incidence in the world with as estimated 40.1 cases per 100,000 women International Agency for Research on Cancer, 2020; Chuang et al., 2016. Adequate screening and treatment of cervical cancer in these countries is hindered by limitations in the availability of screening and treatment facilities and modalities, pathology services, and healthcare infrastructure (Vu et al., 2018; Small et al., 2017). We created a survey in conjunction with the AORTIC in order to evaluate the cervical screening and cancer treatment capacity in Africa. The survey assessed available screening options and the availability of cervical cancer treatment options across various healthcare settings, with the ultimate goal of identifying areas for targeted interventions going forward.

2. Materials and methods

2.1. Survey design

We conducted this investigation using a web-based survey or questionnaire. The survey was emailed to 250 AORTIC members in 2016 to solicit responses from healthcare workers practicing in Africa. Responses were collected over a period of 3 months. The survey included questions to assess respondent demographics, types of practice, cervical cancer screening program, and treatment modalities. All data were self-reported by survey respondents. This survey was submitted to the

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Institutional Review Board at the Mount Sinai Health System of New York City in the U.S. and was deemed to be exempt from review (16-0837-00001-01-PD) as no protected health information was collected from the respondents. Written informed consent was obtained from the AORTIC volunteers who responded to the survey, and the survey and manuscript were additionally approved by the AORTIC members.

2.2. Data collection

Data were collected from October to December 2016 for analysis. Two hundred and one respondents completed the survey and were included in the statistical analysis.

2.3. Statistical analysis

Demographic, screening methodology, and treatment capacities are reported descriptively using number and percent for categorical measures and mean for continuous measures. Qualitative data were analyzed using the Statistical Package for Social Scientists (SPSS), version 20. Univariate and bivariate analysis methods were used using Pearson's chi-square test. The p-value of the chi-squared test was set at a 95% confidence interval.

3. Results

Of the 250 questionnaires that were sent out, 49 (19.6%) received no response, and 18 responses (7.2%) were from clinicians who practice in North America or Europe and were thus excluded from the analysis. One hundred and eighty-three responses received from healthcare practitioners in 23 different African countries were included in the analysis. Out of these 183 respondents, 98 (53.6%) were male and 85 (46.4%) were female. Clinical oncologists represented the largest group of specialists to respond to the survey at 31 respondents (16.9%). This was followed by 24 (13.1%) surgeons, 22 (12%) medical doctors, 22 (12%) pathologists, 17 (9.2%) researchers, 16 (8.7%) palliative care specialists, 14 (7.7%) gynecologic oncologists,10 (5.5%) nurses, and the remainder 27 (14.8%) listed themselves as "others". One-hundred and forty-one (77.2%) respondents worked in public hospitals/clinics while 28 (15.4%) worked in a private setting.

When asked about the availability of cervical cancer screening in their countries, 36 (19.7%) responded that screening was well organized by the government, 60 (32.8%) believed screening was random and opportunistic, and 83 (45.4%) reported that screening availability was limited. The responses on screening availability were also stratified by the levels of country healthcare expenditure. For the 123 (67.2%) respondents from countries that spent <5.5% of their GDP on healthcare, 22 (17.9%) reported that the screening was organized by their governments, 38 (30.9%) reported that the screening was opportunistic, while it was limited for the remaining 63 (51.2%). For the 60 respondents (32.8%) from countries that spent >5.5% of their GDP on healthcare, the rates of screening availability were 28.3%, 36.7%, and 35% respectively reflecting higher governmental support in screening programs (Fig. 1).

When asked about specific screening methods available at their hospitals/clinics, 143 (78.3%) respondents had Pap smear/cytology and 50 (27.1%) had Pap smear/cytology with human papillomavirus (HPV) co-testing available at their site (Fig. 2). One hundred and three (56.6%) respondents had a visual inspection with acetic acid (VIA) and 28 (15.7%) reported the availability of HPV primary screening (Fig. 2).

When treatment capacity was assessed, 131 (71.6%) respondents reportedly had access to gynecologic oncology consultation and 122 (66.7%) had access to medical oncology consultation on a daily basis. Eighty-two (44.8%) respondents did not have access to external beam radiation, 96 (52.5%) did not have access to brachytherapy at their workplace while 160 (87.4%) had access to chemotherapy (Fig. 3). Further, responders reported that 154 (84.2%) of their sites offered simple abdominal hysterectomy, 47 (25.7%) offered a laparoscopic approach, and 102 (55.7%) offered radical hysterectomy as a surgical modality for women undergoing a hysterectomy. When asked about supportive services for surgeries, 63 (34.4%) responders reported that their sites had access to blood products at all times, and 49 (26.8%) had frozen section available.

4. Discussion

Implementation of the Pap smear/cytology for cervical cancer screening in Western Countries has prevented up to 80% of cervical cancer cases (Chakkalakal et al., 2013). However its utilization in Africa is limited, and this disparity is largely due to the lack of resources to develop cervical cancer screening programs. Successful screening programs require the implementation of sustainable infrastructure with skilled personnel and clinical laboratories. Because of the barriers to establishing cervical cancer cytology screening programs, the World Health Organization (WHO) and American Society of Clinical Oncology (ASCO) resource-stratified guidelines recommended screening methods of using either HPV primary screening or VIA in countries with limited resources WHO, 2013; Jeronimo et al., 2017. The VIA approach is less costly and offers the benefit of a "single-visit screen and treat" but the sensitivity and specificity is limited (Mvundura and Tsu, 2014; Goldie et al., 2006). On the other hand, primary HPV screening has improved

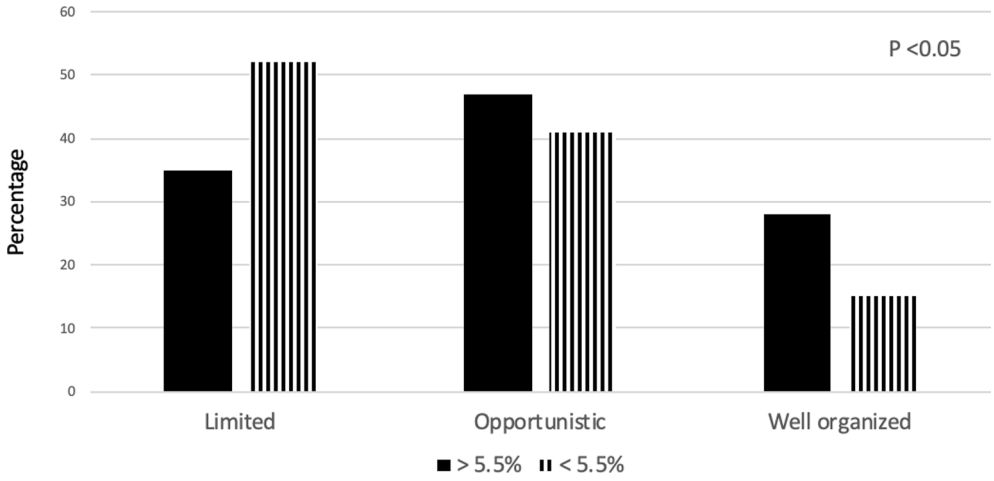


Fig. 1. Responses of availability of cervical cancer screening in respondent's countries compared based on percentage of GDP spent yearly on healthcare (>5.5% or <5.5%).

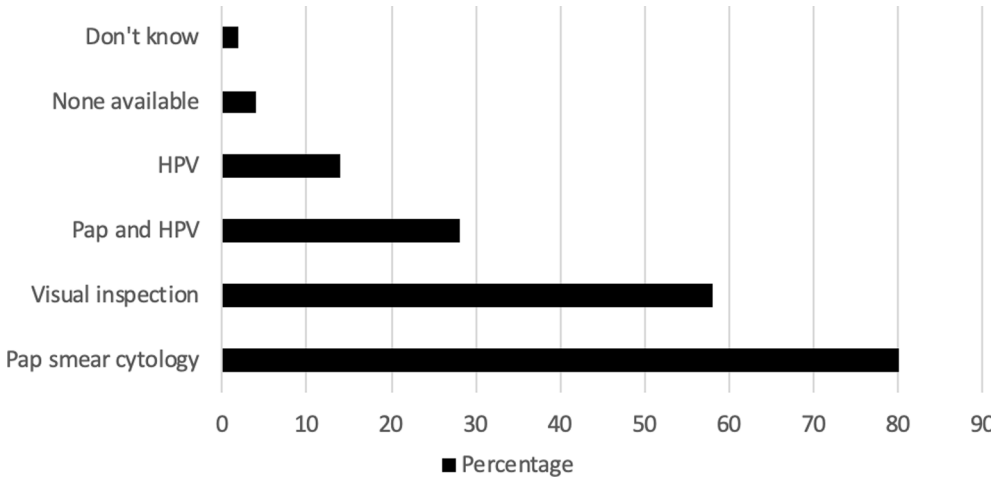


Fig. 2. Percentage of respondents reporting availability of various cervical cancer screening modalities at their health care setting in the AORTIC survey.

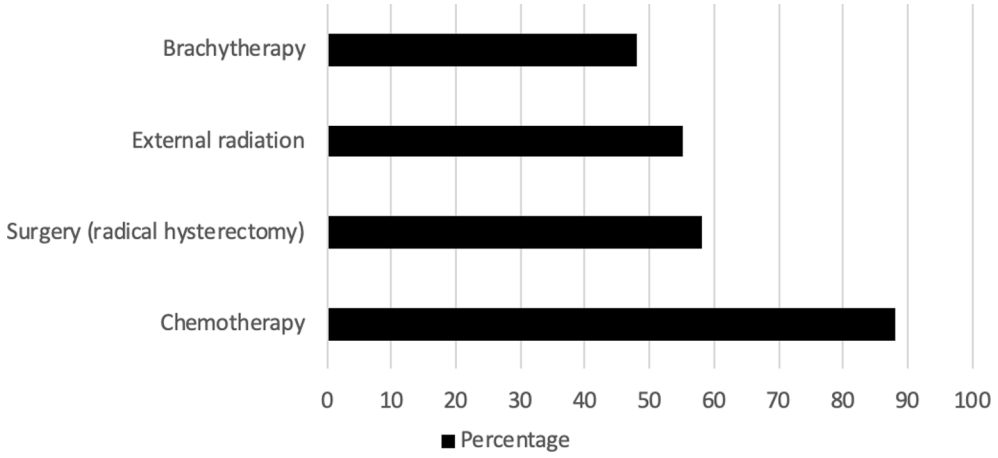


Fig. 3. Percentage of respondents reporting availability at their health care setting of various cervical cancer treatment modalities in the AORTIC survey.

sensitivity and the potential to offer self-sampling which could overcome the societal stigma associated with cervical cancer screening and geographic barriers Madzima et al., 2017. The development and implementation of a more affordable HPV test would make it an optimal screening tool in LMIC countries.

Based on our survey, large variations exist in both the degree of access and methods available for cervical cancer screening across different countries and healthcare settings in Africa. Fewer than 20% of the respondents reported having an organized screening program in their countries. These programs are more likely to be available in countries invested in healthcare; we found a two-fold increase in screening program availability in countries that invested >5.5% than those invested <5.5% of their GDP in healthcare (Fig. 1). Interestingly Pap test/cytology screening is the most commonly available modality for our responders. This may be because most of the responders practice in major healthcare centers. Using these data, future interventions with VIA and/or HPV screening could target settings with limited screening availability in an attempt to detect cases earlier and ultimately lower the significant morbidity and mortality associated with cervical cancer in Africa.

Due to a lack of organized cervical cancer screening programs, the preponderance of cervical cancer cases in LMIC present at an advanced stage (Gage et al., 2003). Treatment of locally advanced cervical cancer requires radical hysterectomy, and pelvic lymphadenectomy for early-stage disease, or a multidisciplinary approach including chemotherapy, external beam radiation, and brachytherapy for locally advanced disease Bhatla et al., 2009. In LMIC, surgical intervention may be limited by access to surgeons trained to perform radical hysterectomy for early cervical cancer. Our study reports that although more than 70% of respondents have access to gynecologic oncology consultation, only 55% have access to gynecologic oncologic specialists who can perform radical hysterectomy for women with cervical cancer (Fig. 3). Training gynecologists or gynecologic oncologists to perform radical hysterectomy in Africa is urgently needed (Chuang et al., 2016). Access to radiation therapy imposes a greater challenge in Africa. Respondents in this study reported the availability of external beam radiation therapy machines and brachytherapy of 54.2% and 45.2% respectively in their institutions (Fig. 3). This is consistent with a previous report that the external radiation therapy machines are available in 46% of African countries (Bishr and Zaghloul, 2018). There is also a lack of blood products and the availability of frozen section among the responders. The availability of cervical cancer treatment varies among different countries and settings in Africa, but there is an overall need for greater access to radiation therapy and specialized surgical techniques and services to treat cervical cancer.

One limitation of this study is the existence of selection bias and self-reported data inherent in a survey. This survey was collected from the AORTIC membership created by clinicians and providers who provide cancer care in their countries where more sophisticated infrastructure exists. There was a higher percentage of responders from Nigeria and South Africa as opposed to other countries with fewer resources in Africa. Clinicians in other parts of sub-Saharan Africa would therefore be

likely to report even lower rates of resources available for prevention and treatment of cervical cancer. In addition, many facilities for the treatment of cancer in sub Saharan Africa are found in large urban centers; access to prevention and treatment of cervical cancer is likely to be lower for women living in rural areas. Due to the survey approval process of AORTIC, there were delays in the data collection and evaluation of study responses which led to an increased interval between data collection and manuscript preparation.

In conclusion, our study reported large variations in participation among different African countries. There were substantial differences between African countries in the availability of screening programs as a result of the resources allocated to healthcare development. Radiation capacity is the most limited treatment modality available, followed by the lack of gynecologists or gynecologic oncologists who can provide surgical care for women with cervical cancer. This information is critical for public health educators and policymakers aiming to improve the outcomes among women with cervical cancer in Africa.

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CRediT authorship contribution statement

Linus Chuang: Conceptualization, Methodology, Investigation, Supervision, Writing – original draft. **Nicole Rainville:** Conceptualization, Writing – review & editing. **Maureen Byrne:** Conceptualization, Investigation, Writing – review & editing. **Thomas Randall:** Conceptualization, Writing – review & editing. **Kathleen Schmeler:** Conceptualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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