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## Abstract

**Background:** Cervix cancer is the most common cause of cancer deaths in Africa accounting for 10.4 deaths, highest global burden of this fatal yet entirely preventable disease. The problem is particularly severe in sub-Saharan Africa, where the age-adjusted incidence rate is 45 per 100,000 women with Ethiopia at 35.9 per 100,000 women. Data from the Addis Ababa population based cancer registry showed that breast and cervical cancers were the leading causes of cancer, comprising 22.6% and 10.8% respectively of all cases of cancers.

**Methods:** Stepwise approach was done. The survey was conducted in the 9 regions and two city administrations (Addis Ababa and Dire Dawa) in Ethiopia. The target population for this survey included all men and 15-69 years old who consider Ethiopia to be their primary place of residence. A single population-proportion formula was used to determine the EAs were covered nationwide. Thus, 5823 women were included in this study. A mix of sampling approach namely settings and the study participants.

**Results:** Cervical cancer screening rate in Ethiopia is extremely low (2.9%). When adjusted for demographic

**Conclusions:** Cervical cancer screening rate in Ethiopia is extremely low as compared to the rates of other countries. This needs a mechanism to establish and strengthen the multi-sectoral response in general for the prevention and control of cervical cancer and increasing awareness of the community towards cervical cancer screening and strengthening the health system in particular.

Keywords: STEPs survey; Cervical; Cancer; Screening

Cervix cancer is a public health problem. It is the third most common cancer in women worldwide and the second most common cancer among women in developing countries [1]. Cervix cancer is the most common cause of cancer deaths in Africa accounting for 10.4 deaths, which represents one in five of all cancer deaths in African women Munoz et al. Sub-Saharan Africa bears the highest global burden of this fatal yet entirely preventable disease [2]. The problem is particularly severe in sub-Saharan Africa, where the age-adjusted incidence rate is 45 per 100,000 women Kizer et al. [3]. With Ethiopia at 35.9 per 100,000 women [4] data from the Addis Ababa population based cancer registry showed that breast and cervical cancers were the leading causes of cancer, comprising 22.6% and 10.8% respectively of all cases of cancers [5]. A study conducted in the teaching hospitals of Ethiopia indicated that invasive cervical malignancy was the most common histological finding with its prevalence of 55.7 while cervical intraepithelial neoplasia (CIN) accounted for 8.6 of the cervical biopsy Nigatu et al. Oncologic outcomes can be improved by four principles narovtm[9]. Therefore, the study is aimed to assess the coverage and factors associated with cervical cancer screening in Ethiopia.

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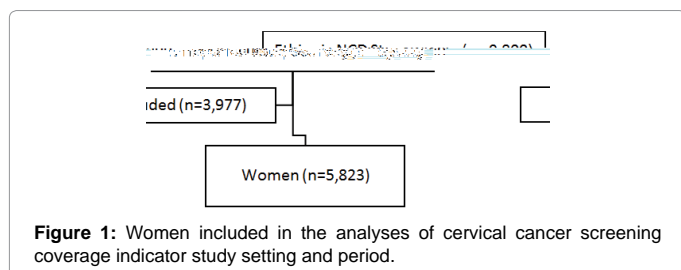
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The data used for this paper were obtained from WHO NCD Steps survey conducted in Ethiopia from April to June, 2015. The survey was conducted using the WHO NCD STEPS instrument version 3.1. The questionnaire consisted of three STEPS for measuring the NCD risk factors. STEP I included questionnaires, STEP II included physical measurements and STEP III included biochemical measurements. This survey was a cross-sectional, representative National population based survey conducted by the Ethiopian Public Health Institute (Ethiopian Ministry of Health). A single population-proportion formula was used to determine the sample size. To adjust for the design effect, a complex sampling design effect coefficient of 1.5 was used to compute the sample size. In order to have an adequate level of precision for each age-sex estimate and place of residence, the sample was multiplied by the number of age sex and place of residence groups for which the estimates were reported. Thus, Z-score=1.96; proportion=35.2%(9) marginal error=0.04; design effect=1.5; age-sex estimate and place of residence-sex estimate=10 groups, and non-response rate=20. A total of 513 EAs were covered nationwide. Stratifying the sampling design by urban rural, 404 rural EAs and 109 to urban EAs. Taking into account the cost of the study and the level of precision - 20 Households (HHs) per EA and one eligible individual from each HH-the sample size the final sample size is calculated to be 10,260 HHs (10,260 study participants). Thus, 10,260 study participants were included in the study. A mix of sampling approach namely stratified, three-stage cluster sampling, simple random sampling and Kish method were employed to select the study settings and the study participants. Prior to sampling, supervisors and data collectors visited the selected EAs and conducted a fresh listing of all HHs in that EA in consultation with local health workers and any other active member who have a good understanding of the local context. Eligible individuals were selected from HHs using Kish method. Only one eligible participant in the selected HH was enrolled in the survey. Using the Kish method, eligible participants in each household were ranked in order of decreasing age, starting with men followed by women. Finally 9,800 participants were responded to the questions and making a response rate of 95.5%. As a result 5823 women were included in our analysis (Figure 1).

Cervical cancer screening status was assessed by asking about whether participants had undergone visual inspection with acetic acid (VIA) testing, a Pap smear and/or human papilloma virus (HPV) test.

Data collection was done simultaneously at the 9 regions and 2 city administration by trained nurses and lab professionals during a face to face interview, using standardized questionnaire. Data were collected digitally using personal digital assistants (PDAs), eSTEPS software was



**Figure 1:** Women included in the analyses of cervical cancer screening coverage indicator study setting and period.

used to design and program the data collection tools in the PDAs. The use of the software and PDAs to collect the data helped to generate the final dataset quickly following the completion of data collection.

The collected datasets were stored in the device as well as the memory card in rml format. The rml files from the PDAs were transferred to the supervisors tablet computers via the Windows Mobile Device Centre.

The files were then transferred to a central server located at EPHI via Internet file streaming system (IFSS) software. IFSS is an application that connects to and exchanges data with the server component. Supervisors managed tablets supported by internet (EVIDEO) and run the IFSS icon (IfssClientPC.exe) located in their desktop to send all the updated data files to central server by entering their user name and password. Finally IFSS automatically perform Automatic packaging and delivering file and Automatic receiving of incoming files. Data was managed using Excel and Stata software.

Descriptive analysis was done along with bivariate and multivariate analysis was conducted for cervical cancer screening. Further statistical analyses were done by using chi-squared tests and logistic regression models. Chi-squared tests were used when comparing groups. All factors with a p-value<0.05 in the bivariate analysis were further entered into the multivariate model to control for confounding effects. Odds ratios (OR) with 95% confidence intervals (CI) were calculated. Statistical significance was accepted at the 5 level (p<0.05). All statistical tests were performed using STATA version 14.0 software (College Station, Texas 77845 USA).

Principles of Ethics were considered. Data were collected unlinked anonymously, without any personal identifiers. For the purpose of data collection, informed consent was obtained from the study participants before administering the questions/collecting blood sample and objectives of the study was explained to the participants by the data collectors. For under eighteen children (age<18 years) survey participants assent and consent from their parents or guardians was obtained. Ethical clearance was obtained first from the University of South Africa, Department of Health Studies, second from the EPHI Institutional review board (IRB) then from National research and Ethics review committee. Furthermore, official letter was produced and delivered to the respective regional health bureaus by EPHI during fieldwork.

In this survey, a total of 5823 women were enrolled with 97 percent response rate of the 6000 originally estimated sample size. Majority of the study participants (43.2%) were in the age group 15-29 years followed by 41.3% of participants in the age group 30-44 years of age. Amhara (27.9%) and Oromo (27.8 percent) ethnic groups together comprised more than half of the study participants. Most of the participants were also from Oromia (22.5%) and Amhara (17.9%) followed by SNNPR (16.8%) regions respectively. Nearly seven out of ten study participants were dwellers from the rural area. More than half (56.6%) of the respondents attended no formal education and only 3.9% of them attended college and above level training. More than six in ten (63.8%) of the study participants were married and/or cohabitating.

The study showed that seven in ten (71.4%) of the respondents were getting the annual income of less than 12,000 ETB (Table 1).

### Cervical Cancer Screening Coverage

Women respondents were asked whether they had ever had a screening test for cervical cancer. Of all the women age 15-69 years participating in the study, only 2.9% (95 CI: 2.5-3.4) reported ever having undergone a screening test for cervical cancer. The highest proportion of testing among women was in the age group 50 and above years, with 4.1% (95 CI: 3.0-5.6). Women in urban areas (6.9%) were more likely to have undergone cervical cancer screening than the rural (0.9%) women population (Table 2).

To identify the association of cervical cancer screening coverage, with socio demographic characteristics, bivariate and multivariate logistic regression analysis was conducted. After performing bivariate analysis, based on the significance levels of each independent variable multivariate analysis was conducted. Among the non-modifiable factors only age of the participant was associated with cervical cancer screening. Among the modifiable factors, area of residence, level of education and household income of the respondent were associated with cervical cancer screening. Based on the findings, cervical cancer screening is significantly associated with being at urban area (AOR=2.5, 95% CI: 1.1, 5.7), age 30-49 years (AOR=2.4, 95% CI: 1.2, 4.8), having annual household income of more than 30,000 ETB (AOR=7.1, 95% CI: 4.8, 10.4) and college and above level of education (OR=2.8, 95% CI: 1.1, 7.8). Women age 30-49 years were 2.4 times, living in urban area were 2.5 times, having secondary education were 3.6 times, having college and above level of education were 2.8 times, having household annual income of more than 23,300 to 30,000 ETB were 2.1 times and having household annual income of more than 30,000 ETB were 7.1 more likely to be screened for cervical cancer than their counterparts. There is no statistically significant difference among the agrarian, emerging and urban regions (Table 2).

Epidemiological studies have consistently shown a strong association between the risks of acquiring cervical cancer, exposure to Human Papilloma Virus (HPV) and factors linked to early sexual activity such as early marriage, young age at first pregnancy, large total number of pregnancies, short mean interval between pregnancies, and multiple sexual partners and all these risk factors are highly prevalent in Ethiopia [10]. The strategic statement of the national cancer control and prevention strategy indicated that Ethiopia will have a system of cancer prevention and control that will reduce cancer incidence, morbidity and mortality through the adoption of a multi-sectoral approach, implementation of concrete and sustainable actions, according to the priorities, taking the greatest advantage of available resources [2]. Therefore, in this study we have identified the coverage of cervical cancer screening rate in Ethiopia and its associated factors.

The Ethiopian FMOH recommends cervical cancer screening every five years following normal results irrespective of HIV status following abnormal results and/or treatment, repeat screening in one year. If follow-up screening is normal, return to screening every five years [5].

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