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Systematic review of cervical cancer prevalence and determinants of early detection in Sub-Saharan Africa

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HIGHLIGHTS

- We systematically reviewed the literature on the prevalence of cervical cancer and determinants of early detection in Sub-Saharan Africa;
- The prevalence of cervical cancer is increasing;
- A very low uptake of cervical cancer screening was found;
- Cervical cancer screening programs are practical and feasible even in resource-limited settings; though there are issues to be addressed by Governments in order to make these programs operational.

ABSTRACT

Cervical cancer is one of the leading causes of morbidity and mortality globally and in Sub-Saharan Africa in particular. There is evidence that early detection and early management of cases are the best strategies to prevent and control this health threat, since treatment of the later stages of the diseases are very expensive. The objectives of the review were: (1) to identify and review studies on the prevalence of cervical cancer and determinants of early detection in Sub-Saharan Africa, and (2) to recommend further studies and interventions based on the findings of this review. Extensive literature search was conducted using the MeSH terms. Articles on cervical cancer and/or determinants of early detection which fulfilled inclusion criteria were reviewed independently by three reviewers. The prevalence of cervical cancer in Sub-Saharan Africa is increasing. Although there are evidences that cervical cancer screening programs are practical and feasible even in resource-limited settings in Sub-Saharan Africa, there is a very low uptake of cervical cancer screening and there are key factors that need to be addressed in order to make these programs established and effective.

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1. Introduction

Cervical cancer is one of the leading causes of morbidity and mortality, since it occupies the second most common malignancy in women worldwide (Durowade et al., 2012; Lyimo & Beran, 2012). Lower-and-middle-income countries (LMIC) carry the highest burden of non-communicable disease-related deaths in general and cervical cancer in particular, since these countries face many challenges to deal with these increasing health threats (Abotchie & Shokar, 2009; Akinyemiju, 2012). These include mainly the lack of NCDs policies and strategic plans, lack of qualified health personnel specializing in cancer management, scarcity of health systems, unavailability of necessary medical equipment and medication, the complex and very expensive nature of cancer prevention and control, especially at later stages, which originate from the lack of community awareness and community-based interventions for prevention and control through early detection and early management (Akinyemiju, 2012; Ezem, 2007; Lyimo & Beran, 2012).

Yet, several studies have shown that cost-effective interventions for prevention and control of cervical cancer through early detection and treatment are feasible in LMIC (Nwozor & Oragudosi, 2013). It was also found that the success of cervical cancer prevention and control in LMIC will hinge on early detection and early treatment because at this stage, individuals, families and countries can afford the cost with better treatment outcomes (Makuza *et al.*, 2015; Nwozor & Oragudosi, 2013). However, these interventions are still insufficient since screening uptake and use of available services were found to be very low in situations whereby cervical cancer prevalence is increasing rapidly (Idowu, Olowookere, Fagbemi, & Ogunlaja, 2016; Nwozor & Oragudosi, 2013). This is the main interest of this review.

2. Methods

The purpose of the review is to identify and review the studies which reported on the prevalence of cervical cancer and determinants of early detection for prevention and control. Specific objectives were (1) to identify and review studies on the prevalence of cervical cancer and determinants of early detection in Sub-Saharan Africa, and (2) to recommend further studies and interventions based on the findings of this review.

Extensive literature search was conducted using the MeSH terms in the PUBMED and their synonyms were identified in order to maximize picking up recently published literature on the prevalence of cervical cancer and determinants of early detection in Sub-Saharan Africa, from the year 2011 to 2017. The following search terms were used: (prevalence OR incidence OR burden) AND (cervical cancer OR Human papilloma virus) AND (Africa OR Sub-Saharan Africa); (awareness) AND (Early detection OR screening OR diagnosis) AND (cervical cancer OR invasive cervical cancer) AND (Africa OR Sub-Saharan Africa). Databases searched included: PubMed, Medline, LISTA (EBSCO), Cochrane and Internet engines such as Google and Google Scholar. Only articles which reported on cervical cancer and determinants of early detection, published in English language were included in the study. One reviewer independently screened the titles and abstracts of all identified retrieved articles, and then an agreement on articles to be reviewed in details was reached. Because of the difference of the reviewed studies in their design, focus, and implementation, a Meta-analysis could not be done; only a systematic synthesis of evidence on the prevalence of cervical cancer and the determinants of early detection was performed.

3. Results

The extensive literature search found a total number of 539 articles and 84 were relevant to the prevalence of cervical cancer and/or determinants of early detection (Figure 1). After exclusion of those out of Africa, 38 remained, and those reporting on the prevalence of cervical cancer and/or determinants of early detection but out of Sub-Saharan Africa or those relevant to Sub-Saharan Africa but published before 2011 were excluded, only 10 remained and they were reviewed.

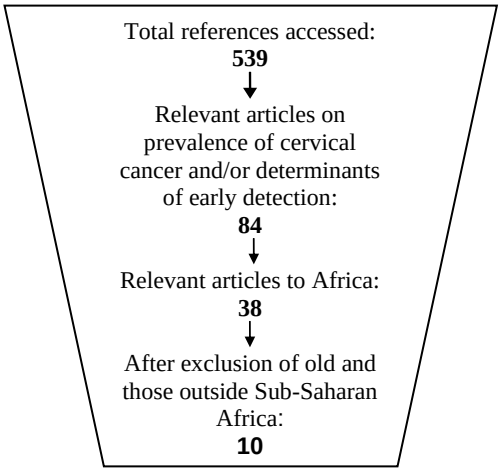

Figure 1: Flow diagram of articles selection

3.1 Overview of the studies reviewed

As summarized in Table 1, two articles reported findings on Africa globally, one was from four countries in Southern Africa, namely Uganda, South Africa, Tanzania, and Nigeria, one article was from South Africa, and one article was from Tanzania. Systematic reviews were two articles and the remaining three were observational descriptive studies.

Table 1: Summary of the 10 articles for review

Articles	Number of articles
Article from country	
Global (sub-Saharan Africa)	1
Ghana	1
Nigeria	4
Swaziland	1
Kenya	1
Tanzania	1
Rwanda	1
Study design	
Systematic Reviews	0
Cross-section descriptive and analytic design	10

3.2 Prevalence of cervical cancer

The findings on prevalence of cervical cancer are summarized in Table 3. A study conducted in Ghana, Nigeria and South Africa among 659 women (167 in Ghana, 192 in Nigeria and 300 in South Africa) found that 570 (86.5%) were histologically confirmed as invasive cervical cancer (ICC) (Denny *et al*., 2014). The tumor type was identified among many of the women with ICC, 551 (96.7%) and squamous cell carcinoma was observed in 476 (83.5%) women. The HPV-positivity rate among women with confirmed ICC was 90.4% (515/570). Also the study found that the prevalence of single and multiple HPV infections were higher among HIV-positive women and HPV type distribution appeared to differ according to tumor type and HIV status. The HPV16, 18, 45 and 35 were the most common HPV types among women with ICC. A similar study that was conducted in Nigeria found that abnormal cytology rate was 12.6% in Agogo study site and 3.5% in Nkawie (Handlogten *et al.*,

2014). This study found demographic differences between education level (P<0.001), occupation (P<0.001), religion (P=0.002), and marital status (P<0.001). The study also found that the identification of higher risk communities and patients should be a priority for screening and a cost-effective intervention in limited-resource contexts.

Another study conducted in Nigeria found that 10 (5%) of the women who participated in the study had positive cytology result, out of which 1(10%) was high grade squamous intraepithelial lesion (HGSIL) and 9 (90%) were low grade squamous intraepithelial lesion (LGSIL). Also the study found that the risk factors for cervical cancer were coitarche, tobacco smoking, number of sexual partners and family history of cervical cancer (Durowade, *et al.,* 2012). Furthermore, a similar study conducted in the same country with comparison of women with and without HIV found that cervical lesions rate was four times greater among HIV positive women (22.9%) against 5.7% (p < 0.0001) among HIV negative women (Jolly *et al.,* 2017). The women who had ≥2 lifetime sexual partners were 3 times more likely (Odds ratio (OR) = 3.00) to have cervical lesions compared to those with one lifetime partner. Also, Cervical lesions among women with a history of Sexually Transmittable Diseases (STIs) were 2.16 greater (OR= 2.16) than among those with no previous STIs, and women who had a previous cervical exam were 2.5 times more likely (OR 2.53) to have cervical lesions than women who had not.

A study conducted in Rwanda on the prevalence of pre-cancer and invasive cervical cancer found that the pre-cancer lesions rate was 5.9% compared to invasive cervical cancer which was 1.7% of the women screened (Makuza, *et al.,* 2015). The study identified the risk factors which were associated with cervical cancer; these included the initiation of sexual activity at less than 20 years (OR=1.75), being unmarried (single, divorced and widowed) (OR=3.29), and older age at the first pregnancy (OR=2.10). Although this study did not focus on the determinants of cervical cancer early detection, it was found that screening using the Visual Inspection with Acetic Acid (VIA) was practical and feasible even in rural and resources-limited settings, so that decentralization of cervical screening at community level is possible in Sub-Saharan Africa.

3.3 Future global trends of cervical cancer

The global trends predict an increase of more than 80% of incidence of all-cancer cases from 12.7 million new cases reported in 2008 to 22.2 million by 2030 (Bray, Jemal, Grey, Ferlay, & Forman, 2012). Cancer deaths among women is predicted to increase up to 60% in 2030, and cervical cancer is predicted to rise at over 25%, from 529,800 in 2008 to over 700,000 in 2030 (Siegel, Miller, & Jemal, 2016). Cervical cancer and breast cancer are the most diagnosed cancers and the leading causes of morbidity and mortality in sub-Saharan Africa (Akinyemiju, 2012). Cervical cancer cases are the commonest occurring among women in Sub-Saharan Africa, accounting for 20-25% of all new cancers (Abotchie & Shokar, 2009). Screening for early detection is viewed as the best and cost-effective strategy to reverse the course of the deadliest cancers among women, which are breast cancer and cervical cancer.

3.4 Determinants of early detection for cervical cancer

A study conducted in Nigeria to identify the determinants of cervical cancer screening uptake found that only 8% of the respondents had ever been screened for cervical cancer (Idowu, *et al.,* 2016). Positive attitudes were associated with screening (81.5%, p= 0.001), as well as the awareness of the disease (100%, p= 0.001), and awareness of cervical cancer screening program (88.9%, p= 0.001). This study concluded an urgent need to improve the knowledge base and attitudes among women and decentralization of screening program to enhance cervical cancer screening uptake. A similar study conducted in the same country on the awareness of cervical cancer disease and screening uptake found a low awareness of the disease among the respondents (37.5%) (Eze, Umeora, Obuna, Egwuatu, & Ejikeme, 2012). Awareness on cervical cancer prevention was 31.9%, screening program (25%), and screening centers (20.8%). The study found a very low cervical screening uptake (0.6%); however, many respondents were willing to be screened regularly (62.5%) (Table 2). However, a number of barriers to screening uptake were identified. These include the lack of awareness, non-availability of screening centers locally, cost and time.

Table 2: Awareness of cervical cancer and screening in Nigeria (Eze, *et al.*, 2012)

Variables	Frequency (n)	Percentage (%)
	Total=360	
Aware of cervical cancer	135	37.5
Aware of cervical cancer prevention	115	31.9
Have heard of cervical screening	90	25
Know screening centers	75	20.8
Have been screened previously	2	0.6
Willingness to be screened	225	62.5

Another similar study conducted also in Nigeria (Nwozor & Oragudosi, 2013) found a low number of respondents who were aware of cervical cancer screening program, 160 (35.6%) and only 8 (1.8%) have done the screening tests before. Identified barriers to getting screened included the lack of awareness 228 (51.6%), cost 70 (15.8%), lack of facility closer to people 70 (15.8%), long walking distance 13 (2.9%), not thinking that screening is necessary 52 (11.8%), and others had no evident reasons 9 (2.0%).

A study conducted in Tanzania showed similar results whereby only 22.6% of the participants have been screened for cervical cancer (Lyimo & Beran, 2012). Identified factors which were associated with screening were the knowledge of cervical cancer and its prevention (OR= 8.90, 95% CI = 2.14-16.03) and distance to the facility which provides cervical cancer screening (OR= 3.98, 95%CI= 0.18-5.10). Other factors included husband approval, women's level of education, women's knowledge of cervical cancer and its prevention, women's concerns about embarrassment and pain of screening, women's preference for the sex of health care provider, and women's awareness of cervical cancer screening services and walking distance. In Kenya, a similar study was conducted and found that only 12.3% of the participants have been screened before, while 22.8% felt that they were at risk of getting cervical cancer (Were, Nyaberi, & Buziba, 2011). A good number of the participants (65%) were willing to be screened. The perception of being at risk was significantly associated with a felt need for screening (p=0.002). However, there were a number of reported barriers to screening including the fear of abnormal results (22.4%) and lack of finances (11.4%). The study found that, since screening is still uncommon, key messages about screening and cheaper screening methods are needed at decentralized entities.

4. Discussion

Available evidence shows that the best strategy for lower-and-middle-income countries to prevent and control cervical cancer is to embark on early detection and early management of the identified cases, since the NCDs in general are very expensive to manage and they are projected to increase dramatically by the year 2030 globally, and LMIC in particular (Abotchie & Shokar, 2009; Ezem, 2007; Kibret & Mesfin, 2015). Since Sub-Saharan African region carries the heavier burden of several infectious and NCDs, and this in the context of resources-limited, it is imperative to embark on early detection and early management of the cases, in order to save many lives (Denny, et al., 2014; Were, *et al.,* 2011).

Table 3: Summary of the 10 articles on the prevalence of cervical cancer and determinants of early detection in sub-Saharan Africa.

Article	Country	Study design and focus	Findings on prevalence of cervical cancer and determinants of early detection
Denny, Adewole, *et al.* (2014)	South Africa, Ghana, and Nigeria,	-Cross sectional study -Prevalence of Human papillomavirus and type distribution in invasive cervical cancer	o Out of 659 women: 570 (86.49%) cases were histologically confirmed as ICC. o The tumour type: 551 (96.66%) among women with ICC, o Squamous cell carcinoma: 476/570 (83.5%) o The HPV-positivity rate in ICC cases: 90.4% (515/570) o Single and multiple HPV infections were higher among HIV-positive women and HPV type distribution appeared to differ according to tumour type and HIV status. o The HPV16, 18, 45 and 35 were the most common HPV types.
Handlogten, *et al.* (2014)	Ghana	-Cross-sectional study -Prevalence of abnormal cytology	o Abnormal cytology rates: 12.6% in Agogo and 3.5% in Nkawie o Demographic differences in education level (P<0.001), occupation (P<0.001), religion (P=0.002), and marital status (P<0.001) o Identification of higher risk communities should be a priority for screening and a cost-effective intervention in limited-resources contexts.
Durowade, , *et al.* (2012)	Nigeria	-Community-based cross-sectional study -Prevalence and risk factors of cervical cancer	o Ten (5%) respondents had positive cytology result, of them1(10%) was high grade squamous intraepithelial lesion (HGSIL) and 9 (90%) were low grade squamous intraepithelial lesion (LGSIL) o Risk factors for cervical cancer: coitarche, tobacco smoking, number of sexual partners and family history of cervical cancer o Regular screening useful for the early detection of cervical cancer.
Idowu, *et al.* (2016)	Nigeria	-Cross-sectional study -Determinants of cervical cancer screening uptake	o The 8% of the respondents had ever been screened o Determinants: positive attitudes to screening (81.5%, p= 0.001), awareness of the disease (100.0%, p= 0.001), and awareness of cervical cancer screening (88.9%, p= 0.001) o There is urgent need to improve the knowledge base and attitude women to enhance cervical cancer screening uptake.
Eze, *et al.* (2012)	Nigeria	-Cross-sectional study -Awareness of cervical cancer and cervical screening services uptake	o Awareness of cervical cancer disease was 37.5%), its prevention was 31.9%, screening was 25% and screening centres was 20.8%, and screening uptake rate was 0.6% o Overall, 62.5% of all the respondents were willing to be screened o Factors hindering screening were lack of awareness, non-availability of screening centres locally, cost and time.
Nwozor and Oragudosi (2013)	Nigeria	-Cross-sectional study -Awareness and uptake of cervical cancer screening	o Low awareness of cervical cancer screening 160 (35.56%) o Only 8 (1.78%) have been screened o Barriers: lack of awareness 228 (51.58%), cost 70 (15.84%), lack of facility 70 (15.84%), distance 13 (2.94%), not thinking it is necessary 52 (11.76%), no reason 9 (2.04%).
Jolly, *et al.* (2017)	Swaziland	-Hospital-based cross-sectional study -Screening, prevalence and risk factors of cervical cancer lesions	o Cervical lesions rate was four times among HIV positive women (22.9%) vs HIV negative women (5.7%) with p< 0.0001) o Women who had ≥2 lifetime sexual partners were 3 times more likely (OR= 3.00) to have cervical lesions versus those with one lifetime partner o Cervical lesions among women with a history of STIs were 2.16 greater (OR= 2.16) than among those with no previous STI, and women who had a previous cervical exam were 2.5 times more likely (OR 2.53) to have cervical lesions than women who had not.
Lyimo and Beran (2012)	Tanzania	-Cross-sectional study -Factors associated with cervical cancer screening uptake	o Only 22.6%have been screened o Main factors associated with screening: the knowledge of cervical cancer and its prevention (OR = 8.90, 95%CI = 2.14-16.03) and distance to the facility (OR = 3.98, 95%CI = 0.18-5.10) o Factors: husband approval, women's level of education, women's knowledge of cervical cancer and its prevention, women's concerns about embarrassment and pain of screening, women's preference for the sex of health provider, and women's awareness of and distance to cervical cancer screening services.
Were, *et al.* (2011)	Kenya	-Cross-sectional study -Perceptions of risk and barriers to cervical cancer screening	o Only 12.3% have been screened before o Only 22.8% felt that they were at risk of the cervical cancer o A good number (65%) were willing to be screened o Perception of being at risk was significantly associated with a felt need for screening (p=0.002) o Barriers: fear of abnormal results (22.4%) and the cost (11.4%) o Screening is still uncommon o Key messages and cheaper screening methods are needed.
Makuza, *et al.* (2015)	Rwanda	-Community-based Cross-sectional analytical study -Prevalence and risk factors for ICC and pre-cancerous lesions	o Pre-cancer: 5.9% and Invasive cervical cancer:1.7% o Risk factors: initiation of sexual activity at less than 20 years (OR=1.75), being unmarried (single, divorced and widowed) (OR=3.29), and older age at the first pregnancy (OR=2.10) o Screening using VIA found practical and feasible even in rural settings.

Screening of cervical cancer was found to be practical and feasible and several studies conducted showed that the majority of women were willing to get screened (Jolly, *et al.,* 2017; Makuza, *et al.*, 2015). Available evidences showed that the community willingness plays a major role in the success of every public health program. The community participation is one of the key principles in Primary Health Care (PHC) programs, such as malaria prevention and control in Sub-Saharan Africa (Otten *et al.,* 2009). This readiness of the people to undergo screening and early detection for cervical cancer is an important factor in the prevention and control of this health threat.

Several studies have reported a number of issues that need to be addressed in order to make cervical cancer screening feasible, practical and cost-effective intervention (Abotchie & Shokar, 2009; Akinyemiju, 2012; Nwozor & Oragudosi, 2013). These issues include lack of accessibility of the services, long walking distance from where people live, which leads to a very low cervical cancer screening uptake, the lack of qualified staff to undertake screening and counselling activities, lack of necessary equipment, lack of medication for those who are diagnosed with the disease, and the lack of policies and strategies for cervical cancer screening programs in several countries. Since cervical screening programs are not yet established and operationalized in several countries in Sub-Saharan Africa, there is lack of evidence-based for decision-making and strategic planning (Akinyemiju, 2012; Idowu, *et al.*, 2016). It is clear that facility-based and community-based operational research studies are much needed, in order to inform the health sector in Sub-Sahara African countries on the best practices in the prevention and control of cervical cancer.

5. Conclusion

The prevalence of cervical cancer in Sub-Saharan Africa is increasing, for the few cases which are known. There is evidence that cervical cancer screening is practical and feasible even in resource-limited settings in Sub-Saharan Africa. However, there is a very low uptake of cervical cancer screening and there are factors that need to be addressed by Governments and their partners in order to make these programs established, in order to reach the main goal to save many lives from this health threat.

Conflict of interest

There is no conflict of interest associated with this research study.

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