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Abstract

Background: Cervical cancer continues to pose a significant public health issue in Nigeria, characterized by high rates of incidence and mortality. Colposcopy is integral to the cervical cancer screening process and its early detection. However, the uptake of colposcopy screening in Nigeria remains suboptimal, with various factors contributing to this phenomenon. Comprehending the experiences and perceptions of healthcare professionals and patients concerning colposcopy for cervical cancer screening is vital to enhance screening initiatives and alleviate the impact of cervical cancer in Nigeria. This systematic review aims to identify the gap in knowledge and synthesize the existing literature on the experiences and perceptions of healthcare professionals and patients regarding colposcopy for cervical cancer screening in Nigeria. **Methods:** A comprehensive search of the literature was conducted in Academic search elite, African journals online (AJOL), CINAHL, Mbase, psycho info, Cochrane, Medline (via PubMed) and Scopus databases from 2010 until March 2023. The quality of the included studies was assessed using Joanna Briggs Institute (JBI) critical appraisal tool. Thematic analysis was deployed to synthesize the extracted data. **Results:** Fourteen (14) studies satisfied the inclusion criteria. Most studies were conducted in developed countries and urban settings. The review revealed key themes that were categorized into four: insufficient knowledge/awareness, emotional factors, cultural/religious factors, and organizational/systemic factors. **Conclusion:** The review identified barriers to colposcopy screening in Nigeria, highlighting the need for targeted interventions to improve cervical cancer screening rates. Hence, the need for a qualitative study in rural parts of Nigeria to explore the in-depth understanding of patients' and healthcare professionals' regarding colposcopy screening utilization.

INTRODUCTION

Cervical cancer remains a significant public health concern in Nigeria, ranking as one of the leading causes of cancer-related deaths among women. With an estimated 14,089 new cases and 8,240 deaths annually, Nigeria has the eighth-highest cervical cancer mortality rate globally (Ezem, 2007; Arulogun and Maxwell, 2012). The World Health Organization reports an age-standardized incidence rate of 36.8 and a mortality rate of 22.5 per 100,000 women for cervical cancer in Nigeria (Arbyn et al., 2020; WHO, 2014). These statistics underscore the critical need for effective screening and early detection programs. While Pap smears have been the primary screening method, they face challenges such as infrastructure deficits and limited healthcare access (Chukwuali et al., 2003). Colposcopy has emerged as an alternative visual screening method, involving a detailed examination of the cervix using a low-powered microscope and specialized lighting (Cronje, 2005; Massad et al., 2013). This procedure allows healthcare professionals to identify abnormal cervical lesions and determine the need for further diagnostic procedures or treatment.

The effectiveness of colposcopy depends on various factors, including healthcare professionals' knowledge and skills, as well as patients' awareness, acceptance, and perceptions of the screening process. Understanding these factors is crucial for developing and implementing effective cervical cancer screening programs in Nigeria. This systematic review aims to synthesize the available literature on healthcare professionals' and patients' experiences and perceptions of colposcopy cervical cancer screening in Nigeria. By examining existing research, the review will provide insights into facilitators, barriers, and challenges faced by both healthcare professionals and patients. It will also identify potential areas for improvement in cervical cancer screening programs in the country. The main objective of this review is to identify knowledge gaps and summarize key issues related to the implementation of cervical cancer screening programs in low-income countries, with a particular focus on Nigeria. The review emphasizes the experiences, perceptions, and challenges associated with colposcopy screening, aiming to inform future research and policy decisions in this critical area of public health.

METHODS: The Search Strategy

This systematic review employed a comprehensive literature search strategy following PRISMA guidelines, utilizing eight electronic databases: Academic Search Elite, AJOL, CINAHL, EMBASE, PsycINFO, Cochrane Library, MEDLINE, and Google Scholar. The search, covering publications from 2010 to 2023, used keywords related to cervical cancer, colposcopy, healthcare professionals, patients, experiences, perceptions, and challenges. The PIOs framework guided the development of search terms, with expanded concepts incorporating synonyms and related terms. The search strategy included published papers, abstracts, and conference posters, with language restricted to English. The research population encompassed both service providers and users. Extensive keywords and subject headings were used to enhance sensitivity. Reference lists of published papers were also scrutinized for additional relevant articles. Grey literature was searched using the World Wide Web, employing Boolean operators and various search terms related to cervical cancer screening, colposcopy, healthcare professionals, patients, and Nigeria. Wildcard symbols were used to find variations of search terms. The search strategy was tailored for each database to ensure comprehensive retrieval of pertinent studies. A manual search of reference lists from selected studies and relevant review articles complemented the electronic database searches to uncover any missed studies. This multi-faceted approach aimed to capture a wide range of relevant literature on healthcare professionals' and patients' experiences and perceptions of colposcopy cervical cancer screening in Nigeria, ensuring a thorough and comprehensive review.

Selection Strategy

Articles from database searches were exported to RefWorks for duplicate removal. Initial screening of titles and abstracts excluded irrelevant studies, followed by a detailed review of remaining abstracts to determine eligibility. Full texts of potentially eligible studies were then reviewed for inclusion. Qualitative, quantitative, and mixed-methods studies were considered to provide a comprehensive understanding of factors influencing colposcopy screening utilization. Inclusion criteria encompassed healthcare professionals and patients involved in colposcopy cervical cancer screening, studies with various designs, outcomes related to knowledge, attitudes, practices, experiences,

and perceptions regarding colposcopy screening, studies conducted in and outside Nigeria, peer-reviewed publications or academic dissertations. Exclusion criteria included studies focusing on non-colposcopy screening methods, those not reporting on experiences and perceptions of healthcare professionals or patients, publications outside the specified date range, conference abstracts, editorials, letters, or commentaries without original data, non-English publications, and secondary studies, expert opinions, and policy documents. This selection process aimed to identify methodologically sound, recent, and relevant studies directly addressing the research questions and providing insights into the Nigerian context of colposcopy cervical cancer screening.

Study Selection and Data Extraction

The study selection involved a two-stage process with two independent reviewers evaluating titles, abstracts, and full texts based on predefined eligibility criteria. Disagreements were resolved through discussion or by a third reviewer. Data extraction used a standardized form covering study characteristics, demographics, professional details, outcomes related to knowledge, attitudes, practices, experiences, and perceptions of healthcare professionals and patients regarding colposcopy for cervical cancer screening. Principal findings and conclusions were also extracted. This systematic approach ensured a comprehensive and unbiased selection of relevant studies, providing a solid foundation for analysing the experiences and perceptions of colposcopy cervical cancer screening in Nigeria.

Data Synthesis

The systematic review employed a narrative data synthesis approach due to study heterogeneity. Reviewers immersed themselves in the data, coding relevant information and identifying recurring themes across studies. These themes were categorized into overarching themes and subthemes, capturing experiences and perspectives of healthcare professionals and patients regarding colposcopy cervical cancer screening in Nigeria. The synthesis provided a comprehensive understanding of the topic, highlighting barriers and facilitators to service use and provision. This method allowed for an extensive exploration of relationships within and between studies, offering valuable insights into the complexities of colposcopy cervical cancer screening in the Nigerian context. The results were summarized and presented through main themes in Table 2.

Quality Assessment

The methodological quality of included studies was rigorously evaluated using the Joanna Briggs Institute (JBI) critical appraisal checklist for prevalence studies, as described by Aromataris et al. (2024). This 9-item checklist assesses methodological rigor, credibility, and reliability, with scoring based on yes (1 point), no (0 points), unclear (0 points), and not applicable (excluded) responses. Studies were classified as high quality ($\geq 80\%$), moderate quality (60-79%), or low quality (Two independent reviewers (A.A and M.L) conducted the quality assessment to reduce bias, with discrepancies resolved through discussion or consultation with a third reviewer (H.K). Impartial quality assessment provides context for findings. Quality stratification informs synthesis, ensuring conclusions reflect methodological rigor, enhancing review reliability and validity.

Ethics and Dissemination

The review was granted ethics approval under the larger project by the College of Nursing, Midwifery, and Healthcare Research Ethics Panel (approval number 01255). The research offered insights into the experiences and perceptions of healthcare providers and users concerning the colposcopy method for cervical cancer screening in Nigeria. The results of this systematic review will be published in a peer-reviewed journal article.

RESULTS

Search Results and Study Selection: A comprehensive search across multiple databases yielded 3,597 initial records. After deduplication using RefWorks, 1,824 unique records remained. Initial screening of titles and abstracts removed 1,496 irrelevant studies. The remaining 328 articles underwent full-text review, with 314 excluded based on predefined criteria. Ultimately, 14 articles met all inclusion criteria and were selected for the systematic review. This rigorous selection process ensured that only the most relevant and methodologically sound studies were included. The selected articles formed the primary dataset for quality assessment and data extraction. A PRISMA flow diagram (Figure 1) visually represents this selection process, detailing the number of studies identified, included, and excluded at each stage of the review. This systematic approach enhances the reliability and comprehensiveness of the review's findings.

Quality assessment: The 14 included studies underwent rigorous quality assessment using the JBI critical appraisal checklist, ensuring methodological soundness in the evidence synthesis. This systematic approach enhances the reliability and validity of the results. According to the JBI assessment, 7 studies (50%) were high quality, 6 (42.9%) moderate quality, and 1 (7.1%) low quality. While most studies (92.9%) were of moderate to high quality, the presence of one low-quality study suggests cautious interpretation of overall results. The limited number of studies meeting all inclusion criteria (n=14) indicates a scarcity of high-quality research in this area. This underscores the need for more studies and highlights the importance of this review in filling knowledge gaps. The quality assessment results provide crucial context for interpreting the review's findings and emphasize the need for further research in this field.

STUDY CHARACTERISTICS

This systematic review analysed 14 studies on colposcopy cervical cancer screening experiences from 2010 to 2023, with only 21.4% published in the last five years. The studies employed diverse methodologies, primarily qualitative and observational (71.4%), with some quantitative approaches (28.6%). Data collection methods varied, enhancing comprehensiveness but complicating synthesis. The review covered a broad geographical scope, including 3,488 participants across multiple continents, though with a significant imbalance between service users (93.6%) and healthcare professionals (6.4%). Methodological quality assessment revealed 50% high-quality, 42.9% moderate-quality, and 7.1% low-quality studies. Key methodological considerations included heterogeneous reporting detail, limitations of qualitative and observational designs, potential confounding factors due to geographical diversity, and inadequate sample size determination reporting. The analysis provides a foundation for

interpreting the review's findings, highlighting the strengths and limitations of the current evidence base and emphasizing the need for more recent research and improved methodological approaches.

Poor Knowledge and Awareness: Studies A1 and A6 identified lack of awareness as a significant barrier to colposcopy screening among women. Study A4 revealed inadequate understanding among healthcare providers and patients' refusal due to unawareness of cervical cancer risks. Studies A8 and A10 reported suboptimal information provision about the screening process and risk factors. Poor communication between healthcare professionals exacerbates the knowledge gap. Study A4 also found that many women refuse screening due to lack of awareness about cervical cancer risks and consequences. These findings underscore the need for comprehensive education programs for both patients and healthcare providers to enhance colposcopy acceptance and improve cervical cancer prevention strategies.

Emotional Factors: This study explored emotional barriers to colposcopy screenings for patients and healthcare providers. Pain, fear, and anxiety were identified as predominant psychological effects. Studies A5, A10, and A11 noted concerns about pain or discomfort, while A2 highlighted embarrassment due to privacy invasion. Studies A8 and A14 emphasized increased anxiety during waiting times. Gender dynamics played a role, with studies A2 and A7 suggesting male colposcopists might discourage participation. Studies A3, A11, and A13 revealed fears about impacts on fertility, childbirth, and sexual health. Fear of cancer diagnosis was a major deterrent, cited in studies A3, A7, A13, and A14. Study A11 found negative experiences and lack of partner support exacerbated these issues. Broader health concerns also acted as barriers, with studies A2, A7, and A8 indicating fear of HIV testing as an obstacle. Study A2 noted that exposing genital areas to unfamiliar healthcare providers, especially male doctors, caused embarrassment and hesitation. These findings highlight the complex interplay of emotional, psychological, and cultural factors influencing colposcopy screening decisions. They underscore the need for holistic, patient-focused strategies that address not only physical procedures but also the multifaceted emotional landscape surrounding screening experiences.

Systemic/Organisational Factors: This study examined systemic and organizational factors influencing colposcopy screening services. Seven out of thirteen studies identified limited accessibility as a major issue, with Studies A1, A4, A6, and A10 reporting challenges due to insufficient information, equipment shortages, and lack of trained professionals. Poor communication and appointment systems exacerbated these issues. Studies A7 and A14 highlighted difficulties in adhering to clinical guidelines, revealing a complex relationship between protocols and practical implementation. Study A4 noted logistical barriers, including transportation issues, further complicating access to screening centres. Economic factors were crucial, especially in lower-income countries. Studies A2 and A4, conducted in Nigeria and South Africa, identified service costs and financial limitations as significant barriers, emphasizing the importance of socioeconomic context in program design. Patient perceptions varied widely. Study A2 reported high satisfaction levels, while Study A9 revealed negative perceptions and a perceived lack of empathy from providers, underscoring inconsistencies in service delivery. These findings highlight the need for a

holistic, systems-level approach to improve colposcopy screening services, addressing technical, organizational, economic, and interpersonal factors. Future research and policies should focus on developing comprehensive strategies to overcome these barriers and enhance screening participation and outcomes.

Cultural And Religious Barriers: This study examined cultural and religious barriers to colposcopy screening utilization across multiple studies. Study A2 found privacy concerns significant, with 83.3% of participants preferring female colposcopists due to cultural and religious restrictions, while 90% desired their spouse's presence during the procedure. Study A7 highlighted challenges in accommodating patient preferences, suggesting the need for culturally adapted procedures. Community influence was crucial, with Study A8 noting how disapproval and lack of peer support negatively impact screening engagement. Study A3 revealed religious beliefs as a significant barrier, with some participants favoring spiritual healing over colposcopy screening. Demographic factors intersected with these barriers, as younger age ($P = 0.029$) and nulliparity ($P = 0.004$) were associated with screening refusal. These findings underscore the complex nature of cultural and religious impediments to colposcopy screening and emphasize the need for culturally informed strategies in healthcare delivery. The study calls for healthcare professionals and policymakers to implement approaches that respect diverse beliefs while promoting preventive care. Future research should focus on developing and evaluating culturally adapted interventions to improve screening participation among diverse populations.

DISCUSSION

This systematic review examines perceptions and challenges associated with colposcopy screening utilization, analysing findings from fourteen studies within the broader literature context. The review identifies four main themes: knowledge/awareness factors, emotional factors, systemic/organizational factors, and cultural/religious factors. These themes provide insights into barriers faced by both service providers and users, emphasizing the need for tailored interventions to improve colposcopy screening uptake. The review highlights a significant knowledge gap as a critical barrier to colposcopy utilization, with 19% of selected studies emphasizing this issue. This aligns with existing literature, particularly in resource-limited settings. Lower literacy levels among women in developing countries may contribute to low awareness. Interestingly, some studies reported high knowledge levels about cervical cancer among healthcare workers but low screening uptake, suggesting that knowledge alone may not drive screening behaviour. This discrepancy warrants further investigation into the complex relationship between knowledge, risk perception, and health-seeking behaviours. Emotional barriers emerged as the most prevalent challenge, accounting for 33% of reported perceptions. Fear of cancer diagnosis, concerns about HIV testing, anxiety about fertility implications, and apprehension regarding the screening procedure were prominent issues. These findings corroborate previous research and highlight the need for interventions addressing psychological barriers. The fear of positive results, often perceived as a "death sentence," emerges as a significant deterrent. Concerns about pain, discomfort, and embarrassment during the procedure, particularly with male healthcare professionals, align with findings from diverse cultural contexts. These emotional barriers underscore the importance of developing culturally sensitive, patient-centred approaches to colposcopy screening. The review identified several

systemic barriers, including limited access to screening services, shortage of trained professionals, and inadequate equipment. These findings are consistent with previous studies in Nigeria and other resource-limited settings. Long waiting times and distant screening centres impact women's screening decisions, highlighting the need for improved healthcare infrastructure and accessibility, particularly in rural areas. Reported lack of empathy from service providers, concerns about diagnostic accuracy, and difficulties adhering to clinical guidelines point to broader issues in healthcare quality and workforce development. The shortage of trained colposcopists in Nigeria and other developing countries emphasizes the need for targeted policies to train and retain specialized healthcare professionals. Cultural and religious beliefs significantly influence colposcopy screening uptake, particularly in resource-poor countries. The review found that 15% of selected studies highlighted cultural and religious challenges, including perceived violations of privacy and sex-negative beliefs. These findings are consistent with broader research on the impact of cultural and religious beliefs on women's health-seeking behaviours in Asia and Africa. Reluctance to expose genitals to male healthcare providers, particularly among Muslim women in Northern Nigeria, and concerns about privacy invasion underscore the need for culturally sensitive screening approaches. The influence of community opinions and peer encouragement on screening decisions highlights the potential role of community-based interventions in promoting colposcopy screening.

Implications for Future Research

This review highlights research gaps in Nigerian colposcopy screening utilization. Future studies should expand geographical and demographic scope, include diverse perspectives, and employ intersectional approaches. Qualitative research exploring provider and patient views, operational studies assessing service enhancement strategies, and culturally tailored. This agenda aims to inform evidence-based policies for cervical cancer prevention in Nigeria and similar countries.

Strength and limitation

This systematic review's strengths include comprehensive methodology and diverse perspectives. However, limitations such as language bias, inconsistent study quality, and scarcity of Nigeria-specific research impact its robustness and applicability. These limitations highlight areas for future research, particularly in the Nigerian context, and necessitate cautious interpretation of findings.

CONCLUSION: This systematic review offers comprehensive insights into healthcare professionals' and patients' experiences with colposcopy cervical cancer screening in Nigeria. It identifies key barriers and facilitators, emphasizing the need for a multifaceted approach to improve service uptake and delivery. Strategies include enhancing healthcare professionals' skills, improving service accessibility, increasing public awareness, and addressing socioeconomic and cultural barriers. The review stresses the importance of culturally sensitive interventions and community engagement. It also highlights the need for further qualitative research to inform targeted interventions and policies, ultimately aiming to reduce cervical cancer incidence in Nigeria through improved screening programs.

REFERENCES

- Al Sairafi, M. and Mohamed, F.A. (2009) 'Knowledge, attitudes, and practice related to cervical cancer screening among Kuwaiti women', *Medical Principles and Practice*, 18(1), pp. 35-42.
- Arbyn, M., Weiderpass, E., Bruni, L., de Sanjosé, S., Saraiya, M., Ferlay, J., & Bray, F. (2020). Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. *The Lancet Global Health*, 8(2), e191-e203.
- Aromataris, E., Munn, Z., Moola, S., Tufanaru, C., & Pearce, A. (2015). *Joanna Briggs Institute Reviewer's Manual*. Joanna Briggs Institute.
https://nursing.lsuhs.edu/JBI/docs/ReviewersManuals/Systematic_Reviews.pdf
- Arulogun, O.S. and Maxwell, O.O. (2012) 'Perception and utilization of cervical cancer screening services among female nurses in University College Hospital, Ibadan, Nigeria', *Pan African Medical Journal*, 11(1).
- Awodele, O., Adeyomoye, A., Awodele, D.F., Kwashi, V., Awodele, I.O. and Dolapo, D.C. (2011) 'A study on cervical cancer screening amongst nurses in Lagos University Teaching Hospital, Lagos, Nigeria', *Journal of Cancer Education*, 26, pp. 497-504.
- Busingye, P., Nakimuli, A., Nabunya, E. and Mutyaba, T. (2012) 'Acceptability of cervical cancer screening via visual inspection with acetic acid or Lugol's iodine at Mulago Hospital, Uganda', *International Journal of Gynecology & Obstetrics*, 119(3), pp. 262-265.
- Chigbu, C.O. and Aniebue, U.U. (2012) 'Experiences of women undergoing colposcopy in southeastern Nigeria', *International Journal of Gynecology & Obstetrics*, 119(2), pp. 182-184. Available at: doi: 10.1016/j.ijgo.2012.06.005.
- Chukwuali, L.I., Onuigbo, W.I.B. and Mgbor, N.C., 2003. Cervical cancer screening in Enugu. *Tropical Journal of Obstetrics and Gynaecology*, 20(2), pp.109-112.
- Creswell, J. (2014) *Research design: Qualitative, Quantitative, and mixed methods approach* 3rd edition. London: Sage
- Creswell, J. (2013) *Qualitative inquiry and research design: choosing among five approaches*. 3rd edition. London: Sage
- Cronje, H.S., 2005. Screening for cervical cancer in developing countries. *International Journal of Gynecology & Obstetrics*, 88(2), pp.94-98.
- Ezechi, O.C., Gab-Okafor, C.V., Ostergren, P.O. and Odberg Pettersson, K. (2013) 'Willingness and acceptability of cervical cancer screening among HIV positive Nigerian women', *BMC Public Health*, 13, pp. 1-8.
- Ezem, B.U. (2007) 'Awareness and uptake of cervical cancer screening in Owerri, South Eastern Nigeria', *Annals of African medicine*, 6(3), pp. 94.
- Fox, N., Hunn, A. and Mathers, N. (2009) 'Sampling and sample size calculation', East Midlands/Yorkshire: the National Institutes for Health Research. Research Design Service for the East Midlands/Yorkshire & the Humber .
- Ifemelumma, C.C., Anikwe, C.C., Okorochukwu, B.C., Onu, F.A., Obuna, J.A., Ejikeme, B.N. and Ezeonu, O.P. (2019) 'Cervical Cancer Screening: Assessment of Perception and Utilization of

Services among Health Workers in Low Resource Setting', *International journal of reproductive medicine*, 2019, pp. 6505482-8. Available at: doi: 10.1155/2019/6505482.

Kirubarajan, A., Leung, S., Li, X., Yau, M. and Sobel, M. (2021) *Barriers and facilitators for cervical cancer screening among adolescents and young people: a systematic review*, Toronto, Canada: Springer Science and Business Media LLC.

Kivuti-Bitok, L.W., Pokhariyal, G.P., Abdul, R. and McDonnell, G. (2013) 'An exploration of opportunities and challenges facing cervical cancer managers in Kenya', *BMC research notes*, 6(1), pp. 1-10.

Kolawole, A.O. (2008) *Cervical Cancer and its Control in Nigeria: Challenges and the way forward*. Royal tropical institute (KIT).

Kwok, C., White, K. and Roydhouse, J.K. (2011) 'Chinese-Australian women's knowledge, facilitators and barriers related to cervical cancer screening: a qualitative study', *Journal of Immigrant and Minority Health*, 13, pp. 1076-1083.

Makwe, C., Anorlu, R., Kathleen, K., Ike, G., Oguntade, S. and Odunbanjo, A. (2009) 'P1063 Knowledge, attitude and perception of cervical cancer and cervical cancer screening among HIV positive women in Lagos, Nigeria', *International journal of gynecology and obstetrics*, 107, pp. S710. Available at: doi: 10.1016/S0020-7292(09)62548-0.

Manley, K.M., Simms, R.A., Platt, S., Patel, A. and Bahl, R. (2017) 'Unsatisfactory colposcopy: clinical decision-making in conditions of uncertainty', *BMC Medical Informatics & Decision Making*, 17(1), pp. 1-11. Available at: doi: 10.1186/s12911-017-0516-3.

Massad LS, Einstein MH, Huh WK, et al. 2012 updated consensus guidelines for the management of abnormal cervical cancer screening tests and cancer precursors. *Obstet Gynecol*. 2013;121(4):829-846. doi:10.1097/AOG.0b013e3182883a34

Momberg, M., Botha, M.H., Van der Merwe, F.H. and Moodley, J. (2017) 'Women's experiences with cervical cancer screening in a colposcopy referral clinic in Cape Town, South Africa: a qualitative analysis', *BMJ open*, 7(2), pp. e013914. Available at: doi: 10.1136/bmjopen-2016-013914.

Mwaka, A.D., Wabinga, H.R. and Mayanja-Kizza, H. (2013) 'Mind the gaps: a qualitative study of perceptions of healthcare professionals on challenges and proposed remedies for cervical cancer help-seeking in post conflict northern Uganda', *BMC family practice*, 14(1), pp. 193. Available at: doi: 10.1186/1471-2296-14-193.

Nayak, B.K. (2010) 'Understanding the relevance of sample size calculation', *Indian journal of ophthalmology*, 58(6), pp. 469.

Ndikom, C.M. and Ofi, B.A. (2012) 'Awareness, perception and factors affecting utilization of cervical cancer screening services among women in Ibadan, Nigeria: a qualitative study', *Reproductive health*, 9, pp. 1-8.

Nwankwo, K.C., Aniebue, U.U., Aguwa, E.N., Anarado, A.N. and Agunwah, E. (2011) 'Knowledge attitudes and practices of cervical cancer screening among urban and rural Nigerian women: a call for education and mass screening', *European journal of cancer care*, 20(3), pp. 362-367.

Nwobodo, H. and Ba-Break, M. (2015) 'Analysis of the determinants of low cervical cancer screening uptake among Nigerian women', *Journal of public health in Africa*, 6(2).

Oche, M.O., Kaoje, A.U., Gana, G. and Ango, J.T. (2013) 'Cancer of the cervix and cervical screening: Current knowledge, attitude and practices of female health workers in Sokoto, Nigeria', *Int J Med Med Sci*, 5(4), pp. 184-190.

Omotunde, O.I. and Amosu Ademola, M. (2020) 'Knowledge, perception and cervical cancer screening practices among female nurses working in healthcare facilities in Lagos State, Nigeria', *Pharmacology*, 1(1), pp. 74-92.

Waller, J., Bartoszek, M., Marlow, L. and Wardle, J. (2009) 'Barriers to cervical cancer screening attendance in England: a population-based survey', *Journal of medical screening*, 16(4), pp. 199-204.

Were, E., Nyaberi, Z. and Buziba, N. (2011) 'Perceptions of risk and barriers to cervical cancer screening at Moi Teaching and Referral Hospital (MTRH), Eldoret, Kenya', *African health sciences*, 11(1).

White, H. L., Meglioli, A., Chowdhury, R., & Nuccio, O. (2017). Integrating cervical cancer screening and preventive treatment with family planning and HIV-related services. *International Journal of Gynecology & Obstetrics*, 138, 41-46. World Health Organisation (2014) *Comprehensive Cervical Cancer Control A guide to essential practice* Second edition, Switzerland:

WHO Press. Xue, P., Ng, M.T.A. and Qiao, Y. (2020) 'The challenges of colposcopy for cervical cancer screening in LMICs and solutions by artificial intelligence', *BMC Medicine*, 18(1), pp. 169. Available at: doi: 10.1186/s12916-020-01613