

## **Uptake of HPV Vaccine, Knowledge of Cervical Cancer and HPV Vaccine among Caregivers in Tana River County, Kenya**

*Laureen Wamaita Kamuya<sup>1\*</sup>, Lily Masinde<sup>1</sup>, Consolata M'mayi<sup>1</sup>*

<sup>1</sup> Kenya Methodist University, P.O. Box, 267-60200, Meru, Kenya

\*Corresponding Author's E-mail: laureenkamuya@gmail.com

### **Abstract**

The global target for eliminating cervical cancer by 2030 entails achieving 90% HPV vaccination coverage among girls under 15. Despite the established safety, effectiveness, and cost efficiency of the HPV vaccine, uptake remains suboptimal in many regions, including Tana River County, Kenya, contributing to the persistent cervical cancer risk. This study assessed knowledge of cervical cancer, HPV, and HPV vaccine, along with vaccine uptake in Tana River County, using a community-based descriptive cross-sectional survey design targeting 27,392 caregivers of girls aged 9-14 years. A sample size of 378 was determined using the Fisher et al. (1998) formula, and stratified random sampling technique employed across the three sub-counties. A pre-test study was conducted in Tana River County involving 38 community health volunteers with daughters aged 9-14 years. A structured questionnaire was used for data collection. Descriptive statistics were used to analyze data and results presented using tables. The results recorded HPV uptake of 56.9%. Significant knowledge gaps were revealed with many respondents mistakenly viewing eating khat (61.6%), poor hygiene (73.4%), chronic UTIs (85.6%), and having an IUD (60.8%) as risk factors for cervical cancer. Only 47.9% knew smoking is a risk factor and 31.1% knew HPV affects both men and women. Only 36.4% correctly identified cervical cancer symptoms, 44.0% knew it is curable and 47.9% were unaware that the HPV vaccine is most effective before sexual debut. The study concluded knowledge gaps persist on risk factors, symptoms, curability of cervical cancer, and the effectiveness of vaccination before sexual debut. It recommends that the Tana River County Department of Health strengthen public health messaging to correct misconceptions about non-risk factors, emphasize the symptoms and curability of cervical cancer, and highlight the benefits of vaccinating girls before they become sexually active.

**Keywords:** *Knowledge, Cervical Cancer, HPV, HPV Vaccine, caregivers, Tana River County, Kenya*

*IJPP 12(6); 87-96*

## 1.0 Introduction

Cervical cancer is a widespread malignancy that impacts women globally, with a notable burden in low and middle-income countries (LMICs). LMICs are responsible for more than 80% of newly diagnosed cervical cancer cases, and approximately 90% of all cervical cancer-related deaths (Sung et al., 2021). The highest burden of cervical cancer mortality is concentrated in developing countries, where there is insufficient access to adequate screening, vaccination, and optimal treatment options (Nabirye et al., 2020). According to Walker et al. (2021), nearly 90% of women who succumb to cervical cancer reside in low-income and middle-income countries, with the highest global cancer mortality rates being reported in countries within East Africa. The mortality incidences vary significantly across regions. Eastern Africa exhibited the highest age-standardized incidence rates, with 40 cases per 100,000 women. In Kenya, there is a significant risk of cervical cancer among women aged 15 years and older, with approximately 16.2 million vulnerable. Annually, approximately 5,236 women are diagnosed with cervical cancer, resulting in 3,211 tragic fatalities. In Kenya, cervical cancer is the second most prevalent cancer among women, and the second most commonly diagnosed cancer in women aged 15 years to 44 years, after breast cancer.

HPV vaccination is crucial for preventing cervical cancer. Despite its proven safety, effectiveness, and cost-efficiency, there is a significant gap in vaccine implementation in low- and middle-income countries. As of June 2020, national HPV vaccination initiatives had been initiated in 31% of African nations, in contrast to the corresponding figures of 85% in the America and 77% in Europe (Bruni et al., 2021). In specific countries like the United Kingdom, school-centered programs designed for the

distribution of the HPV vaccine are currently operational (Bruni et al., 2021). Population-based non-school programs have been started in other countries such as the Netherlands. The uptake of the vaccines has varied widely between countries, with safety and perceived susceptibility to HPV vaccine correlating with HPV vaccine uptake.

Access to HPV vaccines has existed within Kenya's private sector since 2006. In Kitui County, the Ministry of Health (MOH) conducted an inaugural vaccination initiative between 2013 and 2015, and 22,500 females aged 9 years to 12 receiving two doses of HPV vaccination (Karanja-chege, 2022). This translates to 96% uptake rate, signifying the nation's readiness to integrate the HPV vaccine into the regular vaccination routine. Rollout began by prioritizing 10-year-old females and expanding the coverage gradually as more doses become available. Utilization of the first dosage of the HPV vaccine witnessed a notable improvement in uptake, rising from 25% in 2019 to 33% by 2020.

### *Statement of the Problem*

It is estimated that there are around 9.1% of women harboring cervical HPV-16/18 infection at any given time in Kenya. HPV 18 and HPV 16 account for 63.1% of metastatic cervical cancers in the nation (Sung et al., 2021). However, despite Kenya integrating the HPV vaccine into Kenya's expanded immunization program in 2019, the adoption of the vaccine has persisted at a notably low rate of intake in many parts of the country, with national average estimates of 33% for the primary dose and 16 % for the last dose as of 2020, which is far below the national target of 70% (Ministry of Health-Kenya [MOH], 2020). Tana River County continues to record poor uptake rates. Challenges exist in the delivery of the vaccine to 9 -14-year-olds who are the recommended population for HPV vaccinations by the WHO. Routine

immunizations in national campaigns focus on children below 5 years, and delivering HPV vaccines to these new age groups necessitates an alternative approach to health interventions. Limited research has been carried out in Kenya, specifically in Tana River County, on the HPV vaccine. Studies show that addressing factors that influence the utilization of the HPV vaccine is a key strategy for improving HPV vaccine uptake. It is imperative to therefore conduct a study to assess the Knowledge of cervical cancer and HPV vaccine as a factor that influence its uptake, so as to achieve the stated vaccination goal of 90% by 2030, and subsequently eliminate cervical cancer.

### ***Purpose of the Study***

To estimate the uptake of the HPV vaccine and assess knowledge on Cervical Cancer, HPV, and HPV vaccine in Tana River County, Kenya.

### ***Research Questions***

What is the coverage of the HPV vaccine, and what is the level of knowledge regarding cervical cancer, HPV, and the HPV vaccine in Tana River County, Kenya?

### ***Theoretical Review***

The study was guided by the Health Belief Model (HBM) According to HBM, for someone to take action (like vaccinating their daughter), they need to acknowledge the disease as moderately serious, recognize their susceptibility to the disease, understand the benefits of the vaccine, and perceive minimal barriers. The model suggests that action is more likely when the perceived benefits outweigh the disadvantages. Additionally, HBM includes self-efficacy and cues to action as factors influencing behavior (Abraham & Sheeran, 2007; Shapiro et al., 2018).

*“The study found out that respondents incorrectly identified eating khat, poor hygiene, chronic UTIs and having an IUD as risk factors for cervical cancer”*

### ***Empirical Review***

Literature suggests that caregiver knowledge plays a crucial role in the uptake of the HPV vaccine. In many Asian countries, there is a significant gap in knowledge regarding cervical cancer and the HPV vaccine. A study in Malaysia found that less than half of the women surveyed were aware of the HPV vaccine, highlighting the need for improved educational efforts (Wong et al., 2022). A study in the USA revealed that many parents were unaware of the vaccine's ability to prevent multiple types of cancer, indicating a need for continued education (Walker et al., 2021). In sub-Saharan Africa, including Kenya, knowledge about cervical cancer and the HPV vaccine is critically low. A significant proportion of women in Kenya had never heard of HPV or the vaccine, demonstrating the critical need for educational interventions (Nyambe et al., 2019).

Studies by Ogembo et al. (2015) and Soliman et al. (2021) have indicated that inadequate knowledge about HPV, its transmission, and the benefits of vaccination can lead to vaccine hesitancy or refusal. In a comparative study by Mburu et al. (2019), cohorts exhibited an awareness of certain risk factors associated with the acquisition of Human Papillomavirus (HPV), notably early initiation of sexual activity, engagement in multiple sexual partnerships, association with

partners having multiple sexual relationships, and tobacco use. Bitariho et al. (2023) conducted a study in Kenya and found that caregivers generally had low knowledge about HPV and its associated risks. Misconceptions and myths were prevalent, leading to concerns about vaccine safety and efficacy.

**2.0 Materials and Methods**

The study adopted a community-based descriptive cross-sectional survey design targeting 27,392 caregivers of girls aged 9 to 14 years living in Tana River County. The study adopted the Fisher et al. (1998) sampling formula to derive a sample size of 378 respondents. Stratified random sampling was used to select respondents from the three sub-counties; 134 respondents from Tana Delta, 135 respondents from Tana North, and 109 respondents from the Tana River regions. Permission for the study was obtained from Kenya Methodist University's Scientific Ethical Review Committee, the National Commission for Science, Technology and Innovation, as well as the Tana River County Health Ethical Committee. Local permission came from the area chief and village heads. Community health promoters consented to assist with data collection, and informed consent was obtained from participants, with consent forms and questionnaires provided in Swahili.

Respondents were free to exit at any time. No personal details were collected for confidentiality, and data was securely stored. Research assistants were trained on ethical guidelines and questionnaire administration.

A structured questionnaire was used as the primary data collection tool. Respondents were required to produce their HPV vaccination card to assess uptake of the HPV vaccine. Data on the knowledge of cervical cancer and HPV vaccine was collected. A pilot study was conducted in Tana River County on 38 community health volunteers who were parents with daughters between the ages of 9 years and 14 years, to check the validity. Cronbach alpha coefficient was used to measure reliability. Data collected was cleaned and keyed into Statistical Package for Social Sciences (SPSS) version 27. It was analyzed using frequencies and percentages, and the results tabulated.

**3.0 Results and Discussions**

***Response Rate***

378 questionnaires were administered to guardians of daughters aged 9 years to 14 years. 357 questionnaires were returned; hence, the response rate was 94.4%. This was considered satisfactory according to Mugenda and Mugenda (2003), who stated that a response rate of 50% is deemed adequate for analysis and reporting, 60% is considered acceptable, and 70% or higher is regarded as excellent.

***Reliability Results***

This study conducted a pre-test on 38 community health volunteers from Tana River County who were parents of daughters between the ages of 9 years and 14 years, to check the validity. The responses are shown in Table 1.

**Table 1**

*Reliability Results*

<b>Research Instruments</b>	<b>Pilot Population</b>	<b>Cronbach Alpha</b>
Questionnaires	38	0.793

According to Table 1, the Cronbach alpha was 0.793, revealing that the questionnaires were reliable since the coefficient was more than 0.07.

***Results of the uptake of the HPV vaccine***

The study sought to estimate the uptake of the HPV vaccine. Uptake was measured as having had at least one HPV vaccine. Vaccination cards provided evidence of HPV vaccine uptake. Table 2 presents the distribution of the HPV vaccine uptake per sub-county.

**Table 2**

*Uptake of the HPV vaccine as per sub-county*

<b>Sub-county</b>	<b>Not vaccinated (%)</b>	<b>One vaccine</b>	<b>Two vaccines</b>
Tana Delta	52(33.8%)	25(35.2%)	33(25.0%)
Tana North	56 (36.3%)	20(28.2%)	34(25.8%)
Tana River	46(29.9%)	26(36.6%)	65(49.2%)
	<b>154(100%)</b>	<b>71(100%)</b>	<b>132(100%)</b>

Notes: n=357

Table 2 shows that 203 respondents, representing 56.9%, had received at least one vaccine. Among the 203 respondents, Tana River Sub-County had the highest number of girls aged 9–14 years who had received at least one vaccine, 91 respondents (44.8%), followed by Tana Delta with 58 respondents (28.6%), and lastly, Tana North with 54 respondents (26.6%). Out of the 357 respondents, 154 had not received any vaccine, indicating that nearly half of the respondents were unvaccinated. This implies that there is still a significant gap in vaccine coverage, which needs to be addressed, particularly in Tana River County. The 56.9 % uptake rate surpasses that of Tanzania

(49.0%) (Mphuru et al., 2022), Uganda (22.0%) (Isabirye et al., 2020), and an urban Ethiopian study (Addisu et al., 2023), but falls below findings from the North Shoa Zone in Ethiopia (66.5%) (Kassa et al., 2021) and Rwanda (93.2%) (Binagwaho et al., 2012). Variations in coverage rates may be attributed to differing socio-cultural attitudes toward vaccination.

***Results of Knowledge on Cervical Cancer and HPV***

The study also sought to assess knowledge of cervical cancer and HPV on the caregivers of girls aged 9 -14 years in Tana River County. The responses are indicated in Table 3.



**Table 3**

*Knowledge of cervical cancer and HPV*

		<b>TRUE(%)</b>	<b>False(%)</b>	<b>Not sure(%)</b>
General knowledge	cervical cancer is a major cause of cancer among women	317(88.8)	11(3.1)	29(8.1)
Cause and transmission	HPV causes cervical cancer	202(56.6)	89 (25.0)	66 (18.4)
	HPV is transmitted through sexual intercourse	240(67.3)	54(15.0)	63(17.7)
Risk Factors	HPV affects women only	154(43.1)	114(31.9)	89(25.0)
	Smoking increases the risk of cervical cancer	171(47.9)	117(32.8)	69(19.3)
	Poor genital hygiene increases the risk of cervical cancer	200(56.0)	91(25.5)	66(18.5)
	Chronic UTIs increase the risk of cervical cancer	237(66.4)	54(15.2)	66(18.4)
	Eating Khat increases the risk of cervical cancer	103(28.8)	137(38.4)	117(32.8)
	Having an IUD increases the risk of cervical cancer	117(32.8)	134(37.6)	106((29.6)
	Start of sexual activity early increases the risk of HPV infection	237(66.4)	54(15.1)	66(18.5)
	Having a partner with multiple sexual partners increases the risk of getting HPV infection	231(64.7)	66(18.5)	60(16.8)
	HIV /AIDS increases the risk of HPV infection	199(55.7)	69(19.4)	89(24.9)
	Cervical cancer has no visible signs and symptoms	134(37.5)	129(36.1)	94(26.4))
	cervical cancer has no cure and treatment	123(34.4)	157(44.0)	77(21.6)
	cervical cancer screening through pap smear and VIA is a preventive measure for cervical cancer	257(72.0)	69(19.2)	31(8.8)
	HPV vaccine prevents against cervical cancer	271(76.0)	23(6.4)	63(17.6)

Findings in Table 3 indicate that 88.8% (317) of participants recognized cervical cancer as a leading cause of mortality among women in

Kenya. Awareness of HPV as a causative agent of cervical cancer was reported by 56.6%, slightly below the 60% observed in an

urban study by Omondi (2020). Knowledge of HPV transmission via sexual contact was significantly higher at 67.2% (240), compared to 28.1% reported by Samrawit et al. (2023). Regarding risk factors, 43.1% (111) erroneously believed HPV only affects women. Awareness of early sexual debut as a risk factor was 66.4%, markedly higher than the 25.2% noted by Samrawit et al. (2023). Over, 56.0%, (200) identified HIV/AIDS as a risk factor, and 47.9% (171) knew that smoking increases HPV risk. A misconception was prevalent about khat consumption, with 61.6% (220) incorrectly considering it a risk factor. Similarly, 60.8% mistakenly perceived IUDs as a cervical cancer risk, which is notably higher than the 20% reported in a Tanzanian study by Henke et al. (2020). Awareness of multiple sexual partners as a risk factor was 65.6% (234), while 73.4% (262) and 85.6% (306) believed poor hygiene and chronic UTIs, respectively, are risk factors. In terms of symptom

knowledge, 37.5% (134) correctly identified cervical cancer as potentially asymptomatic; while 50.4% (180) were aware of the prolonged development period (10-15 years) of cervical cancer. Approximately 44.0% (157) knew that cervical cancer is curable. The majority of respondents 72.0%, (257) recognized Visual Inspection with Acetic acid (VIA) and Pap smears as screening methods, and 76.0% (271) were aware of the preventive role of the HPV vaccine. These findings highlight significant knowledge gaps in understanding the true risk factors and symptoms of cervical cancer, and imply that more comprehensive education and awareness campaigns are needed to dispel misconceptions and promote preventive measures.

***HPV Vaccine knowledge.***

The study further inquired about HPV vaccine knowledge. Table 4 shows the results.

**Table 4**

*Knowledge on the HPV vaccine*

<b>Statements</b>	<b>Yes</b>	<b>No</b>	<b>Not sure</b>
HPV vaccine can be given to girls below 5 years	34 (9.5%)	257 (72.0%)	66(18.5%)
HPV vaccine is effective if given before the first sexual intercourse	186(52.1%)	69(19.3%)	102 (28.6%)
HPV vaccine can be given to people who have already engaged in sex	140(39.2%)	140(39.2%)	77 (21.6%)

Table 4 reveals that 72.0% (257) of respondents correctly identified that the HPV vaccine is not administered to girls below the age of 5. Additionally, 52.1% (186) were aware that the vaccine should be given to

those not yet sexually active which is significantly higher than the 25.6% reported in Uganda by Bitariho et al. (2023), and the 21.7% in Ghana who knew that the HPV vaccine remains effective even if

administered to individuals who have already engaged in sexual activity, as reported by Drokow et al. (2020). While results indicated that awareness of the HPV vaccine was slightly better, there remains a need for ongoing education to close the remaining knowledge gaps and ensure widespread understanding of the vaccine's importance, especially regarding its administration before sexual activity.

#### **4.0 Conclusion**

The study reported an HPV vaccine uptake of 56.9%. However, it also highlighted significant knowledge gaps among respondents. Many incorrectly identified eating khat (61.6%), poor hygiene (73.4%), chronic UTIs (85.6%), and having an IUD (60.8%) as risk factors for cervical cancer. Awareness of smoking as a risk factor was low, with only 47.9% of respondents recognizing it. Further, only 31.1% understood that HPV affects both men and women, while 36.4% could correctly identify the symptoms of cervical cancer, and 44.0%

#### **References**

Abraham, C., & Sheeran, P. (2007). The health belief model. In S. Ayers, A. Baum, C. McManus, S. Newman, K. Wallston, J. Weinman, & R. West (Eds.), *Cambridge Handbook of Psychology, Health and Medicine* (2<sup>nd</sup> ed., pp. 97–102). Cambridge University Press.  
<https://doi.org/10.1017/CBO9780511543579.022>

Addisu, D., Gebeyehu, N. A., & Belachew, Y. Y. (2023). Knowledge, attitude, and uptake of human papillomavirus vaccine among adolescent schoolgirls in Ethiopia: A systematic review and meta-analysis. *BMC Women's Health*, 23(1), 1-12. <https://doi.org/10.1186/s12905-023-02412-1>

were aware of its curability. Notably, 47.9% of respondents were unaware that the HPV vaccine is most effective when administered before sexual debut. These findings underscore the need for targeted educational interventions to address misconceptions and improve knowledge surrounding cervical cancer and HPV vaccination.

#### **5.0 Recommendations**

The study recommends that the Tana River County Department of Health Services address misconceptions about non-risk factors for cervical cancer and provide accurate information on its symptoms and curability, to promote early diagnosis and treatment. The importance of vaccinating girls before their sexual debut should also be emphasized to enhance public understanding and acceptance of the HPV vaccine. Further, special focus should be placed on sensitizing caregivers of girls aged 9 to 14 on the importance of uptake of HPV vaccine in the prevention of cervical cancer.

Binagwaho, A., Wagner, C. M., Gatera, M., Karema, C., Nutt, C. T., & Ngabo, F. (2012). Achieving high coverage in Rwanda's national human papillomavirus vaccination programme. *Bulletin of the World Health Organization*, 90(8), 623–628. <https://doi.org/10.2471/BLT.11.097253>

Bitariho, G. K., Tuhebwe, D., Tigaiza, A., Nalugya, A., Ssekamatte, T., & Kiwanuka, S. N. (2023). Knowledge, perceptions, and uptake of human papillomavirus vaccine among adolescent girls in Kampala, Uganda: A mixed-methods school-based study. *BMC Pediatrics*, 23(1), 2-14. <https://doi.org/10.1186/s12887-023-04174-z>



- Bruni, L., Saura-Lázaro, A., Montoliu, A., Brotons, M., Alemany, L., Diallo, M. S., Afsar, O. Z., LaMontagne, D. S., Mosina, L., Contreras, M., Velandia-González, M., Pastore, R., Gacic-Dobo, M., & Bloem, P. (2021). HPV vaccination introduction worldwide and WHO and UNICEF estimates of national HPV immunization coverage 2010–2019. *Preventive Medicine, 144*, 106399. <https://doi.org/10.1016/j.ympmed.2020.106399>
- Drokow, E. K., Zi, L., Han, Q., Effah, C. Y., Agboyibor, C., Sasu, E., Akpabla, G. S., Foli, F., & Sun, K. (2020). Awareness of cervical cancer and attitude toward human papillomavirus and its vaccine among Ghanaians. *Frontiers in Oncology, 10*(1651), 7-14. <https://doi.org/10.3389/fonc.2020.01651>
- Fisher, A. A., Laing, J. E., Stoeckel, J. E. & Townsend, J. W. (1998). *Handbook for Family Planning Operations Research Design*. Population Council
- Henke, A., Kluge, U., Borde, T., Mchome, B., Serventi, F., & Henke, O. (2020). Tanzanian women's knowledge about Cervical Cancer and HPV and their prevalence of positive VIA cervical screening results. Data from a Prevention and Awareness Campaign in Northern Tanzania, 2017 – 2019. *Global Health Action, 14*(1), 212-219. <https://doi.org/10.1080/16549716.2020.1852780>
- Isabirye, A., Mbonye, M., Asimwe, J. B., & Kwagala, B. (2020). Factors associated with HPV vaccination uptake in Uganda: A multi-level analysis. *BMC Women's Health, 20*(1), 143-146. <https://doi.org/10.1186/s12905-020-01004-4>
- Karanja-Chege, C. M. (2022). HPV vaccination in Kenya: The challenges faced and strategies to increase uptake. *Frontiers in Public Health, 10*(802947), 2-5. <https://doi.org/10.3389/fpubh.2022.802947>
- Kassa, H. N., Bilchut, A. H., Mekuria, A. D., & Lewetie, E. M. (2021). Practice and Associated Factors of Human Papillomavirus Vaccination Among Primary School Students in Minjar-Shenkora District, North Shoa Zone, Amhara Regional State, Ethiopia, 2020. *Cancer Management and Research, 13*, 6999–7008. <https://doi.org/10.2147/CMAR.S324078>
- Mburu, A., Itsura, P., Mabeya, H., Kaaria, A., & Brown, D. R. (2019). Knowledge of cervical cancer and acceptability of prevention strategies among human papillomavirus-vaccinated and human papillomavirus-unvaccinated adolescent women in Eldoret, Kenya. *Biores Open Access, 8*(1), 139–145. <https://doi.org/10.1089/biores.2019.0007>
- Mphuru, A., Li, A. J., Kyesi, F., Mwengee, W., Mazige, F., Nshunju, R., Shayo, B., Giattas, M. R., Loharikar, A., & Lyimo, D. (2022). National introduction of human papillomavirus (HPV) vaccine in Tanzania: Programmatic decision-making and implementation. *Vaccine, 40*(1), 2-9. <https://doi.org/10.1016/j.vaccine.2021.04.025>
- Ministry of Health-Kenya (2020). *Campaign to expand routine immunization coverage*. <https://www.health.go.ke/campaign-to-expand-routine-immunization-coverage>
- Mugenda, O.M., & Mugenda, A.G. (2003). *Research methods, quantitative and qualitative approaches*. ACT Press

- Nabirye, J., Okwi, L. A., Nuwematsiko, R., Kiwanuka, G., Muneza, F., Kanya, C., & Babirye, J. N. (2020a). Erratum: Correction to: Health system factors influencing uptake of human papillomavirus (HPV) vaccine among adolescent girls 9-15 years in Mbale District, Uganda. *BMC Public Health*, 20(1), 491-501. <https://doi.org/10.1186/s12889-020-8348-y>
- Nyambe, A., Kampen, J.K., Baboo, S.K., & Hal, G.V. (2019). Knowledge, attitudes, and practices of cervical cancer prevention among Zambian women and men. *BMC Public Health*, 19(508), 1-15. <https://doi.org/10.1186/s12889-019-6874-2>
- Ogembo, R. K., Gona, P. N., Seymour, A. J., Park, H. S., Bain, P. A., Maranda, L., & Ogembo, J. G. (2015). Prevalence of human papillomavirus genotypes among African women with normal cervical cytology and neoplasia: A systematic review and meta-analysis. *PLoS One*, 10(4), 1-10. <https://doi.org/10.1371/journal.pone.0122488>
- Omondi, K. C. (2020). *Determinants of HPV vaccine hesitancy among parents attending Kenyatta National Hospital outpatient clinics* [Doctoral dissertation, University of Nairobi]. <http://erepository.uonbi.ac.ke/handle/11295/154240>
- Shapiro, G. K., Tatar, O., Amsel, R., Prue, G., & Zimet, G. D. (2018). Using an integrated conceptual framework to investigate parents' HPV vaccine decision for their daughters and sons. *Preventive Medicine*, 116(5), 203–210. <https://doi.org/10.1016/j.ypmed.2018.09.017>
- Samrawit, S. A., Hawulte, B., Dessie, Y., & Tura, A. K. (2023). The cost of maternal complications and its associated factors among mothers attending public hospitals in harari region and dire dawa city administration, Eastern Ethiopia: An institution-based cross-sectional study. *Clinico Economics and Outcomes Research*, 15(2), 645-658. <https://doi.org/10.2147/CEOR.S416562>
- Soliman, M., Oredein, O., & Dass, C. R. (2021). Update on Safety and Efficacy of HPV Vaccines: Focus on Gardasil. *International Journal of Molecular and Cellular Medicine*, 10(2), 101–112. <https://doi.org/10.22088/IJMCM.BUMS.10.2.101>
- Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*, 71(3), 209–249. <https://doi.org/10.3322/caac.21660>
- Walker, Z. J., Xue, S., Jones, M. P., & Ravindran, A. V. (2021). Depression, anxiety, and other mental disorders in patients with cancer in low- and lower-middle-income countries: A systematic review and meta-analysis. *JCO Global Oncology*, 3(2), 1233-1250. <https://doi.org/10.1200/GO.21.00056>
- Wong, L. P., Alias, H., Seheli, F. N., Zimet, G. D., Hu, Z., & Lin, Y. (2022). Human Papillomavirus (HPV) vaccination intent and its associated factors: a study of ethnically diverse married women aged 27 to 45 in Malaysia, a Southeast Asian country. *Human Vaccines & Immunotherapeutics*, 18(5), 1-10. <https://doi.org/10.1080/21645515.2022.2076525>