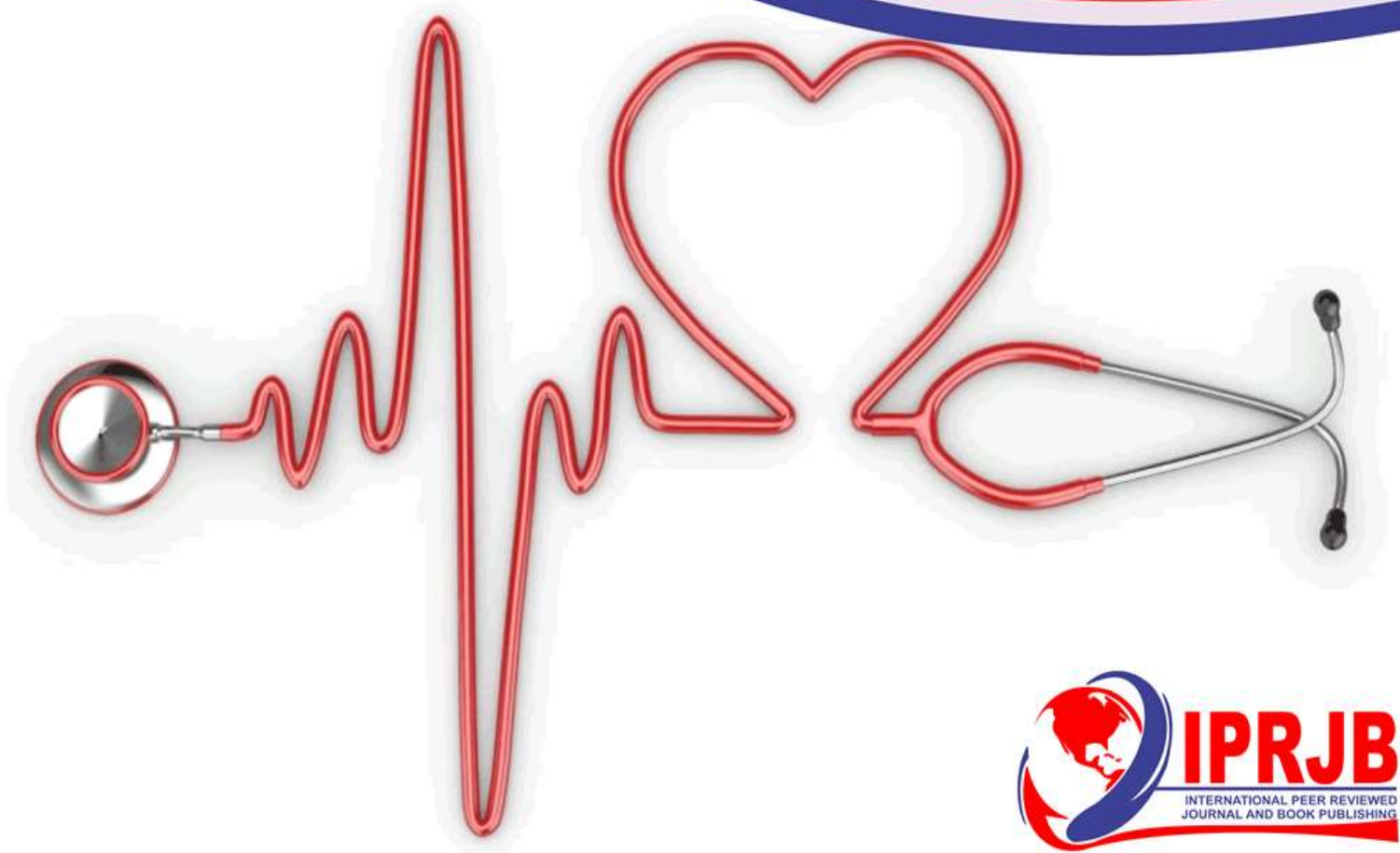


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Abstract

Purpose: This study sought to establish characterization of immunization messaging for HPV vaccine uptake for cervical cancer prevention among caregivers of young adolescent girls aged 10 -14 years in Kajiado County, Kenya.

Methodology: The study applied a mixed method research design. It combined qualitative and quantitative study approaches. This study utilized Health Belief Model (HBM) and Protection Motivation Theory (PMT). The population of the study included all the parents/caregivers of the young adolescent girls 10 – 14 years in Kajiado County who passed the inclusion and exclusion criteria. The study adopted multi-stage sampling to select the respondents and the location of study. Purposive sampling was applied to choose Kajiado County. Four out of all the 5 sub counties/constituencies namely; Kajiado Central, Kajiado South, Kajiado East and Kajiado West were included in the study.

Findings: The study found that message characterization strongly influenced HPV vaccine uptake by framing cervical cancer prevention as empowering and manageable, encouraging caregivers to take action. Messages that were clear, culturally appropriate, and delivered by trusted health workers, which enhanced understanding and acceptance. Within the conceptual framework, this reflects the role of HPV immunization messages and communication strategies (independent variables) in directly influencing HPV vaccine uptake (dependent variable), with positive framing increasing uptake and negative perceptions reducing it, while government policy moderates this relationship.

Unique Contribution to Theory, Practice and Policy: The study recommended that the characterization of immunization messaging for cervical cancer prevention should be culturally sensitive and aligned with the beliefs and values of the Kajiado County community. It emphasized that messages should be framed in an empowering, clear, and relatable manner to enhance understanding, acceptance, and positive perception among caregivers, thereby improving HPV vaccine uptake.

Keywords: *Adolescent Health, Immunization Messaging, HPV Vaccine Uptake, Cervical Cancer*

JEL Codes: *I12, I18, I15, J13*

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INTRODUCTION

Cervical cancer remains a major global public health challenge, ranking as the fourth most common cancer among women and a leading cause of cancer-related deaths worldwide. In 2020, an estimated 604,000 new cases and 342,000 deaths were reported globally, with persistent infection by high-risk Human Papillomavirus (HPV) types, particularly HPV16 and HPV18, accounting for nearly all cases (Okunade, 2020). Despite the availability of preventive measures such as HPV vaccination and screening, disparities in access and uptake remain stark between high-income and low- and middle-income countries (LMICs). The World Health Organization (WHO, 2020) launched the Cervical Cancer Elimination Initiative, setting ambitious 90–70–90 targets by 2030 to accelerate elimination, underscoring the critical role of HPV vaccination in reducing incidence and mortality.

In Africa, the burden of cervical cancer is disproportionately high, with sub-Saharan Africa accounting for over 90% of global cervical cancer deaths (Lancet, 2023). Age-standardized incidence rates in Eastern Africa exceed 30 cases per 100,000 women-years, with mortality rates often surpassing 20 per 100,000 (Deependra et al., 2020). While weak health systems and limited screening programs contribute to this burden, evidence shows that even where health infrastructure is relatively strong, poorly designed or ineffective communication strategies can undermine vaccine delivery and uptake. Misaligned messaging fosters vaccine hesitancy, perpetuates myths such as infertility risks, and weakens trust in immunization programs (Zhang et al., 2021). Thus, structural capacity alone is insufficient; communication quality is a decisive factor in whether preventive interventions succeed.

Kenya reflects these continental challenges, with cervical cancer ranking as the second most common cancer among women and a leading cause of cancer mortality (MOH, 2021; Ginsburg et al., 2017). The Ministry of Health has prioritized HPV vaccination for girls aged 10–14 years, yet uptake remains suboptimal. This is particularly evident in counties such as Kajiado, where socio-cultural dynamics intersect with infrastructural constraints. Kajiado is predominantly inhabited by the Maasai community, whose pastoralist and semi-nomadic lifestyle, gendered decision-making structures, and cultural beliefs about fertility and adolescence shape health-seeking behavior. Caregivers—often mothers and extended family members—play a pivotal role in influencing young adolescent girls’ health decisions, but their perceptions are mediated by traditional norms and mobility patterns that complicate consistent access to vaccination services.

Understanding how HPV vaccine messages are characterized, framed, and delivered to caregivers in this unique socio-cultural context is therefore vital. By focusing on Kajiado County, this study aims to generate localized insights into communication barriers and opportunities, thereby informing more effective messaging strategies that enhance vaccine acceptance and coverage among adolescent girls.

Problem Statement

Globally, HPV vaccination is recognized as a cornerstone in eliminating cervical cancer, with the WHO’s 90–70–90 targets underscoring the importance of effective communication to achieve 90% coverage among girls by age 15 (Zhang, 2020). Despite this, uptake remains unacceptably low in many low- and middle-income countries, particularly in sub-Saharan Africa, where ineffective messaging continues to undermine otherwise available preventive interventions (Asgedom et al., 2024).

In Kenya, the HPV vaccine was first introduced through a pilot program in Kitui County in 2016, followed by a national rollout in October 2019. Yet coverage has remained sub-optimal, with only 33% of eligible girls receiving the first dose in 2020 and 31% completing the two-dose schedule in 2021 (Umutesi, 2023). Kajiado County has performed below the national average, recording only 29% coverage for the first dose against the global and national target of 90% (MOH, 2022).

This shortfall highlights not only structural barriers but also weaknesses in how immunization messages are characterized, framed, and delivered to caregivers, who are the primary decision-makers for adolescent girls. The problem disproportionately affects young adolescent girls aged 10–14 years in Kajiado County, where caregivers' perceptions of immunization messages are shaped by socio-cultural, economic, and educational contexts. Misconceptions about infertility, misinformation, and limited awareness of HPV's link to cervical cancer have undermined the effectiveness of existing communication efforts.

While prior studies have examined health communication in cervical cancer prevention (Agimas et al., 2024; Oketch et al., 2023; Krieghoff et al., 2017; Logaraj, 2021), they have not adequately explored the specific attributes of immunization messaging that fail to resonate with caregivers in Kajiado County. This lack of empirical evidence on message characterization represents a critical gap. This study therefore seeks to fill that gap by investigating how immunization messages are structured, the channels through which they are delivered, and the extent to which they influence caregivers' decisions on HPV vaccine uptake among young adolescent girls in Kajiado County.

General Objective

The general objective of the study was to establish characterization of immunization messaging on HPV vaccine uptake for cervical cancer prevention among caregivers of young adolescent girls aged 10 -14 years in Kajiado County.

Research Question

To achieve the study objective, the following research question guided the study:

What are the characteristics of immunization messages on cervical cancer and HPV vaccination by health care workers among caregivers of young adolescent girls aged 10 - 14 years for prevention of cervical cancer in Kajiado County?

Justification of the Study

Cervical cancer remains a significant public health concern, particularly in low- and middle-income settings such as Kenya, where morbidity and mortality rates remain high despite the availability of effective preventive measures like HPV vaccination. Although national and global efforts have emphasized increasing vaccine coverage, uptake in counties such as Kajiado continues to lag behind the recommended global and national targets. This gap highlights the need to move beyond structural explanations and examine how immunization messages are characterized and how they influence caregivers' perceptions and decisions. Caregivers play a central role in determining whether young adolescent girls receive the HPV vaccine, making them a critical target for communication interventions. This study is justified by the limited empirical attention given to the characterization of immunization messaging within rural and culturally diverse contexts. While previous studies have explored general health communication and vaccine uptake, they have not sufficiently addressed how message framing, clarity, cultural relevance, and delivery channels shape acceptance and action among

caregivers. Understanding these dimensions is essential for designing messages that are not only informative but also persuasive and contextually appropriate. Additionally, the findings of this study are expected to inform policymakers, health practitioners, and communication strategists in developing more effective, culturally sensitive, and targeted immunization messaging strategies that enhance HPV vaccine uptake. By contributing to improved immunization messaging, the study supports broader national and global efforts, including the WHO's cervical cancer elimination targets, ultimately helping to reduce the burden of cervical cancer among girls and women in Kenya.

LITERATURE REVIEW

Theoretical Framework

This study made use of two complementary psychological frameworks: the Health Belief Model (HBM) and Protection Motivation Theory (PMT).

Health Belief Model (HBM)

The health belief model (HBM) was developed in the 1950s by Hochbaum, Rosenstock, and Kegels. It posits that individuals' health behaviors are shaped by their perceptions of susceptibility to a health threat, the severity of its consequences, and the benefits versus barriers to taking preventive action (Rosenstock, 1974; Hochbaum, 1958). In the context of HPV vaccination, these perceptions are particularly relevant for caregivers, who act as the primary decision-makers for young adolescent girls aged 10–14 years. Caregivers' beliefs about cervical cancer risk, vaccine safety, and benefits influence whether they consent to vaccination. Immunization messages disseminated through trusted communication channels such as schools, health facilities, and community health promoters, can shape these perceptions by offering cues to action that prompt vaccine uptake. The relevance of HBM to this study lies in its ability to explain how the characterization of immunization messages influence caregivers' decisions that ultimately determine young adolescent girls' engagement in protective health behaviors.

Protection Motivation Theory (PMT)

Protection Motivation Theory (PMT) was introduced by R.W. Rogers in the 1970s. It further enriches the study theoretical framework by focusing on the cognitive processes that drive protective behavior (Rogers, 1975). The theory distinguishes between threat appraisal (how individuals evaluate the risk of engaging in unhealthy behaviors or failing to act) and coping appraisal (how they assess their ability to respond effectively). In this study, PMT is applied to caregivers as the primary audience of immunization messaging. Threat appraisal explains how caregivers interpret messages about cervical cancer severity and susceptibility, while coping appraisal highlights how messages about HPV vaccine safety, efficacy, and accessibility influence their confidence in authorizing vaccination. For young adolescents girls, the theory explains how exposure to accurate, accessible health information, often mediated through caregivers, can foster adaptive responses and reduce hesitancy, particularly in settings where HPV knowledge is limited.

By integrating both HBM and PMT, the study situates immunization messaging as a strategic intervention capable of influencing vaccine-related decision-making in mediated contexts. Although young adolescent girls are the direct recipients of the HPV vaccine, caregivers' cognitive evaluations remain central because they authorize uptake. Thus, the characterization of immunization messages—how they are structured, delivered, and received, is not only

relevant but essential: it is the mechanism through which immunization messaging strategies translate into vaccination behavior in marginalized communities such as Kajiado County.

Together, the Health Belief Model (HBM) and Protection Motivation Theory (PMT) provide a complementary lens for understanding caregivers' decision-making on HPV vaccination. HBM explains the belief structures that shape behavior, caregivers' perceptions of susceptibility to cervical cancer, the severity of its consequences, and the benefits versus barriers of vaccination. PMT extends this by explaining the motivational processes that translate those beliefs into action. Specifically, threat appraisal in PMT aligns with HBM's constructs of susceptibility and severity, while coping appraisal corresponds to HBM's constructs of perceived benefits and barriers. When combined, the two frameworks show that effective immunization messaging must not only raise awareness of risk (HBM) but also instill confidence in the ability to act (PMT). This integration underscores that message characterization, how information is framed, the channels used, and the cues provided, directly influences whether caregivers move from awareness to protective action in authorizing HPV vaccination for their daughters.

Conceptual Framework

According to Miles and Huberman (1994), conceptual framework is a visual or written product, one that "explains, either graphically or in narrative form, the main things to be studied, the key factors, concepts, or variables and the presumed relationships among them". The figure below shows the relationship between the independent variables and the dependent variable of the study:

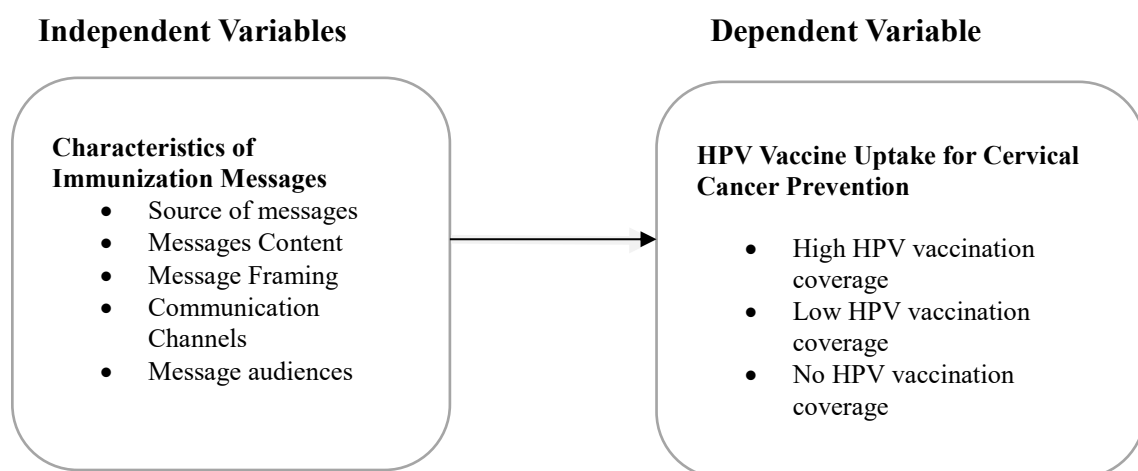


Figure 1: Conceptual Framework

The conceptual framework demonstrates that the characterization of immunization messaging, as the independent variable, directly influences HPV vaccine uptake for cervical cancer prevention, the dependent variable, through five key attributes: source of messages, message content, message framing, communication channels, and message audience. The source of messages plays a critical role in shaping caregivers' trust and acceptance, as information delivered by credible and authoritative figures such as health workers and teachers is more likely to be believed and acted upon, thereby increasing HPV vaccine uptake.

Message content is a critical attribute of immunization communication because it determines the actual information conveyed to caregivers regarding the HPV vaccine. Effective message content should be clear, accurate, consistent, and informative, addressing key issues such as

the purpose of the vaccine, eligibility, dosage schedule, benefits, safety, possible side effects, and where vaccination services can be accessed. When caregivers receive complete and understandable information, they are more likely to develop confidence in the vaccine and make informed decisions regarding uptake. In contrast, incomplete, contradictory, or ambiguous content may create uncertainty, reinforce misconceptions, and contribute to vaccine hesitancy.

Message framing refers to the manner in which health information is presented in order to influence perception and decision-making. In the context of HPV vaccination, messages may be framed in terms of benefits (gain-framed messages), such as protection against cervical cancer and improved future health outcomes, or in terms of risks and consequences (loss- or fear-framed messages), such as vulnerability to HPV-related disease if vaccination is not received. Evidence suggests that gain-framed messages are often more effective in promoting preventive health behaviors because they encourage positive action without inducing excessive fear. However, effective communication should also maintain a balance between communicating the seriousness of cervical cancer and strengthening caregivers' confidence in the vaccine's effectiveness and safety. Poorly framed messages, especially those that overemphasize fear without offering reassurance or efficacy, may increase anxiety, mistrust, and resistance.

Message audience is equally important because the effectiveness of immunization messaging depends on how well it is tailored to the characteristics, beliefs, and informational needs of the intended recipients. In this study, the primary audience comprises caregivers of young adolescent girls aged 10–14 years, whose decisions are influenced by their educational background, cultural beliefs, religious values, prior experiences with vaccination, and community norms. Messages that are audience-specific are more likely to be perceived as relevant, culturally appropriate, and trustworthy. Tailoring communication to the audience helps ensure that messages resonate with caregivers lived realities and address the particular concerns or misconceptions that may shape their vaccination decisions. Failure to consider the audience may result in messages that are poorly received, misunderstood, or rejected.

Communication channels further influence how caregivers' access and engage with immunization messages. The use of multiple and context-appropriate platforms such as health facilities, schools, community forums, religious gatherings, mass media, and social media enhances the reach, accessibility, and reinforcement of vaccine-related information. Repeated exposure through trusted channels increases message credibility and recall, thereby strengthening caregivers' willingness to vaccinate their daughters

Collectively, these dimensions message content, message framing, message audience, and communication channels shape caregivers' perceptions, attitudes, and behavioral responses toward HPV vaccination. When these message attributes are well-designed and effectively aligned, they can function as a powerful behavioral intervention that promotes trust, reduces hesitancy, and improves HPV vaccine uptake. Conversely, weak, inconsistent, or poorly targeted messaging may contribute to low acceptance and suboptimal vaccine uptake among young adolescent girls aged 10–14 years in Kajiado County.

Empirical Review

Oketch et al. (2023) conducted a study on communication strategies to improve HPV immunization uptake among adolescents in sub-Saharan Africa. The systematic review found that interventions facilitating decision-making achieved uptake rates of 100%, those enabling communication achieved 92%, and those informing and educating achieved 90%. The most effective strategies were those that educated communities, facilitated decision-making, and promoted ownership of the vaccination process. However, the study primarily emphasized provider-side strategies and did not sufficiently analyze how caregivers — as the ultimate decision-makers for adolescent girls — receive and interpret these messages. The current study addresses this gap by focusing on caregivers in Kajiado County, where pastoralist mobility and reliance on oral communication may alter how immunization messages are received compared to more urbanized African settings.

Dilley et al. (2020) examined barriers and facilitators of HPV vaccination uptake in Alabama, USA, using surveys and interviews with pediatric care providers, parents, and community stakeholders. Barriers included lack of knowledge, vaccine safety concerns, and the association of HPV vaccination with sexuality, while facilitators included trust in physicians, parental education, reminder systems, and the use of schools and social media for positive messaging. However, the U.S. context differs significantly from rural African settings. Unlike Alabama, Kajiado's pastoralist community relies more on face-to-face communication through schools, health workers, and community elders than on social media platforms, making the transferability of these findings limited. The current study therefore examines how culturally sensitive caregiver-focused messaging influences uptake in Kajiado.

Xu et al. (2021) investigated the effects of message framing and evidence type on HPV vaccination promotion among college students in China, using a quasi-experimental design. Results showed that loss-framed messages generated stronger vaccination intentions than gain-framed ones, and statistical evidence stimulated greater information needs compared to narrative evidence. While framing and evidence type interacted to shape behavior, the study's focus on college students limits its applicability to caregivers of younger adolescents. In Kajiado, where caregivers rather than adolescents authorize vaccination, and where oral narratives from trusted community figures may carry more weight than statistical evidence, the relevance of framing and evidence type must be re-examined in a caregiver-centric context.

Sackey et al. (2022) conducted a systematic review of healthcare professionals' promotional strategies to improve HPV vaccination uptake in adolescents across multiple countries. Effective approaches included consistent vaccine recommendations, initiating vaccination before age eleven, and multi-setting strategies to reach vulnerable adolescents. Open communication and motivational approaches were also effective in addressing misconceptions. However, the review emphasized healthcare professionals as trusted sources but did not sufficiently analyze how message content and framing influence caregiver perceptions. In Kajiado, where trust in health workers is high but mediated by cultural norms and pastoralist mobility, understanding how caregivers interpret and act upon health workers' messages is critical. The current study therefore investigates how healthcare workers' communication styles and message framing affect caregiver acceptance in this rural Kenyan setting.

Despite growing evidence on the role of messaging in HPV vaccination, existing studies reveal important gaps. Meta-analyses confirmed the effectiveness of communication interventions in sub-Saharan Africa but focused on provider-side strategies rather than caregiver reception

(Oketch et al., 2023). U.S.-based studies highlighted barriers and facilitators but relied on communication channels less relevant to pastoralist communities (Dilley et al., 2020). Experimental studies demonstrated the impact of message framing and evidence type but examined student populations rather than caregivers (Xu et al., 2021). Systematic reviews emphasized healthcare professionals’ promotional strategies but overlooked how message characterization resonates with caregivers in rural African contexts (Sackey et al., 2022). Collectively, these gaps underscore the need for context-specific research that examines caregiver reception, message framing, and communication channels in Kajiado County, where socio-cultural dynamics and pastoralist lifestyles critically shape HPV vaccine uptake.

METHODOLOGY

A mixed method research design was used in this study. It combines qualitative and quantitative study approaches. A total of 422 participants were randomly selected from the study constituencies. Sample size was determined using Fisher et al. (1998) formula. Quantitative data was gathered through structured questionnaires administered to a representative sample comprising of 342 caregivers/guardians of young adolescent girls aged 10-14 years. Qualitative data was collected through focus group discussions (FGDs) involving 20 community health promoters, and 20 local leaders. Key informant interviews (KIIs) with stakeholders that consisted of 20 immunization staffs and 20 headteachers were also conducted. The study was conducted in Kajiado County. Kajiado County is a county in the former Rift Valley Province of Kenya. As of 2019, Kajiado County spanned an area of 21,292.7 km², with a recorded population of 1,117,840.

The population of the study included all the sampled caregivers/guardians of the young adolescent girls aged 10-14 years in Kajiado County who passed the inclusion and exclusion criteria. The study adopted multi-stage sampling to select the respondents and the location of study. Firstly, purposive sampling was applied to choose Kajiado County because of the increased cases of cervical cancer and low HPV vaccine uptake (Awich, 2019). Four out of all the 5 constituencies, namely, Kajiado Central, Kajiado South, Kajiado East and Kajiado West were studied. Using simple random sampling, the research assistant selected one sub county hospital from each constituency. Thirdly, using each day’s registration information both outpatient and MCH/FP, the research assistant systematically sampled the respondents. The research assistant selected every fifth registered caregiver as the study respondent until the entire sample size was attained. Permit to conduct the study was acquired from National Commission for Science, Technology & Innovation (NACOSTI). All the relevant stakeholders were informed as well prior to the study. To conduct the quantitative data analysis, the Statistical Package for Social Sciences computer software package (SPSS statistics version 22) was used. The Quantitative data generated was subjected to the descriptive statistics feature in SPSS to generate mean, and standard deviation which was presented using tables, frequencies and percentages, while Qualitative data consisted of words and observations, not numbers.

Inferential statistics was used to present quantitative data, predict and make conclusions. The following linear regression model was adopted.

$$\text{Thus, } Y = \beta_0 + \beta_i X_i + e \dots\dots\dots (i)$$

RESULTS

Response Rate

A total of 342 questionnaires were administered to caregivers/guardians. A total of 287 were responded to which represents an 83.9 percent response rate. This was considered adequate for analytical purposes for the study.

Descriptive Statistics

Characteristics of Immunization Messaging on HPV Vaccine Uptake for Cervical Cancer Prevention among Caregivers/Guardians

The objective was to establish characterization of immunization messaging on HPV vaccine uptake for cervical cancer prevention among caregivers of young adolescent girls aged 10 -14 years in Kajiado County. To achieve this objective, the following research question guided the study:

What are the characteristics of immunization messages on cervical cancer and HPV vaccination by health care worker among caregivers of young adolescent girls aged 10 - 14 years for prevention of cervical cancer in Kajiado County?

The respondents were requested to indicate whether they have heard a message on cervical cancer and HPV vaccine. The findings are shown in figure 1 below:

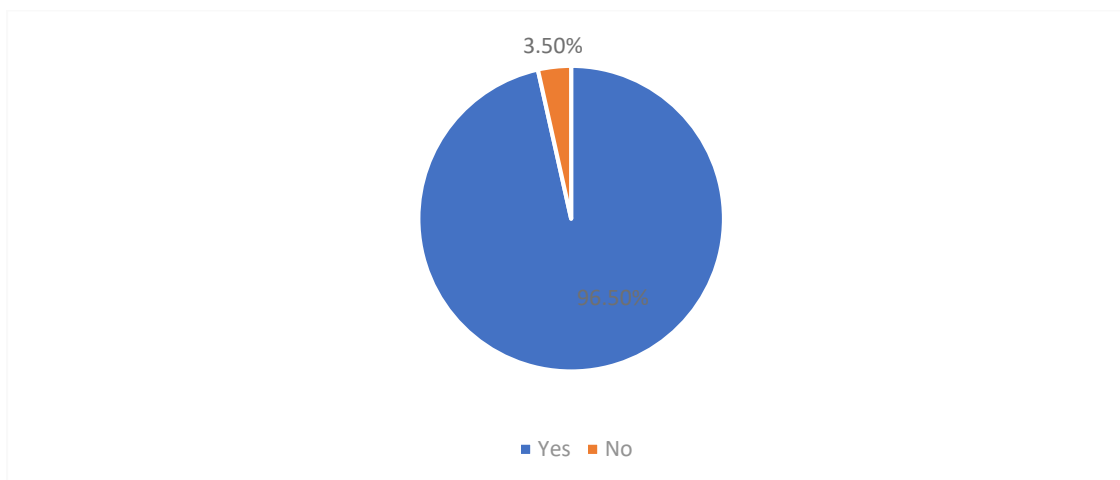


Figure 1: Message on Cervical Cancer and HPV Vaccine

From the findings, majority (96.5%) of the respondents indicated that they have heard a message on cervical cancer and HPV vaccine while 3.5% were of the contrary opinion. This depicts that respondent heard a message on cervical cancer and HPV vaccine. Sackey et al.'s (2022) study agree with the finding that respondents heard a message on cervical cancer and the HPV vaccine, as their review focuses on the role of healthcare professionals in promoting the HPV vaccine. One common strategy for promoting vaccine uptake is messaging that links HPV to cervical cancer, as this is a major health concern and a significant motivator for vaccination. According to the study description, Sackey et al. (2022) conducted a systematic review of literature on healthcare professionals' promotional strategies aimed at improving HPV vaccination uptake in adolescents. This suggests that the study explored various ways healthcare professionals communicate about the HPV vaccine, including possible messaging around cervical cancer prevention, to improve vaccine uptake.

Respondents were requested to select their thought on characteristics of immunization messaging. Their responses are shown in Figure below:

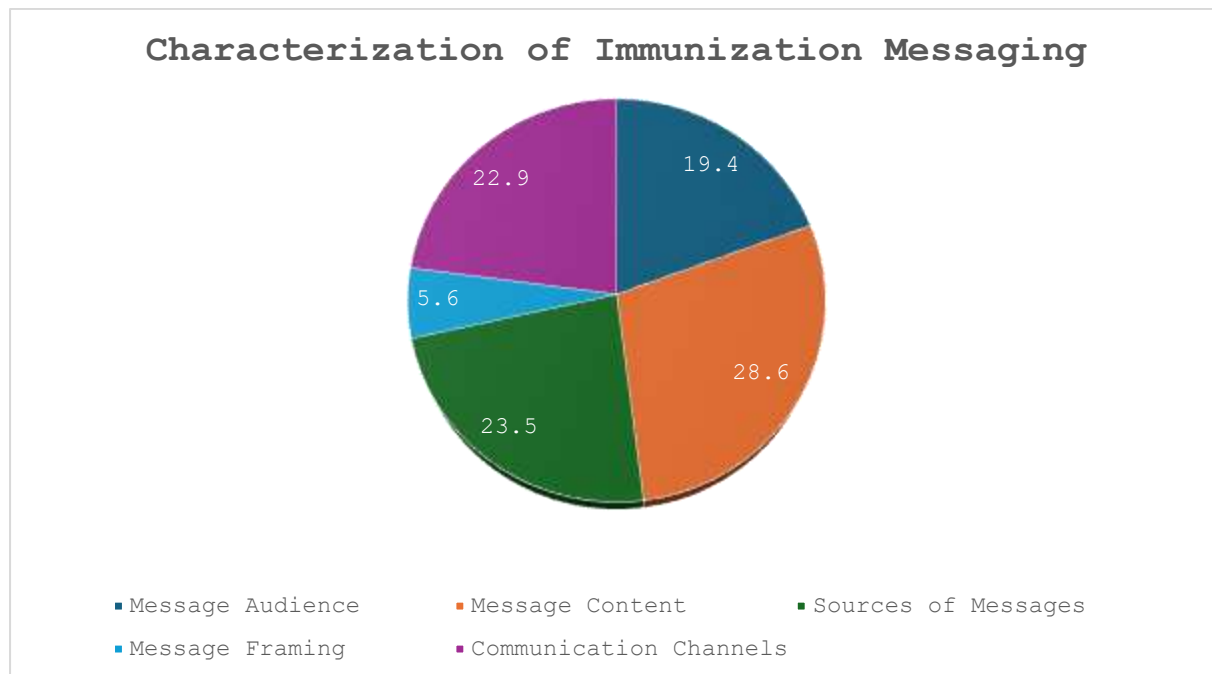


Figure 2: Characteristics of Immunization Messaging on Cervical Cancer and HPV Vaccine

Figure above illustrates the characteristics of immunization messaging on cervical cancer and the HPV vaccine as perceived by caregivers of young adolescent girls. The findings indicate that message content is considered the most influential characteristic, accounting for 28.6% of responses. This suggests that caregivers place the greatest importance on the clarity, relevance, and comprehensiveness of information provided about cervical cancer and the HPV vaccine. This finding is consistent with existing literature which shows that vaccination programs depend heavily on caregivers having sufficient knowledge and understanding of vaccines in order to promote uptake and sustain appropriate coverage rates (Logaraj, 2021). Similarly, effective communication between health workers and parents has been found to influence parental acceptance of vaccination, particularly when caregivers are provided with clear and understandable information that supports informed decision-making regarding their children's health (Chauhan et al., 2020).

The figure further shows that sources of messages and communication channels were also highly valued by respondents, accounting for 23.5% and 22.9% respectively. This implies that caregivers not only value the content of the information itself but also pay close attention to who delivers the message and how it is delivered. Trusted sources such as healthcare providers, teachers, and community leaders may increase confidence in HPV vaccination, while accessible and familiar channels such as health facilities, schools, community meetings, media, and social platforms enhance the reach and reinforcement of vaccine-related information. This finding aligns with studies from other contexts, such as Nigeria, where caregivers preferred vaccine information that was delivered consistently, through credible sources, and beyond limited campaign periods (Oku et al., 2017). Such findings underscore the importance of using reliable messengers and multiple communication platforms to ensure both exposure to and acceptance of HPV vaccine information.

In addition, message audience accounted for 19.4% of responses, indicating that caregivers recognize the importance of tailoring immunization messages to the specific characteristics, beliefs, and informational needs of the target audience. This suggests that messaging strategies should be designed in a way that is culturally appropriate, socially relevant, and understandable to caregivers of adolescent girls. Audience-centered messaging helps ensure that messages resonate with caregivers lived experiences, values, and concerns, thereby increasing the likelihood of positive behavioral responses such as vaccine acceptance.

By contrast, message framing received the least emphasis, accounting for only 5.6% of responses. This suggests that the way in which HPV vaccine information is presented whether emphasizing benefits, risks, or emotional appeals is currently less recognized by caregivers compared to other message characteristics. Nevertheless, health communication literature demonstrates that framing remains an important factor in influencing preventive health behavior. Research has shown that gain-framed messages, which emphasize the benefits of taking preventive action, are often more effective than fear-based or loss-framed messages in promoting vaccine acceptance and other preventive behaviors (Gallagher et al., 2012). Similarly, Cartmell et al. (2019) observed that framing HPV vaccination in ways that emphasize parental responsibility and protection of children can positively influence vaccine-hesitant parents.

Overall, the results presented in the figure suggest that caregivers respond most strongly to well-developed message content, supported by credible sources, appropriate communication channels, and audience-specific targeting. Although message framing appears to receive less attention, it remains an area with untapped potential to strengthen HPV vaccine communication. Therefore, an effective immunization messaging strategy should integrate clear and accurate information, trusted sources, accessible delivery channels, audience-sensitive tailoring, and culturally appropriate framing in order to enhance HPV vaccine uptake among young adolescent girls.

Six (6) questionnaire items on a Likert scale were given to the respondents and were asked to fill their preferences on a continuum of strongly disagree (SD), disagree (D), neutral (N), agree (A) and strongly agree (SA) concerning characteristics of immunization messaging. The respondents were requested to indicate the extent of agreement on the various statements on characteristics of immunization messaging on HPV vaccine uptake for Cervical Cancer Prevention.

The findings are presented in Table 1 below:

Table 1: Extent of Agreement on Characteristics of Immunization Messaging

Statement	N	Mean	Std. Dev
Messages provide sufficient information on the severity of cervical cancer and the importance of HPV vaccination	287	3.394	1.094
Messages communicate that cervical cancer poses a threat to all sexually active women and can be prevented through HPV vaccination	287	3.923	0.72
Information presented motivates parents to take their young adolescent girls for HPV vaccination	287	4.038	0.74
Health workers are trusted sources of information on cervical cancer prevention and HPV vaccination	287	4.059	0.806
Information from government health institutions increases confidence in HPV vaccination	287	4.209	0.646
Messages from community leaders, teachers, and religious leaders influence caregivers' decisions on HPV vaccination	287	3.876	0.854
HPV vaccination messages are specifically tailored to parents and guardians of young adolescent girls	287	3.812	0.883
Messages address the concerns and information needs of caregivers regarding HPV vaccination	287	3.967	0.731
Messages on cervical cancer prevention effectively targets decision-makers responsible for adolescent girls' health	287	4.114	0.689
Health communication through hospitals and health facilities improves awareness of HPV vaccination	287	4.182	0.663
Radio, television, and social media are effective channels for communicating HPV vaccination information	287	3.741	0.927
Community outreach and school-based sensitization effectively promote HPV vaccination uptake	287	4.087	0.795
Messages framed around the benefits of HPV vaccination encourage caregivers to vaccinate their daughters	287	4.021	0.748
Fear-based messages about the dangers of cervical cancer increase the perceived importance of HPV vaccination	287	3.688	0.991
Positively framed messages that emphasize protection, hope, and prevention motivate HPV vaccine uptake	287	4.173	0.671

As seen in the figure above, respondents indicated that the most strongly rated communication message attribute was that information from government health institutions increases confidence in HPV vaccination (mean = 4.209), followed by health communication through hospitals and health facilities improving awareness of HPV vaccination (mean = 4.182), and positively framed messages that emphasize protection, hope, and prevention motivating HPV vaccine uptake (mean = 4.173). The findings further showed that respondents agreed that communication on cervical cancer prevention effectively targets decision-makers responsible for adolescent girls' health (mean = 4.114), community outreach and school-based sensitization effectively promote HPV vaccination uptake (mean = 4.087), and that health workers are trusted sources of information on cervical cancer prevention and HPV vaccination (mean = 4.059).

The respondents also agreed that information presented motivates parents to take their young adolescent girls for HPV vaccination (mean = 4.038), messages framed around the benefits of HPV vaccination encourage caregivers to vaccinate their daughters (mean = 4.021), and that messages address the concerns and information needs of caregivers regarding HPV vaccination (mean = 3.967). In addition, they agreed that messages communicate that cervical cancer poses a threat to all sexually active women and can be prevented through HPV vaccination (mean = 3.923), while messages from community leaders, teachers, and religious leaders influence caregivers' decisions on HPV vaccination (mean = 3.876). Similarly, respondents moderately agreed that HPV vaccination messages are specifically tailored to parents and guardians of young adolescent girls (mean = 3.812), and that radio, television, and social media are effective channels for communicating HPV vaccination information (mean = 3.741). Comparatively, lower mean scores were recorded for fear-based messages about the dangers of cervical cancer increasing the perceived importance of HPV vaccination (mean = 3.688) and messages providing sufficient information on the severity of cervical cancer and the importance of HPV vaccination (mean = 3.394).

These findings suggest that communication message attributes play a significant role in influencing HPV vaccination uptake among caregivers and parents of young adolescent girls. In particular, the findings show that credible message sources, appropriate communication channels, and positive framing of health messages are especially important in shaping caregivers' understanding, confidence, and willingness to vaccinate their daughters. When caregivers receive information from trusted institutions such as government health agencies, hospitals, and health workers, they are more likely to perceive the messages as reliable and actionable. This implies that the effectiveness of communication on HPV vaccination depends not only on the content of the message itself, but also on who delivers the message, how it is framed, and through which channel it is communicated.

The findings further indicate that message content remains central in creating awareness and improving caregivers' knowledge of cervical cancer and HPV vaccination. Clear and informative messages help caregivers understand the seriousness of cervical cancer, the preventive role of the HPV vaccine, and the importance of timely vaccine uptake. Such messages can also reduce uncertainty, address misconceptions, and strengthen informed decision-making. This supports the argument by Constable et al. (2022), who found that clear and targeted communication by health professionals is effective in improving HPV vaccine acceptance and uptake. Similarly, Oketch et al. (2023) observed that comprehensive and culturally appropriate communication is essential in strengthening awareness and improving HPV immunization outcomes among adolescents in sub-Saharan Africa. Therefore, the

findings imply that the quality, relevance, and clarity of message content are critical in promoting vaccine confidence and uptake.

On the other hand, message framing influences how caregivers emotionally and cognitively interpret the information presented to them. Framing concerns the way in which a message is structured, for instance whether it emphasizes the benefits of vaccination, the risks of non-vaccination, or the protective responsibility of caregivers in safeguarding the health of their children. In this study, positively framed messages emphasizing hope, prevention, and protection received relatively stronger support than fear-based messages, suggesting that caregivers may respond better to encouraging and solution-oriented communication than to messages built primarily around fear or threat. This means that framing is an important strategic tool in health communication because it helps move caregivers from awareness to actual behavioral intention and vaccine uptake. Consequently, the study demonstrates that effective communication on HPV vaccination should combine credible sources, relevant content, appropriate audience targeting, accessible communication channels, and constructive message framing in order to achieve greater public health impact.

Findings from the FGDs corroborate with the quantitative findings that immunization messaging has played a crucial role in creating awareness and encouraging the uptake of the Human Papillomavirus (HPV) vaccine for cervical cancer prevention among caregivers of young adolescent girls in Kajiado. In Kajiado, health organizations, including the Ministry of Health, local community health promoters (CHPs), and NGOs, have actively engaged with caregivers through various communication channels to raise awareness about cervical cancer and the importance of the HPV vaccine. Messaging has focused on the prevention aspect, emphasizing how the HPV vaccine can protect girls from the types of HPV that cause cervical cancer.

Participant F2 stated, “health workers from our hospital usually use health promoters to teach the community on benefits of vaccinations in preventing cervical cancer...”

Community health talks, radio broadcasts, and informational materials such as posters and leaflets have been used to reach caregivers, particularly in rural areas where access to healthcare and information may be limited. One of the key strategies in promoting HPV vaccine uptake in Kajiado is addressing cultural concerns and misconceptions. Immunization messaging has been tailored to the local context, with careful attention to cultural beliefs and practices. Health campaigns often include discussions with elders and community leaders, who play an influential role in shaping perceptions about health practices in this region. These leaders have been vital in reassuring caregivers about the safety and efficacy of the HPV vaccine and encouraging its acceptance within their communities.

According to FGDs, in Kajiado, like many other regions, cervical cancer awareness campaigns are tailored to encourage the uptake of the Human Papillomavirus (HPV) vaccine, which is essential in preventing cervical cancer. Campaigns use local languages and culturally relevant materials to ensure that the message reaches a wide audience. In Kajiado, where the Maasai community is prevalent, the campaign might use local dialects and traditional forms of communication like community meetings, songs, and dances to raise awareness. The HPV vaccine is typically offered to girls before they become sexually active (ages 9 –14 years). In Kajiado, health campaigns focus on reaching parents and guardians of young girls, emphasizing the importance of vaccinating early to prevent future health issues like cervical cancer. There may be cultural or religious beliefs that cause hesitancy about the vaccine,

particularly around issues like sexual health. One of the focus group discussion participant stated:

“Our community health workers educate the community on cervical cancer and the vaccines... we have seen the number of parents coming for the vaccines grow” ...said F1.

Campaigns in Kajiado County are designed to be culturally sensitive, using respected community leaders to endorse the vaccine and address concerns directly. In Kajiado County, tailored immunization messages that resonate with the local community's cultural and social values could enhance the effectiveness of vaccination campaigns. Collaborating with local leaders and utilizing community-based platforms for disseminating information can further strengthen these efforts. By addressing specific concerns and providing accessible information, such initiatives can foster a more informed and receptive audience, ultimately leading to higher HPV vaccination rates and a reduction in cervical cancer incidence.

This was confirmed by one of the FGD participant who said:

“We’ve heard about cervical cancer and HPV vaccination from our health workers during campaigns making some parents agree to vaccinate their daughters...” stated F5.

The HPV vaccine is most effective when administered to girls before they become sexually active, ideally between the ages of 9 and 14 years. According to the KIIs, many people may not be aware of this optimal age for vaccination and may delay vaccination until later, reducing its effectiveness. There might be a lack of awareness about where the HPV vaccine is available and whether it is free or subsidized in Kajiado County. This was expressed by a key informant interview participant who said:

“Most people should just take their time and read thoroughly and comprehensively about cervical cancer and the vaccines. I am sure not every parent knows about it” ...said K1.

Public health campaigns could emphasize that the vaccine is offered at local health facilities and schools, making it more accessible for families. Many people in Kajiado County may not fully understand the link between HPV and cervical cancer and how the vaccine can dramatically reduce the risk. Raising awareness about the life-saving potential of the vaccine could make it a more urgent priority for families. Sometimes, seeing or hearing about personal experiences from people in the community can have a stronger impact than statistics. This finding corroborates with the quantitative findings as reflected by one participant (K5) who commented,

“...explaining to the people how the vaccine prevents cervical cancer can convince parents to take their young girls for vaccination...”

Local community leaders or individuals who have benefited from the vaccine or who have seen the tragic effects of cervical cancer may be able to share their stories to encourage others.

Correlation

Correlational analysis using Pearson’s product moment technique was done to determine the relationship between immunization messaging on HPV vaccine uptake for Cervical Cancer Prevention. Results of the correlation are presented in Table 3.

Table 2: Correlation between Immunization Messaging on HPV Vaccine Uptake for Cervical Cancer Prevention

		HPV Vaccine Uptake for Cervical Cancer Prevention		Immunization Messaging
HPV Vaccine Uptake for Cervical Cancer Prevention	Pearson Correlation	1		.541
	Sig. (2-tailed)			.000
	N	287		287
Immunization Messaging	Pearson Correlation	.541		1
	Sig. (2-tailed)	.000		
	N	287		287

** . Correlation is significant at the 0.01 level (2-tailed).

Results from the Table 2 above reveal that there is a significant positive relationship between immunization messaging and HPV Vaccine Uptake for Cervical Cancer Prevention ($r = 0.541$). This implies that there is a very strong association between immunization messaging and HPV Vaccine Uptake for Cervical Cancer Prevention.

Regression Analysis (Hypothesis Testing)

The corresponding mathematical model for the hypothesis was identified as follows:

HPV Vaccine Uptake for Cervical Cancer Prevention = f (Immunization Messaging)

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon$$

Table 3: Simple Linear Regression Results for Immunization Messaging on HPV vaccine uptake for Cervical Cancer Prevention

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.541a	.293	.291	.50906		
ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.622	1	30.622	118.166	.000b
	Residual	73.856	285	.259		
	Total	104.478	286			
Coefficients ^c						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	1.664	.227		7.340	.000
1	Immunization Messaging	.618	.057	.541	10.870	.000

Dependent Variable: HPV vaccine uptake for Cervical Cancer Prevention
Predictors: (Constant), Immunization Messaging

The results in Table 4 shows that $r = 0.514$, implying a positive slope between the independent variable (immunization messaging) and the dependent variable (HPV vaccine uptake for Cervical Cancer Prevention). The R- Squared was .291, meaning that 29.1% of the variation in the HPV vaccine uptake for Cervical Cancer Prevention was explained by variation in the immunization messaging. The other factors explained 60.9%. The ANOVA results indicated that the model was statistically significant at ($p < 0.05$).

The results indicate that the $p\text{-value} = 0.000 \leq 0.05$, $t = 10.870$, $r = 0.514$ and $r\text{ square} = 0.291$. Hence based on these findings we reject the null hypothesis that immunization messaging has no significance in HPV vaccine uptake for Cervical Cancer Prevention since p value of 0.000 is less than 0.05 and accept the alternative hypothesis at $\alpha = 0.05$ level of significance that immunization messaging has significance in HPV vaccine uptake for Cervical Cancer Prevention.

$$Y = \beta_0 + \beta_2 X_2 + \varepsilon$$

can then be substituted as follows; $Y = 1.664 + 0.618X_2$

The beta value implies that for one-unit increase in immunization messaging, HPV vaccine uptake for Cervical Cancer Prevention increases by 0.618. This therefore confirms that health communication strategies had a significant positive influence on HPV vaccine uptake for Cervical Cancer Prevention. In Reno et al. (2019), the findings indicate agreement between different strategies for improving healthcare providers' communication about adolescent HPV vaccination. Specifically, the combination of the presumptive approach (PA), motivational interviewing, and the use of a fact sheet for vaccine-hesitant parents was identified as effective. These communication components led to the intervention group reporting higher perceived levels of parental HPV vaccine acceptance compared to the control group, as well as increased vaccination rates in the intervention arm.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

Characteristics of Immunization Messaging on HPV Vaccine Uptake for Cervical Cancer Prevention among Caregivers/Guardians

The study aimed to establish how the characterization of immunization messaging influences HPV vaccine uptake for cervical cancer prevention among caregivers of adolescent girls aged 10–14 years in Kajiado County. Using both descriptive and inferential statistics, the findings revealed that messaging plays a crucial role in creating awareness, empowering women to take control of their reproductive health, and encouraging vaccine uptake. Focus group discussions highlighted the importance of timely messaging, while key informant interviews emphasized that the vaccine is most effective before sexual debut, ideally between ages 9 and 14 a fact often unknown to many caregivers. Inferential analysis confirmed that well-characterized immunization messages significantly and positively affect vaccine uptake. This aligns with Constable et al. (2022), who found that the content, clarity, and relevance of immunization messages play a key role in raising awareness and encouraging preventive health behaviors. Their findings underscore that well-characterized messages those that are clear, accurate, and actionable—are central to promoting HPV vaccine uptake and cervical cancer prevention

HPV Vaccine Uptake for Cervical Cancer Prevention

Both descriptive and inferential statistics were used to derive the study findings. The study confirmed that HPV vaccination effectively reduces the risk of cervical cancer among women. Findings from the FGDs indicated that caregivers have made notable progress in encouraging HPV vaccine uptake for adolescent girls, although the extent and impact of these efforts vary depending on geographic region, cultural context, and healthcare systems. Similarly, KIIs revealed that caregivers, particularly parents and healthcare providers, play a significant role in promoting HPV vaccination. These findings can be linked directly to the characteristics of immunization messages. The messages' content providing clear, relevant, and comprehensive information on cervical cancer and the benefits of HPV vaccination equips caregivers with the knowledge needed to encourage vaccination. The framing of messages highlighting hope, empowerment, and the preventable nature of cervical cancer appears to strengthen caregivers' motivation to act. Finally, the behavioral influence aspect of messaging messages that explicitly guide caregivers toward taking concrete actions, such as bringing their adolescent girls for vaccination supports the observed uptake efforts reported in FGDs and KIIs. Together, these elements suggest that well-characterized messages are instrumental in enabling caregivers to take informed, proactive steps toward HPV vaccine uptake and cervical cancer prevention.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concluded that messages create awareness that women can take control of their reproductive health situation with regard to cervical cancer prevention. Immunization messaging has played a crucial role in creating awareness and encouraging the uptake of the Human Papillomavirus (HPV) vaccine for cervical cancer prevention among caregivers of young adolescent girls aged 10 - 14 years in Kajiado County. The HPV vaccine is most effective when administered to girls before they become sexually active, ideally between the ages of 9 and 14 years. Many people may not be aware of this optimal age for vaccination and may delay vaccination until later, reducing its effectiveness. The inferential statistics showed that characterization of immunization messaging had a significant positive influence on HPV vaccine uptake for cervical cancer prevention among caregivers of young adolescent girls.

Recommendations

The study recommended messages regarding cervical cancer prevention should be culturally sensitive and relevant to the beliefs and values of the Kajiado County community. Messages should respect cultural norms while still providing accurate and necessary health information. This could include collaborating with local leaders and influencers to ensure the messages resonate well with the target audience.

Additionally, the study recommended to policy makers and health care workers to combine loss-framed messages and gain-framed messages as an effective strategy in changing caregiver risk perceptions and, thus, increase HPV vaccination intentions.

Further research should examine the long-term impact of immunization messaging on young adolescent girls' knowledge, attitudes, and behaviors toward cervical cancer prevention, using longitudinal studies to assess sustainability. Further research should also investigate how family members and community dynamics influence awareness and practices, while identifying financial, cultural, and logistical barriers that hinder access to HPV vaccination in rural contexts like Kajiado County. In addition, given the growing reliance on digital platforms

among youth, future studies should evaluate the effectiveness of mobile apps, social media campaigns, and online workshops in delivering tailored, culturally relevant messages that enhance HPV vaccine uptake and cervical cancer preventive behaviors.

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