Factors influencing maternal vaccine acceptance among pregnant women in Kericho East Sub-County, Kenya

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ABSTRACT

Maternal immunization is beneficial to both mothers and their newborns, providing protection against vaccine-preventable diseases. However, vaccination could be affected by vaccine hesitancy, which has been identified by the World Health Organization as one of the top ten threats to global health. Data from the Kenya Demographic and Health Survey (2022) showed that Kericho County had the fifth-highest percentage of women whose most recent births were protected at birth against tetanus. However, factors behind the acceptance of the tetanus vaccine remain largely unexplored, and they could inform the tailoring of information for new vaccines. The specific objectives of this study included determining the level of maternal vaccine acceptance and exploring individual and health system factors that influence maternal vaccine acceptance. The study was guided by the 5-P Model for Vaccine Decision-Making in Pregnancy, and a descriptive cross-sectional design was employed. The target population consisted of pregnant women, with a sample size of 180 respondents determined using Cochran's (1977) formula. Five locations in Kericho East Sub-County were selected through systematic sampling, and random sampling was employed to select the respondents. Data was collected using a semi-structured questionnaire. The Statistical Package for the Social Sciences (SPSS) version 26 was used to analyze the data using descriptive and inferential statistics, including odds ratios and binary logistic regression at a significance level of 0.05. The findings were presented in tables. The study revealed high acceptance of maternal vaccines: tetanus toxoid (TT) at 96%, influenza at 91.4%, RSV at 90.2%, and GBS at 88.4%, if recommended for use during pregnancy. Facilitators of maternal vaccine acceptance included having a postgraduate education (OR = 4.67, $p < 0.01$), as well as knowledge of the RSV vaccine (OR = 3.18, $p = 0.01$) and the GBS vaccine (OR = 3.42, $p < 0.01$). Barriers to maternal vaccine acceptance included living more than 20 km from the nearest health facility (OR=0.11, $p < 0.01$) and not being comfortable discussing maternal vaccines with a healthcare provider (OR=0.32, $p = 0.01$). Maternal vaccine acceptance in Kericho East Sub-County is facilitated by factors like higher education levels, whereas barriers may include living more than 20 kilometers from a health facility. Therefore, to maintain and increase the acceptance of maternal vaccines, public health agencies could leverage the facilitators and address the barriers.

Keywords: Kericho, Maternal, Pregnancy, RSV, Tetanus, Vaccine

I. INTRODUCTION

The United Nations (UN) Sustainable Development Goals target 3.2 provides a target of the reduction of preventable deaths among children under five, specifically lowering neonatal mortality rate (NMR) to at least 12 deaths per 1,000 live births in every country by 2030(UN, 2023). NMR in Sub-Saharan Africa currently stands at approximately 27 deaths per 1,000 live births, and the most of these neonatal deaths result from preventable conditions (World Health Organization, [WHO] 2021). Public health as a field centers primarily on disease prevention. Indeed, disease prevention has long been recognized as crucial in the attainment of good health and prolonging life expectancy, with vaccines occupying a crucial role in preventing vaccine-preventable diseases (Shultz, et al., 2021). Maternal vaccinations are important in significantly reducing maternal, neonatal, and infant mortality and morbidity. Vaccines administered during pregnancy offer direct benefits to the pregnant mother and provides protection to the fetus or newborn through the transplacental transfer of antibodies or by breastfeeding (WHO, 2023).

The Centers for Disease Control and Prevention (CDC) advises that tetanus, diphtheria, and pertussis (Tdap) vaccine be administered to all pregnant mothers between the 27th and 36th week of each pregnancy (CDC, 2022). Equally, the Respiratory syncytial virus (RSV) vaccine is recommended for administration to pregnant women for the protection of their babies—whose immune systems are not fully developed at birth, making them high susceptible to RSV, which can lead to severe bronchiolitis. Group B streptococcus (GBS) is one of the causes of meningitis and neonatal sepsis. Consequently, the WHO General Assembly approved the initiative Defeating Meningitis By 2030: A

Global Road Map in 2020, which aims to address the primary causes of bacterial meningitis, including meningococcus, pneumococcus, Haemophilus influenzae, and group B streptococcus, among other targets (WHO, 2021).

In Kenya, the tetanus toxoid vaccine is recommended for all expectant women as part of the antenatal care. According to data from Kenya Demographic and Health Survey (KDHS) 2022, 75% of women who had given birth within the preceding two years were reported to have received adequate tetanus toxoid (TT) injections, providing adequate protection for their infants against neonatal tetanus (KNBS and ICF, 2023). Data from the Kenya National Bureau of Statistics (KNBS), according to the National Council for Population and Development (NCPD), on women of reproductive age who participated in the KDHS 2014 revealed that 45.9% had received at least two TT injections, whereas 54.1% had not in Kericho County (NCPD, 2018). However, in 2022, Kericho County was among the top five counties in terms of the percentage of women whose most recent live birth was protected against NT at 87.7%, compared to the national average of 75% (KNBS & ICF, 2023). As a result, conducting the study in Kericho will help identify factors contributing to high acceptance rates and provide strategies to maintain these rates.

The 5-P Model encompasses factors that are relevant and specific to pregnant women's vaccine acceptance, appreciating the fact that there is increased interaction between pregnant women and healthcare providers during pregnancy (Cox, et al., 2023). It also acknowledges that vaccine acceptance during pregnancy involves weighing the benefits and risks for both the mother and the baby. The model includes the following categories of factors (the 5 Ps): perceived information sufficiency on vaccine safety in pregnancy, protection of pregnancy, provider–patient relationship, perceived vaccine benefits for mother and fetus, and perceived disease susceptibility and severity in pregnancy (Cox, et al., 2023).

Kenya's Vision 2030 recognizes quality health as a key element under the Social Pillar, highlighting the importance of reducing the incidence of preventable diseases (GoK, 2007). Specifically, the Kenya National Immunization Policy Guidelines (2023) outline that pregnant women can be vaccinated with Inactivated Influenza, Tetanus-Diphtheria (Td), and Tetanus Toxoid (TT) vaccines. Additionally, Kenya's Health Act No. 21 of 2017 recognizes the importance of addressing maternal and neonatal health, promoting public health, and eliminating preventable diseases (Kenya Law, 2017). Moreover, WHO also acknowledges the need for the use of TT to maintain Kenya's MNTE status (WHO, 2019). Therefore, the findings of the study will outline factors that will help sustain and further enhance maternal vaccine acceptance.

1.1 Statement of the Problem

Maternal vaccination stands as a crucial strategy for reducing maternal and neonatal morbidity and mortality, aligning with targets 3.1 and 3.2 of the Sustainable Development Goal 3, to reduce the global maternal mortality ratio to less than 70 per 100,000 live births and end preventable newborn deaths respectively (UN, 2023). Unfortunately, according to the WHO, the neonatal mortality rate in Sub-Saharan Africa in 2021 stood at 27 deaths per 1,000 live births (WHO, 2021). Neonatal tetanus, for instance, is a fatal disease that can lead to neonatal deaths or leave survivors with lifelong morbidities, such as brain damage and other developmental difficulties. In some countries that have eliminated the disease, there may be underreporting of its occurrence, particularly in rural areas (Naicker, et al., 2022).

Vaccination is one of the best strategies to prevent vaccine-preventable diseases (VPDs) such as neonatal tetanus, which has been recognized as a fatal disease and targeted for elimination by the World Health Organization. However, the availability of safe and effective maternal vaccines does not automatically guarantee acceptance by pregnant mothers. WHO has defined vaccine hesitancy as the "delay in acceptance or refusal of vaccines despite the availability of vaccination services" (WHO, 2015). Consequently, in 2019, WHO declared vaccine hesitancy one of the ten threats to global health (WHO, 2019). With the outbreak of the COVID-19 pandemic and the eventual rollout of vaccines, it is evident that vaccines can be lifesaving, but only when they are administered.

In 2019, Kenya obtained its maternal and neonatal tetanus elimination status. However, one of the recommendations for maintaining this status was the vaccination of women of reproductive age with TTCV, and this is very important, particularly where every county matters when it comes to the elimination of MNT. In the absence of knowledge regarding the drivers of maternal vaccine uptake, policymakers and other duty bearers face the risk of not knowing what to address. Equally, the introduction of crucial vaccines such as RSV and GBS could be faced with challenges. Addressing these gaps is critical for developing strategies to enhance maternal vaccine acceptance. This study sought to identify factors influencing maternal vaccine acceptance among pregnant women in Kericho East Sub-county, Kenya.

1.2 Research Objectives

i. To determine the level of acceptance of maternal vaccines among pregnant women in Kericho East Sub-County, Kenya.
ii. To determine individual factors influencing maternal vaccine acceptance among pregnant women in Kericho East Sub-County, Kenya.

iii. To determine health system factors influencing maternal vaccine acceptance among pregnant women in Kericho East Sub-County, Kenya.

II. LITERATURE REVIEW

2.1 Theoretical Framework

2.1.1 The 5-P Model for Vaccine Decision-Making in Pregnancy

The study employed *The 5-P Model* to predict and explore factors that could influence the decision-making of pregnant women regarding the acceptance of maternal vaccines. Under *The 5-P Model*, different factors are addressed that are well suited to the frequent and intense interactions between pregnant women and healthcare providers during pregnancy. Indeed, the authors characterize pregnancy as an "intense-information" phase (Cox, et al., 2023). Also, unlike many existing models that focus on vaccine hesitancy, this theory focuses on vaccine acceptance during pregnancy.

The 5P Model encompasses perceived information sufficiency on vaccine safety in pregnancy, protection of pregnancy, the (healthcare) provider–patient relationship, perceived vaccine benefits for the mother and fetus, and perceived disease susceptibility and severity during pregnancy (Cox, et al., 2023). The model also recognizes that women exist within a community and, hence, acknowledges the broader sociodemographic determinants of health. This study specifically focused on the interactions between pregnant women and healthcare providers (HCPs) within the wider health system. This included the involvement of healthcare providers in decision-making, HCP attitudes, and trust in HCPs to communicate the benefits and risks associated with maternal vaccines, among other factors. Also included were issues related to the accessibility of healthcare facilities, such as distance.

In addition to health system factors, individual factors such as age, level of education, religious beliefs, and monthly household income were explored. Since the model is fairly new and has not been employed extensively—including critiques of its strengths and weaknesses—this study involved consultations with experts, whose insights were incorporated.

2.2 Empirical Review

2.2.1 Level Of Acceptance of Maternal Vaccines Among Pregnant Women

Presently, tetanus, inactivated influenza, and pertussis-containing vaccines are some of the vaccines recommended for administration during pregnancy (Abu-Raya, et al., 2020). However, just because a vaccine that is safe and effective is available does not automatically mean that it will be accepted (McQuaid, et al., 2016). The acceptance of the maternal tetanus vaccine in Sub-Saharan was at an average of 51.5%, ranging from the lowest in Zambia at 27.5% to the highest in Liberia at 79.2% (Aboagye, et al., 2023). In the Dominican Republic also showed that 94% of the pregnant women surveyed would accept a GBS vaccine if it were offered (Job, et al., 2024). The acceptance of RSV has varied with studies reporting its acceptability in some cases to be ranging from 24% to 48.5% (Giudice, et al., 2023; McClymont, et al., 2025 & McCormack, et al., 2024).

2.2.2 Individual Factors Influencing Maternal Vaccine Acceptance Among Pregnant Women

In their study, Chang et al (2019) established that knowledge of and attitude toward a vaccine also affect its uptake (Chang, et al., 2019). Attitude would often include perception on the safety of the vaccine, among other issues. Misinformation, and even disinformation, regarding the adverse effects of vaccines can cause concern to pregnant women, even when they doubt the credibility of the source of the negative information (Fuss, et al., 2022). Pregnant and breastfeeding women would also worry most about the safety of a maternal RSV vaccine if introduced (Limaye, et al., 2024). Similarly, a survey involving 13,105 women established that, of those who indicated they would decline the COVID-19 vaccine during pregnancy, 34.8% cited concerns about safety and doubts regarding vaccine effectiveness (Naqvi, et al., 2022).

Doubt on vaccine safety, including reports where one would only accept it after observing its effect on early adopters, can affect the acceptance and uptake of new vaccines (Kajungu, et al., 2020). 23.8% of the respondents in a study in South Korea indicated that they were waiting for a larger number of pregnant women to receive the COVID-19 vaccine before deciding to get vaccinated themselves (Yoon, et al., 2022). In the United States, individuals holding a college degree showed a higher likelihood of accepting the GBS vaccine (Geoghegan, et al., 2023).

2.2.3 Health System Factors Influencing Maternal Vaccine Acceptance Among Pregnant Women

The World Health Organization (WHO) revealed that vaccine hesitancy was one of the ten threats to global health in 2019 (WHO, 2019). Vaccine hesitancy is complex, but it is defined by WHO as "the reluctance or refusal to vaccinate despite the availability of vaccines" (WHO, 2019). One of the issues could be distrust toward the healthcare

system and the pharmaceutical industry, and the perception that side effects are always under-reported. This is one of the issues that could shape perceptions of the safety of maternal vaccines.

National health agencies, such as the Ministry of Health in Kenya, play important roles such as setting policies. In the United Kingdom (UK), 79% of women of childbearing age expressed willingness to receive the GBS vaccine if there was a recommendation for its use by the National Health Service (McQuaid, et al., 2016). This was 27% more than those who would just accept the vaccine without a recommendation from the agency. In Kenya, 90% of expectant mothers in a study believed that all vaccines recommended by the government are beneficial (Otieno, et al., 2020).

Apart from government agencies, health workers are also key influencers and highly trusted when it comes to decision-making concerning vaccination. A study in Kenya established that pregnant women would be willing to accept a vaccine recommended by a healthcare provider, even if they were not aware of the vaccine or the condition it prevents (Nganga, et al., 2019). Similarly, another study also concluded that women would prioritize a healthcare provider over from friends and family when it comes to vaccine recommendations (Geoghegan, et al., 2023). The manner in which healthcare providers interact with pregnant women has been found to influence the acceptance of a vaccine (Msoka, et al., 2023). The significance of a positive attitude of HCPs towards pregnant women in increasing vaccine uptake has also been established in existing studies (Nalubega, et al., 2021).

III. METHODOLOGY

3.1 Study Area

The study was conducted in Kericho East Sub-County in Kericho County. Kericho East Sub-County was purposively selected for it comprises both rural and urban areas. Data has revealed slight differences recorded in the acceptance and uptake of vaccines between women in urban and rural areas (KNBS & ICF, 2023).

3.2 Study Design

This study employed a cross-sectional design, and quantitative data were collected using a structured questionnaire. The cross-sectional study design was suitable for this study, as it sought to establish the level of maternal vaccine acceptance and the factors contributing to this acceptance among pregnant women. The main strength of this study is that it is relatively quick and inexpensive, and the findings could subsequently be used for more in-depth studies (Wang & Cheng, 2020).

3.3 Study Population

The study population comprised eligible expectant women and girls aged 15–49 years in Kericho East Sub-County. The inclusion criteria were women and girls aged 15–49 years who were pregnant at any gestational stage within the chosen areas of Kericho East Sub-County, willing to participate in the study and able provide informed consent. The exclusion criteria included individuals who were unable to provide informed consent, or unwilling to participate in the study, or unable to participate due to physical or mental health reasons.

3.4 Study Variables

The independent variables of the study included individual factors, defined as demographic traits such as age, income level, education level, marital status, occupation, and sources of information on maternal vaccines, as well as health system factors. The dependent variable was maternal vaccine acceptance.

3.5 Sampling Design

Systematic sampling was used to select five locations from the 11 locations in Kericho East Sub-County. Proportionate stratified sampling was then employed to allocate the number of study participants to be chosen from each of the ten sub-locations within the five selected locations. Random sampling was then used to select participants from each sub-location.

Cochran's (1977) formula was used to determine the sample size. Given Z=1.96 for a 95% confidence level, p=0.88, and E=0.05 for a 5% margin of error, the sample size was calculated as follows:

$$n = \frac{1.96^2 \times 0.88 \times (1-0.88)}{0.05^2}$$

$$n = 163$$

Additionally, 10% was added to account for non-response, bringing the total sample size to 180.

3.6 Data Collection and Analysis

The study was conducted between February and March 2025 using a structured questionnaire to collect quantitative data. The data collection instrument was availed in Kiswahili, which is the national language in Kenya. The data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 26, and the results were presented using tables.

3.7 Ethical and Logistical Considerations

Approval to conduct the study was sought and obtained from the Masinde Muliro University of Science and Technology (MMUST) Directorate of Postgraduate Studies, and ethical clearance was obtained from the MMUST Institutional Scientific and Ethics Review Committee (MMUST-ISERC). A research permit was also granted by the National Commission for Science, Technology and Innovation (NACOSTI). Ethical principles adhered to included autonomy, informed consent, and confidentiality. Participants under the age of 18 were included in the study only after obtaining consent from their legal guardians, followed by assent from the minors themselves using the study Assent Form, which was written in a language understandable to them.

IV. FINDINGS & DISCUSSION

4.1 Response Rate and Demographic Profile

Of the 180 questionnaires administered, 175 were completed and returned, yielding a 97% response rate. The respondents' demographic profile is presented in Table 1 below.

Table 1

Sociodemographic Characteristics of the Respondents

Factor		
Age (years)	Mean 29.2	Stdev 7.1
Marital Status	**Frequency**	**Percentage**
Single	30	17.1
Married	120	68.6
Separated	5	2.9
Divorced	2	1.1
Widowed	3	1.7
Prefer not to say	15	8.6
Education		
No Formal Education	17	9.7
Primary School	35	20.0
Secondary School	57	32.6
Diploma/Certificate	33	18.9
Undergraduate Degree	30	17.1
Postgraduate Education	3	1.7
Employment		
Unemployed	80	46.0
Self employed	53	30.5
Employed private sector	19	10.9
Civil servant	22	12.6
Average Monthly Household Income		
<10K	79	46.5
10-19.9K	59	34.7
20-29.9K	12	7.1
>30K	20	11.8
Religion		
Christian	171	97.7
Islam	3	1.7
Traditionalist	1	0.6

4.2 Level of Maternal Vaccine Acceptance

The tetanus vaccine, which is recommended had the highest rate, n=165 (96%), while the lowest acceptance was for group B streptococcus, if it were offered. Table 2 illustrates the results.

Table 2

Vaccine Acceptance

Vaccine	Frequency	Percent
Tetanus vaccine acceptance		
Neutral	7	4
Likely	167	96
Influenza vaccine acceptance		
Unlikely	2	1.1
Neutral	13	7.5
Likely	159	91.4
Group B strep vaccine acceptance		
Unlikely	4	2.3
Neutral	16	9.2
Likely	153	88.4
RSV vaccine acceptance		
Unlikely	5	2.9
Neutral	12	6.9
Likely	157	90.2

The overall acceptance of the TT vaccine among the respondents was 96%, and this is the only vaccine routinely recommended for administration to pregnant women in Kenya. The acceptance of the maternal tetanus toxoid vaccine was higher than that reported in a study that focused on Sub-Saharan Africa, where the average level of acceptance was 51.5% (Aboagye, et al., 2023).

Although not currently recommended, the majority of the women (91.4%) expressed a willingness to accept the influenza vaccine if it were offered. This finding is slightly higher than that of another study conducted in Kenya, where 77.8% of the pregnant women involved stated that they would be willing to accept the influenza vaccine if it were offered (Otieno et al., 2020). The acceptance level in a different study was 83.7% (Otieno et al., 2020). The findings show that there is a high likelihood that pregnant women would accept the influenza vaccine if introduced.

The high acceptance of a future RSV vaccine, despite low knowledge about it, indicates women's willingness to protect their babies against RSV. This is in contrast to the findings of a study conducted in Ireland, where, although the majority of pregnant women had not heard about RSV (75.6%), only 48.5% of them were willing to have the RSV vaccine availed (McCormack, et al., 2024). This was also contrary to another study in Canada focused on pregnant and postpartum individuals, which found that only 24% would accept the RSV vaccine during pregnancy (McClymont, et al., 2025).

Of the three vaccines not currently recommended by the Ministry of Health, Kenya, the least accepted was the GBS vaccine, with an acceptance rate of 88.4%. The findings from another study conducted in the Dominican Republic also showed that 94% of the pregnant women surveyed would accept a GBS vaccine if it were offered (Job, et al., 2024). The acceptance in this study was higher than the findings of a study in which the acceptability of the GBS vaccine, if offered to women in the US and Ireland, was 55% and 56%, respectively (Geoghegan, et al., 2023). The finding was contrary to that of another study conducted in China, where the level of acceptance of a GBS vaccine, if offered, was only 45.76%, even though the majority of the respondents (59.6%) had heard of GBS but were not familiar with it (Du, et al., 2023).

4.3 Individual Factors Influencing Maternal Vaccine Acceptance

Women with a post-graduate level of education were over 4.5 times more likely to accept vaccines than the uneducated ones (OR= 4.67, 95% ci= 1.19-18.29). Additionally, women from households with monthly incomes between 20-29k were 78% less likely to accept vaccines than those under 10k a month (OR= 0.22, 95% ci= 0.19-1.69). Table 3 summarizes the results.

Table 3

Demographic Predictors of Vaccine Acceptance

Predictor	Category	OR (95% ci)	p value
Age		0.98(0.9-1.06)	0.61
Children born		1.14(0.63-2.06)	0.66
Marital	Withheld	2.03(0.27-15.26)	0.49
	Widowed	**1.87(1.21-2.89)**	**0.04**
	Divorced	**2.97(0.72-12.21)**	**0.00**
	Separated	3.42(0.28-41.58)	0.34
	Married	1.01(0.23-4.5)	0.99
	Single	1(0-0)	
Education	**Postgraduate**	**4.67(1.19-18.29)**	**0.00**
	Degree	1.29(0.16-10.59)	0.81
	Diploma/Certificate	0.33(0.06-1.93)	0.22
	Secondary	0.63(0.12-3.24)	0.58
	Primary	0.22(0.03-1.72)	0.15
	No Education	1(0-0)	
Employment	Civil servant	1.06(0.06-19.52)	0.97
	Employed private sector	3.35(0.31-36.79)	0.32
	Self employed	1.24(0.13-11.72)	0.85
	Unemployed	1(0-0)	
HH income	>30K	0.78(0.04-1.58)	0.10
	20-29.9K	**0.22(0.19-1.69)**	**0.00**
	10-19.9K	0.72(0.1-5.15)	0.74
	<10K	1(0-0)	
Religion	**Traditionalist**	**0.05(0.04-0.07)**	**0.00**
	Islam	0.68(0.02-30.08)	0.84
	Christian	1(0-0)	

The study reveals that, compared to single expectant women, those who were widowed were almost twice as likely to accept vaccination (OR = 1.87, 95% CI = 1.21–2.89), while those who were divorced were almost thrice as likely (OR = 2.97 95% CI = 0.72-12.21). This was contrary to the finding of a study conducted in Brazil, where being single/widowed/divorced increased the likelihood of a woman being unvaccinated for tetanus compared to married women. (Faria, et al., 2021). However, this would require further investigation, as only 1.1% of the respondents reported that they were divorced, while another 1.7% reported that they were widowed. Though the likelihood of accepting a maternal vaccine for a traditionalist was 95% less than that of a Christian, this finding might not be practically meaningful, as only one respondent was a traditionalist. However, previous findings have established the association between religion and vaccine acceptance due to factors such as the influence of religious leaders and beliefs, for instance, that diseases only affect nonbelievers (Aynalem, et al., 2022 & Chimukuche, et al., 2022).

Education level has been one of the factors associated with vaccine acceptance and hesitancy. In this study, respondents with a postgraduate degree were almost five times more likely to accept a maternal vaccine compared to those with no formal education. The results were similar to a study conducted in Ethiopia, where education status was one of the factors associated with vaccine acceptance. In that study, individuals with a college education or higher were more than twice as likely to accept a vaccine compared to those with only a primary education (Getachew, et al., 2022). It is almost similar to the finding of a study conducted in Ethiopia, where individuals with a college education or higher were more than twice as likely to accept a vaccine compared to those with only a primary education (Getachew et al., 2022). However, the findings in this study contrast with those of a study in Senegal, where a higher education level among individuals in the diaspora was linked to increased vaccine hesitancy among their family members back home as they were likely to influence them (Johm, et al., 2021). The association between a pregnant woman's education level and maternal vaccine acceptance may be linked to the greater exposure to information about the importance of vaccines.

Economic factors are likely to affect vaccine acceptance, especially in instances such as having clinic days on weekdays, as is the practice in many Level 2 and 3 government facilities in Kenya. This study revealed that having an average monthly household income of between KES 20,000 and KES 30,000 was associated with a woman being 78% less likely to accept a maternal vaccine compared to those whose average monthly income was less than KES 10,000. This contradicts a finding in a study conducted in Malaysia, where higher household income and employment were

associated with increased vaccine acceptance (Kalok, et al., 2023). This finding supports the conclusion by Msoka et al. that in regions where women must choose between working and attending clinics for vaccines on certain days, they would opt for work over attending the clinics (Msoka, et al., 2023). This factor is particularly relevant in our context where ANC clinics operate on specific days, necessitating that women adhere to these scheduled appointments.

4.4 Health System Factors Influencing Maternal Vaccine Acceptance

As shown in table 4, Stock outs were mostly rare, the modal distance to the facility was 1-5km n=56 (32.4%), with a further 15% (n=26) living within a kilometre of the nearest facility offering vaccination. Half of the expectant women covered between 6-20 km to get to the nearest facility with vaccination services. Nonetheless, most of the women rated the ease of access to the nearest health facility for vaccination as either easy, n=111 (64.2%), or very easy n= 13 (7.5%).

Table 4

Health Facility Access Factors

Factor	Category	Frequency	Percentage
Distance to nearest facility	<1km	26	15.0
	1-5km	56	32.4
	6-10 km	44	25.4
	11-20km	44	25.4
	>20 km	3	1.7
Access to nearest facility	Very easy	13	7.5
	Easy	111	64.2
	Neutral	15	8.7
	Difficult	33	19.1
	Very difficult	1	0.6
Average spending for vaccine	<100	41	24.6
	100-200	40	23.4
	200-300	45	26.3
	300-400	17	9.9
	>400	27	15.8
Stock outs	Never	26	15.3
	Rarely	65	38.2
	Sometimes	73	42.9
	Often	6	3.5

98.3% of the respondents reported that they were comfortable discussing maternal vaccines with their health care providers (HCPs). Further, 94.9% trusted their HCPs to honestly tell them about the benefits and risks of vaccines. However, 75% felt that HCPs were unlikely to involve them in decision-making about a maternal vaccine through providing them with information so they could make an informed decision. Table 5 shows the results.

Table 5

Healthcare Provider Factors

Factor	Disagree	Neutral	Agree
Comfortable discussing maternal vaccine with HCP			
Frequency	1	2	171
Percentage	0.6	1.1	98.3
Receive adequate information about maternal vaccines from HCP			
Frequency	1	4	169
Percent	0.6	2.3	97.1
Trust Healthcare provider for Information on vaccine risks and benefits			
Frequency	1	8	165
Percent	0.6	4.6	94.9
Involved decision by HCP on vaccine decision			
Frequency	130	28	16
Percent	74.7	16.1	9.2

Accessibility in the study was measured based on the average cost incurred by pregnant women and their opinion of the overall ease or otherwise of reaching the nearest health facility where they could receive the maternal vaccine. Those whose average expenditure to get vaccinated were below KES. 100 were 22 times more likely than those spending over KES. 400 to accept maternal vaccines. Additionally, women who were over 20 kilometre from the nearest facility were 89% less likely to accept vaccination than those living less than 1 kilometre from the health facility (OR = 0.11, 95% ci= 0.02-0.54). Table 6 shows the results.

Table 6

Health System Factors Influencing Maternal Vaccine Acceptance

Factor	Response	OR (95% ci)	p value
Comfortable discussing vaccine with HCP	**No**	**0.32(0.26-0.38)**	**0.00**
	Yes	Ref	
Receive adequate information	No	7.23(0.76-68.68)	0.09
	Yes	Ref	
Trust HCP on risk/benefits	**No**	**4.04(0.99-16.43)**	**0.05**
	Yes	Ref	
Involved decision by HCP	No	3.67(0.36-37.06)	0.27
	Yes	Ref	
Access to nearest facility	Difficult	0.87(0.21-3.61)	0.84
	Easy	Ref	
Average spending to get vaccine	**<100**	**22.74(1.29-40.44)**	**0.03**
	100-200	3.08(0.41-23.44)	0.28
	200-300	1.73(0.29-10.46)	0.55
	300-400	1.46(0.25-8.44)	0.67
	>400	Ref	
Distance to nearest facility	**>20 km**	**0.11(0.02-0.54)**	**0.00**
	11-20km	1.42(0.34-5.84)	0.63
	6-10 km	0.55(0.15-1.93)	0.35
	1-5km	0.95(0.26-3.42)	0.94
	<1km	Ref	
Stock outs	Never	1.67(0.24-11.45)	0.60
	Rarely	0.41(0.13-1.32)	0.14
	Sometimes	0.76(0.25-2.28)	0.62
	Often	Ref	

The results of the binary regression analysis in this study show that women whose average spending was below KES 100 were 22 times more likely to accept a maternal vaccine compared to those who would spend more than KES 400 to access a vaccine. The vaccines are offered free of charge, and hence this was the amount they would spend on transportation and other associated costs. The findings were similar to those of another study conducted in The Gambia and Senegal found that the distance to health facilities, combined with factors such as accessibility and issues with public transportation, were some of the factors influencing the uptake of maternal vaccinations (Johm, et al., 2021). Similarly, in Ethiopia, a study found that the accessibility of the TT vaccine delivery point was highly associated with the utilization of the vaccine (Anatea, et al., 2018). Besides the cost of travel to the health facility, time is another factor when the distance to the facility is far. As many women could be preoccupied with household chores that consume a significant amount of time, along with the costs associated with travel, this could explain the association between distance and travel expenses and the acceptance of a maternal vaccine.

Nganga et al. found in their study that pregnant women trust healthcare providers due to their societal standing as trained professionals. (Nganga, et al., 2019). In this study, those who did not trust their healthcare providers to honestly inform them about the risks and benefits of maternal vaccines were four times more likely to accept a vaccine compared to those who did trust their healthcare providers to communicate about the benefits and risks. However, it is important to note that this group comprised only 5.2% of the respondents. Equally, those who did not feel comfortable discussing maternal vaccines with their HCPs were 68 times less likely than those who did to accept a maternal vaccine.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This study demonstrates a high acceptance of maternal vaccines among pregnant women. The top three trusted sources of information on maternal vaccines were healthcare providers, the Ministry of Health, and spouses. Information from these sources would be influential in the decision of a pregnant woman whether to accept a vaccine. Despite a majority of the respondents reporting that they were comfortable discussing vaccines with healthcare providers (98.3%), 75% of them felt excluded from the vaccination decision-making process. These findings show the willingness of pregnant women to accept maternal vaccines and their desire to be included in the vaccine decision-making process.

5.2 Recommendations

The trust and confidence pregnant women have in healthcare providers can be leveraged to enhance vaccine acceptance by actively involving women in the decision-making process. Small group sessions during antenatal care clinics could enhance informed decision-making without significantly increasing the time burden on healthcare providers if an individual one-on-one approach is not taken for each woman. The factors behind the acceptance of GBS and RSV vaccines by 88.4% and 90.2% of the respondents, respectively, if offered, could be discovered through subsequent in-depth studies employing qualitative data collection strategies.

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