Community Factors associated with Initiation to HPV Vaccination among Adolescent Girls aged 9 to 17 years in Eastern Uganda. A Cross-sectional Study

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Abstract

Background

Initiation to the HPV vaccine is critical in the prevention of cervical cancer and failure to receive vaccines as recommended may aggravate the disease burden on the female population. Unfortunately, evidence indicates that initiation to HPV vaccination is still very low in Mbale district, Uganda, and sub-Saharan Africa at large. Hence this study was conducted to document the Community factors associated with the Initiation of HPV Vaccination among Adolescent girls aged 9 to 17 years in Eastern Uganda.

Methodology:

The study adopted a population-based cross-sectional study design in which questionnaires were used in the data collection process. The data were analyzed in STATA.

Results:

Family support and the caretaker's average monthly income range were the factors that had a significant association with the initiation of HPV. The rest of the community factors did not show a significant association with initiation to HPV vaccination as they had p-values

Conclusion:

Community factors play a role in influencing caretakers towards initiation to HPV vaccination when assessed in isolation. Also, factors significantly influence the caretaker's decision to initiate their adolescent girls to HPV vaccination.

Recommendations:

Community health inspectors should adopt the role of sensitization about HPV vaccination against cervical cancer in adolescent girls within the recommended age range of 9 to 14 years as they perform their community health inspection roles.

Keywords: Community Factors, HPV Vaccination, Adolescent Girls, Date Submitted: 2022-04-13 Date Accepted: 2022-08-19

1. Background to the Study

Sub-Saharan Africa has the third highest incidence (17.5%) of cervical cancer cases after India (17.7%) and East and Central Asia (18.2%). The region shares the second largest number of global cervical cancer deaths (21.6%) after India (25.4%). It is the only region where cervical cancer is equivalent to breast cancer with each constituting a quarter of the global cancer burden (IARC, 2020). In Sub-Saharan Africa, the

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East African region registers the highest number of new cervical cancer cases. In SSA, NIPs (national immunization programs) have undergone steady advancements since the establishment of the Expanded Program on Immunization in 1974 (WHO, 2013). Tremendous progress has been made in increasing access to lifesaving vaccines and reducing the burden of vaccine-preventable diseases in the region Despite this, sub-Saharan Africa continues to lag in meeting global immunization targets ((Amponsah 2020)

In Uganda, HPV vaccines against HPV 16 and HPV 18 have been available since 2006. The first HPV pilot vaccination in Uganda was first implemented in 2008 in Nakasongola and Ibanda districts to assess the feasibility of the intervention. (Isabirye 2020). It was later piloted in 12 other districts in 2012. The breakthrough of these pilot projects paved the way for a countrywide roll out of the HPV vaccination in November 2015 .

Uganda is listed among the five countries with the highest cervical cancer incidence rates in the world. It is the most commonly diagnosed cancer and has the highest incidence of malignancy and mortality among women. In 2012, there were an estimated 527,624 new cases and 265,672 deaths due to cervical cancer. 85% of these deaths occurred in sub-Saharan Africa (Nakisige 2017). Cervical cancer is the number one cause of cancer-related death in women in Uganda. The WHO estimates that in 2014 approximately 3915 Ugandan women were diagnosed with cervical cancer and that 2160 died from the disease (ICO Information Centre on HPV and Cancer (Nakisige 2017) Whereas several interventions have been implemented, a 33.6% prevalence of human papillomavirus (HPV) among women in Uganda combined with low screening initiation has resulted in the country having one of the highest cervical cancer incidence rates in the world at 47.5 per 100,000 per year (ICO Information Centre on HPV and Cancer, .

A study carried out in Mbale discovered that only 14% of adolescent girls self-reported HPV vaccine initiation (Nabirye et al. 2020), which is lower than the Lira district which is at 17.4% (Isabirye et al, 2020) and below the national average at 17%. Despite all efforts from the stakeholders, Empirical evidence shows very low HPV vaccine initiation, hence the need for the current study to establish the community factors associated with initiation to HPV Vaccination among Adolescent girls aged 9 to 17 years in Eastern Uganda.

2. Methodology

The methods described in this paper are similar to the ones described in the main paper by (Wangwa, 2022) which was published on 30th June 2022.

Research Design

This study employed a cross-sectional study design and adopted both quantitative and qualitative approaches to data collection. By combining quantitative and qualitative data, we sought convergence and corroboration among the different data sources. The multiple perspectives provided an opportunity to develop a complete understanding of the factors associated with the initiation of HPV vaccination among adolescents aged 9 – 17 years in the Mbale District. The selected design is often identified with survey research, and it is appropriate in situations where there is no manipulation of the study subjects (non-experimental) common in social research. As a one-off design, it helped the researcher to collect data on individual, community, and health systems simultaneously. Additionally, this design allowed the researcher to conduct a comparison of many variables with HPV vaccine initiation to adolescent girls aged 9 – 17 years in Mbale at the same time, as recommended by Nachmias (2005). A cross-sectional survey design allowed; the researcher to collect self-reported data to understand and make conclusions regarding HPV vaccine initiation among adolescent girls aged 9 to 17 years in the Mbale district (Lavrakas, 2008). A cross-sectional design further allowed for an investigation of similar cases at the same time thus, saving time, and costs since data were collected just once using questionnaires. This research design was used by Kisaakye et al. (2018) to conduct a related study in Northern Uganda.

Locale of the Study

This study was done in Mbale District including two city divisions. Mbale District is a district in Eastern Uganda. It serves as the main administrative and commercial center in the sub-region. Mbale District is bordered by Sironko District to the north, Bududa District to the northeast, Manafwa District to the southeast, Tororo District to the south, Butaleja District to the southwest, and Budaka District to the west. Pallisa District and Kumi District lie to the northwest of Mbale District. Mbale, the largest town in the district and the location of the district headquarters, is located approximately 245 kilometers (152 mi), by road, northeast of Kampala, the capital of Uganda, and the largest city in the country. The coordinates of the district are 00 57N, 34 20E. It has an area of 518.8 square kilometers (200.3 sq. mi). The districts of Bududa, Manafwa, Namisindwa, and Sironko were part of the Mbale District before they were split off as independent districts. This area was chosen because prior related studies indicate a very low initiation to HPV vaccines (14%) as reported in Nabirye et al. 2020, compared to the national average of 17%.

Study Population

A study population is a collection of individual units, informants, or respondents to whom the results of a survey are to be generalized . The study population was the Caregivers (parents or guardians) of adolescent girls in the age bracket of 9 – 17 years. The researcher interviewed parents or guardians, preferably females who had adolescent girls aged 9 – 17 years under their care in Mbale District to enlist information on personal and adolescent girl characteristics, health systems factors, and community characteristics.

This study also targeted the health workers in health centres where HPV services are given in the catchment area because of their knowledge and positions as regards HPV. Included also were the household heads who offer care to adolescent girls aged 9 – 17 years living in either rural or urban setup in Mbale District. The age of the adolescents was determined through parents' / Guardians' reports. Further to this, the researcher only proceeded to administer the interview if the caregiver consented to participate in the study. Excluded were those caregivers in households who did not have girls within the age bracket of this study and those who refused to consent to participate in the study.

Sample Size

The sample is the part of the population that helps researchers to draw inferences about the population. Isaac and Michael (1995) indicate that larger sample sizes will result in smaller sampling errors, greater reliability, and an increase in the power of the statistical test applied to the data. Several mathematical formulae have been proposed for sample size determination.

In this study, one of the objectives was to estimate the proportion of HPV initiation by caregivers of adolescents in the age bracket of 9-17 years, which was a dichotomous outcome variable (yes/no) in a single large population of unknown size.

Propose the following formula for determining sample size for unknown large populations ($N > 50,000$).

$n_0 = \frac{Z^2 * p * (1-p)}{e^2}$

Where, n_0 is the sample size. Z, is the value from the standard normal distribution reflecting the confidence level that will be used. e; is the acceptable sampling error p; is the estimated proportion of an attribute that is present in the population.

Here the research planned a study to generate a 95% confidence interval for the unknown population proportion, p. The range of p is 0 to 1, and therefore the range of p(1-p) is 0 to 1. From theory, to generate the most conservative, or largest sample size, p(1-p) has to be maximized and this achievable when p = 0.5 . Z = 1.96 for a 95% confidence level, and the corresponding sampling error (margin of error) = 0.05. Computing these values in the formula yields $n_0 = 385$

The research expects the population of caretakers of adolescents aged 9 – 17 years to be less than 50,000, thus, the finite population correction for proportions was:

$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$

Where; - the initial sample size. - adjusted sam-

ple size N - the expected population size. Population Projections of Mbale District from 2015-2020, puts the population of adolescent girls aged 9yrs to 17yrs at 46,810 (obtained by summing up specific age populations of the females in the target age bracket) in 2020. This number is a proxy approximation of caretakers since the researcher will consider only one adolescent girl in each household.

Substituting these values in formula 2, yields a sample size of 381. For purposes of improving the precision of the sample estimates, the research will take n = 400 for interview-administered questionnaires, a number slightly above the calculated value. All in all, 445 respondents (400 adolescents' caretakers, 10 Key Informants (a health facility in charge and his/her assistant in each sub-county), and 50 village health team members for FGDs will be selected to participate in the study (one FGD will consist of 10 village health teams, two (preferably females) out of an average of 3 per selected villages in selected sub-counties). VHTs are selected on the background that they are knowledgeable about health services in their communities. All contributions from the participants will be appreciated to encourage free interaction to enhance the productivity of the FGD. Each FGD session will be expected to last 15 to 30 minutes, giving every participant at least two minutes to contribute.

Sampling Procedure

The sampling technique is the process of selecting a sample from a given population. This study employed a multistage sampling technique. Multistage sampling has been recommended because it concentrates the sample around several sample points rather than spread them over the entire area to be surveyed and at the same time gives precise estimates, hence reducing the cost Specifically, this study used a three-stage sampling procedure. In the first stage, the researcher stratified the sub-counties by location (urban and rural) and applied simple random sampling by lottery in each stratum to select five sub-counties/ divisions, the primary sampling units (PSU) out of the 21 in the whole district (i.e., Three rural-based and two urban-based). In the second stage, the researcher used a lottery simple random sampling to select three parishes /wards in each sub-county or division, the secondary sampling units (SSU) from each of the selected sub-counties/divisions.

A sampling frame consisting of a household list of adolescent girl caretakers in the selected parishes was constructed. This list was developed with the help of the village health trainers (VHTs) and local council one (LCIs) in the selected parishes. These moved together with research assistants from house to house enumerating caretaker households in which target adolescent girls existed. After listing, the number of respondents per parish was established using probability proportional to size (i.e., a parish with a small number listed contributed a small number of caretakers to participate in the study and vice versa) where the probability of selection was $\frac{number\ listed\ in\ a\ parish(m_i)}{Total\ sum\ listed\ in\ all\ the\ parishes\ (m)}$.

The required sample size per parish was determined using the formula; $\frac{number\ listed\ in\ a\ parish(m_i)}{Total\ sum\ listed\ in\ all\ the\ parishes\ (m)} \times n$, n *being the study sample size* $= 400$. This formula was first proposed .

In each parish, a caretaker to participate in the study was selected using the listing order of household numbers assigned a priori during the listing and interviewed them until the required sample size for the respective parish was obtained. Information was obtained from the caretaker about only one adolescent girl from each household so that the number of caretakers is a proxy for the number of adolescent girls for whom the caretakers provided the information.

Data Collection Methods and Instruments

In this study, both quantitative and qualitative strategies of data collection were adopted. The study adopted both the questionnaire and interview method as the data collection methods in eliciting data from the respondents.

Research instruments

The researcher developed three data collection instruments; The interviewer-administered questionnaire for collecting quantitative data from caregivers of adolescent girls aged 9-17 years, open-ended questions for key informants and focus group discussions questionnaires to collect

Table 1: Sample method, target population and sample size

Category of target population	**Target population**	**Sample size**	**Sampling Method**
Adolescent Girls	46, 810	400	Multistage sampling and Simple Random Sampling
KIs FGDs	56 395	10 50 (5 FGDs x10)	Purposive sampling Purpose Sampling
Total	-	**460**	

Source: Researcher's Intuition based on Sullivan (2020) and Cochran (1977)

qualitative data from the health facility in-charges who were the key informants and from the village health trainers (VHTs) who constituted the FGDs. This strategy of adopting both methods of data collection help to prevent the inefficiencies of using just one method. The questionnaire samples are attached as appendix ii.

Validity and Reliability

Reliability

Reliability is a measure of the consistency of scores obtained (Gray, 2004). Amin (2005) emphasises that reliability is the dependability or trustworthiness of research results or the degree to which a measuring instrument consistently measures what it is supposed to measure.

The reliability of this research tool was assessed through brainstorming on all the question items about the initiation of HPV vaccination among adolescent girls under care. The questions that seemed to have contradictions were adjusted to fit the research context based on the research objectives. The Cronbach-alpha standard measure of internal consistency could not be applied as the mixed nature of questionnaire items could not fit the theoretical assumptions. That is (1) all the item variable values should be on a continuous or Likert scale (2) all the item variables should be dichotomous .

Validity

The validity of an instrument refers to the extent to which the instrument measures what it is intended to measure. Amin (2005) and (Gray, 2004) point out that a research instrument is valid if it measures what it is supposed to measure and when the data collected through it accurately represents the respondents' opinion.

To ensure that there is internal validity of the research instruments used in this study, the researcher first discussed the draft questionnaires with the supervisors and two colleagues (MPH candidates) for scrutiny, language clarity, comprehensiveness of content, length of the questionnaire, and removal of ambiguity. Recommendations of the supervisors, lecturers, and colleagues were used in the correction of the instruments before pre-testing. To ensure the content validity of the instruments, the researcher availed the corrected questionnaires to the research supervisors of Bugema University. The content validity index (CVI) was calculated using the formula below.

$$CVI = \frac{no.\ of\ question\ items\ considered\ relevant}{Total\ no.\ questions\ in\ the\ questionnaire}$$

$$CVI = \frac{28}{33.} = 0.85$$

The CVI calculated results should be within the accepted range of 0 to 1. The result from the computation of CVI were interpreted scale:

Amin (2005) points out that the researcher should consider the content valid only when the CVI > 0.70.

Thus, a CVI of 0.85 was considered good enough for the tool to be used.

Data Collection Process

This study entirely used primary data that was collected using an interviewer-administered questionnaire. Primary data will help the researcher

Table 2: Showing Validity of Instruments

CVI	VALIDITY OF INSTRUMENT
0.90 - 1.00	Excellent
0.80 – 0.89	Good
0.70 – 0.79	Acceptable
0.60 – 0.69	Questionable
0.50 – 0.59	Poor
0.00 – 0.50	Unacceptable

Source: George and Mallery (2003)

to enlist only required information by customising the questionnaire and further minimise missing data (Institute for Work and Health, 2008). The data was both qualitative data and quantitative data, and the quantitative data may be descriptive data or causal data but for this study, the researcher mainly collected quantitative data with a blend of qualitative data. The researcher collected these data through questionnaires .

A community-based survey was conducted in selected parishes while the COVID 19 standard operating procedures of wearing a mask, hand washing, and social distance were maintained. A mixed methods approach was employed using an interviewer-administered questionnaire for quantitative (Seeking numerical) data, focus group discussions, and KIs for qualitative (seeking opinions and motivations to supplement quantitative data.) data. The researcher had a comprehensive consent form for the respondents to sign before participating in the study. The researcher utilized trained research assistants, guided by the LCI council members to access places and respondents in the villages.

Interviewer-administered questionnaires were administered to caregivers of adolescents, 9 – 17 years in the Mbale district. Each caregiver was respondent to only one questionnaire since they are a proxy measure of the required sample size but also to minimize bias. Five FGDs, consisting of village health volunteers, were conducted in the five selected sub-counties / divisions using FGD guides. Ten Key informants, who were the heads of health centres and their assistants, in the health facilities offering HPV vaccine services in the selected sub-counties or divisions were interviewed using interview guides.

Confidentiality and Anonymity were achieved by not asking participants to write their names on the questionnaires but identification numbers (respondent ID). Stringent data Storage and Security Measures were undertaken. The transcribed data was maintained in separate, secure locations and electronic data or files were stored on password protected computer. The researcher sought approval from the Institutional review board. The researcher presented the proposal to Mulago Hospital IRB for approval as well as obtained a Bugema University Graduate school introductory letter:

The researcher also obtained a letter from the DHO of Mbale district to enable him to interact with the health facility staff for the Key Informants interviews. The research participants were also given informed consent where they knowingly, voluntarily, intelligently, and clearly, agreed to participate in the study.

The researcher also observed the principle of beneficence and non-maleficence so that the research findings benefit and do not do harm to the respondents Makore-Rukuni, 2001 & Urombo, 2000).

3. Data Analysis

In this study, both quantitative and qualitative data analysis was undertaken for comprehensive interpretations, discussions, and conclusions.

Collected data were coded on the questionnaire and entered into Stata software. The strange val-

ues/ outliers were eliminated while the missing values were imputed depending on the variable.

Quantitative data were analysed using STATA to generate frequency tables at the univariate analysis level and tests of association and significance at the bivariate. Finally, multivariate analysis to generate odds ratios (a measure of effect) and p- values to assess the factors influencing the initiation of HPV vaccine among adolescent girls in the Mbale district.

Specifically, analysis for each objective was performed as explained in the sections that follow;

4. Results:

According to the previously published article (Wangwa, 2022), out of 400 questionnaires that were delivered to respondents 388 (97%) were returned with sufficient responses. The reason why some questionnaires were not filled was due to misplacement by the research assistants and a few with inadequate responses were ignored. The 388(97%) respondents were considered adequate for this analysis.

5. Table 3: Community characteristics.

Significant at $\alpha = 0.05$

6. Discussion:

Community characteristics

The study investigated the influence of community characteristics on the initiation of the HPV vaccine by the caretakers for the adolescent girls under their care and found out that 300 (77.3%) of the community families support adolescent girls for the HPV vaccine, only 59 (15.2%) reported that the community was a threat to the adolescent girls as regards to HPV vaccine initiation. 359 (92.5%) of the caretakers had a positive attitude and recommended adolescent girls get the HPV vaccine. 274 (70.6%) of the caretakers' average monthly income was between UGX 100,000 and UGX 3000,000.

The community factors that had a significant association with initiation to HPV at the 5% level of significance were; family support($\chi^2 = 7.66,\ df = 1,\ p - value = 0.006$) and caretaker's average monthly income range ($\chi^2 = 31.83,\ df = 3,\ p - value = 0.000$). The rest of the community factors did not show a significant association with initiation to HPV vaccination as they had p-values ≥ 0.05.

Among the community factor influencing initiation to HPV vaccination among girls aged 9 to 17 years only average monthly income in Uganda shillings of the caretaker. Uniquely influenced initiation to HPV vaccination among the girls aged 9 to 17 years in Mbale as evidenced with the following statistics. Relatedly, Sriram, et al (2019) found out that Adolescents from the low-income families were 1.21 times less likely to get vaccinated for HPV.

7. Conclusions

Community factors play a role in influencing caretakers towards initiation to HPV vaccination when assessed in isolation. Also, factors significantly influence the caretaker's decision to initiate their adolescent girls to HPV vaccination.

Recommendations

1. Village health trainers (VHTs) should be empowered to do household surveillance to enlist all adolescent girls who have not yet received the vaccination.

Community health inspectors should adopt the role of sensitization about HPV vaccination against cervical cancer in adolescent girls within the recommended age range of 9 to 14 years as they perform their community health inspection roles.

1. This is supported by Ayissi, et al, (2012), who report that the Community education strategy effectively raises acceptability and generates demand for the HPV vaccine.

8. Acknowledgement:

ALL glory and honor to the almighty God creator of heaven and earth for giving me the ability to go through this journey up to this level. The

Table 3: Community characteristics.

Community characteristics	Frequency(n)	Percentage (%)
Family support for HPV vaccine	**388**	
Yes	300	77.3
No	88	22.7
Support from other social networks	**388**	
Yes	254	65.5
No	134	34.5
Community safety	**388**	
Yes	59	15.2
No	329	84.8
Attitude of Caretakers towards HPV vaccine	**388**	
Positive	359	92.5
Negative	29	7.5
Caretaker's average monthly income	**359**	
Less than UGX 100,000	23	5.9
100000-<300000	274	70.6
300000-<500,000	75	19.3
500,000 & above	16	4.2

Source: Primary Data 2021

Table 4: **Bivariate Results on Community Characteristics Associated with Initiation to HPV Vaccination among Adolescent girls aged 9 to 17 years in Mbale District**

Community characteristics	HPV Initiation Status		Chi-square test Results	
	Yes n (%)	No n (%)	χ2 (df)	p-value
Family support for HPV vaccine			7.66 (1)	**0.006***
Yes	120 (85.1)	180 (72.9)		
No	21 (14.9)	67 (27.1)		
Support from other social networks			1.60 (1)	0.206
Yes	98 (69.5)	156 (63.2)		
No	43 (30.5)	91 (36.8)		
Community Stigma			1.70 (1)	0.192
Yes	17 (12.1)	42 (17.0)		
No	124 (87.9)	205 (83.0)		
Attitude of Caretakers towards HPV vaccine			0.38 (1)	0.537
Positive	132 (93.6)	227 (91.9)		
Negative	9(6.4)	20 (8.1)		
Caretaker's average monthly income			31.83(3)	**0.000***
Less than UGX 100,000	5 (3.6)	18 (7.3)		
100000-<300000	82 (58.2)	192 (77.7)		
300000-<500,000	41(29.1)	34 (13.8)		
500,000 & above	13 (9.2)	3 (1.2)		

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Conflict of interests

No conflict of interests declared.

9. List of Abbreviations

9.1. Operational Definition of Terms

9.2. Individual factors

Age: This was used at the time of study to the period of time a person has existed since birth. It was measured on ration scales as years.

Sex: This was used in this study to describe whether the respondent was a male or female. It was measured on a nominal scale as 1 = male, 2 = female

Religion: This term was to refer to a person's beliefs in terms of faith, worship and deity they revere. This was measured on a categorical nominal scale as follows: 1. Catholic 2. = Protestant 3. = Muslim 4. = Born again 5 = other.

Place of Residence (rural/Urban): This was used in this study to refer to whether the caretaker of the adolescent was living in urban or rural setting. This was measured on a categorical nominal scale as 1 = Rural 2 = Urban.

Family History of cervical cancer: This was used to refer to whether a person's close blood relationship has ever had cervical cancer. This was measured on a nominal scale as 1 = Yes 2 = No

Schooling status: This was used to find out whether the adolescent girls in the study age bracket was in school or not. This was measured on a nominal scale as 1 =Not in school, 2 = In school

Type of school: This was used to find out whether the adolescent who is in school is in boarding section or day schooling section. This was measured on a nominal scale as 1 = Day 2 = Boarding

Household head: This was used in this study to mean whether the caretaker was the head of the household where the adolescent girl lived or not. This was measured on a nominal scale as 1 = No. 2 = Yes.

Marital status: This term was used to refer to whether the caretaker had a spouse or not, by laws and customs of Uganda. This was measured on a nominal scale as 1. Single 2. Married 3. Divorced 4. widowed 5. Separated.

Education Level: This was used to refer to the extent to which the caretaker or adolescent girl in care had attained a formal instruction. This was measured on a nominal scale as 1. No formal education, 2. Primary, 3. Secondary 4. Post-secondary.

10. Publisher details:

Table 5: List of Abbreviations

CBCHS	Cameroon Baptist Convention Health Services
DNA	Deoxyribonucleic acid
FGD	Focus Group Discussions
HBM	Health Belief Model
HPV	Human Papilloma Virus
LC1	Local Council 1
NIPS	National Immunization Programs
WHO CURE	World Health Organization Crippled children rehabilitation effort
IRB	Institutional review board
ID	Identification
UBOS	Uganda bureau of standards
PSU	Primary sampling units
SSU	Secondary sampling Units
TSU	Tertiary Sampling Units
KI	Key Informant
CVI	Content Validity Index

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Author biography

Fred Wangwa The author was born on the 25th of December 1985 to Mr. and Mrs. John and Suzan Makombe of Mbale district in eastern Uganda. He went to Bumbobi Primary School for primary education.

The author attained his certificate of education from Entebbe Secondary School, Then he attended a course in BCP from Bungokho rural development center where he excelled, and after joined All Nations Theological College and Seminary for three years and was awarded an Advanced Diploma in Bible and Theology. After that, the author proceeded to Bugema University, undertaking a Bachelor of Science in Psychology and Counseling, where he excelled and was awarded a first-class degree.

The author has worked with various faith-based organizations, holding leadership positions, the most current being CURE Children's Hospital of Uganda where he is the director of Spiritual ministries.