

# Socioeconomic factors and the evaluation of HIV/AIDS prevention programs: A psychometric analysis of an instrument

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## ABSTRACT

**Introduction:** Research has documented the prevalence of different HIV/AIDS prevention programs launched to reduce the spread of the virus. However, the extent to which the success or otherwise of these programs are achieved is rarely discussed. This study addresses this gap by analyzing the impact of three socioeconomic parameters on the evaluation of HIV/AIDS prevention programs in the Southern Senatorial District of Cross River State, Nigeria.

**Methods:** A sample of 239 health care employees selected using the proportional stratified random sampling technique participated in the study. A priori power analysis (using G\*power) indicated that the sample size was large enough to achieve a 96.7% statistical power. Data was collected using a structured questionnaire. Exploratory factor analysis assessed the dimensionality of the instrument. Acceptable construct and discriminant validity and composite reliability coefficients were obtained. At the .05 alpha level, the null hypotheses were tested using a one-way analysis of variance.

**Findings:** Findings indicated that the evaluation of HIV/AIDS prevention programs significantly varied with the level of funding provided ( $F[2, 236]=81.11, p<.001$ ), human capacity available ( $F[2, 236]=40.91, p<.001$ ), and stigmatization to people living with AIDS ( $F[2, 236]=40.79, p<.001$ ). Health facilities with higher funding and human capacity successfully evaluated HIV/AIDS prevention programs. However, the evaluation of HIV/AIDS prevention programs was lower in areas with a high level of stigmatization.

**Conclusion and implication:** This study's findings provided evidence that funding, human capacity, and stigmatization affect how HIV/AIDS pandemic can be effectively evaluated. This study implies that additional responsibility is required for public health workers to promote quality service delivery across different health facilities.

**Keywords:** evaluation, funding, HIV, human capacity, pandemic, stigmatization

## INTRODUCTION

The pervasive spread of the HIV/AIDS pandemic has attracted the attention of major health institutions and stakeholders. For instance, the United Nations included HIV in its third, fourth, fifth, tenth and sixteenth Sustainable development goals [1]. The damage caused by the HIV/AIDS pandemic is a stark reminder of the need to invest in the health sector. This importance has been exposed with the advent of the COVID-19 pandemic.

Research has documented the prevalence of different HIV/AIDS prevention programs launched to reduce the spread of the virus [2-4]. However, the extent to which the success or otherwise of these programs are achieved is rarely discussed. This seems to be due to the limited studies focusing on evaluating HIV/AIDS programs globally and in Africa. During

pandemics, developing countries like Nigeria are often unprepared because of poor medical infrastructure and healthcare delivery [5,6]. If individuals have the understanding, assistance, and services to choose a new safe behavior, they can make responsible decisions about their health.

For HIV/AIDS preventive programs to be effective, they must be effectively implemented, monitored, and evaluated [7,8]. Over the last decade, significant advancements have been made in collecting, analyzing, and utilizing data regarding persons living with HIV/AIDS. However, previous experience has demonstrated that various HIV/AIDS program indicators must be adjusted to gauge the specialized efforts for its prevention. Much research has focused on risk behaviors linked with health conditions. It has been indicated that two discoveries are fundamental to preventive programming:

- (1) risk behaviors tend to cluster in persons [9] and

(2) risk behaviors have shared determinants since they are impacted by the same protective variables [10].

These findings have significant implications for what must be measured to develop and manage HIV/AIDS programs for individuals. For these reasons, the current study assessed some factors associated with evaluating policies and programs for HIV prevention among people.

Evaluation is a collection of activities to assess a program, intervention or project's value. It can give program managers and policymakers an idea regarding the amount of effectiveness of all HIV-related efforts in a particular district, region, or country. Three socioeconomic elements that may impact the monitoring and evaluation (M&E) of HIV/AIDS preventive programs were investigated. These include funding, human capacity, and stigmatization. As an economic factor, funding could affect the evaluation of HIV/AIDS preventive programs. This is because the number of funds available may enable or hinder the procurement and maintenance of human and material resources for evaluation purposes. According to [11], significant funding is needed to reduce the incidence of HIV and AIDS. Financing for HIV/AIDS and STI programs varies significantly nationwide [12,13].

Studies have proven that the evaluation of HIV/AIDS prevention programs is either neglected or funds are inefficiently allocated in certain nations with relatively good resources for medications and therapy [14,15]. Due to these funding gaps, several donor agencies provide financial aid to needy countries [16,17]. In this regard, the authors in [11] submitted that many developing countries rely on international donations to undertake HIV/AIDS prevention programs. Furthermore, industrialized nations such as the United States, Japan, Canada, the United Kingdom, Germany, and Australia have contributed funding to these nations. Simultaneously, the recession has put pressure on these contributors, reducing aid to several nations [18]. Therefore, donors seeking to know whether funds are appropriately utilized frequently advocate for improved monitoring and assessment.

As a social component, the availability of human capacity is critical for evaluation frameworks to be enhanced. As UNAIDS reports, stakeholder capacity building is crucial to successfully implementing M&E activities and development systems [19]. Human capacity must be strengthened to promote the availability of services and avoid personnel shortages [20]. Poor-quality services and the unfavorable attitudes of certain healthcare providers, particularly adolescents and essential groups, may impede continued access to HIV services [21,22]. Despite the importance of human capacity in evaluating HIV/AIDS preventive programs, past evaluation studies have scarcely included this variable in their framework. Our literature review from 2010 to date only yielded studies on human capacity as a problem affecting HIV evaluation [23,24]. The role of human capacity in evaluating HIV/AIDS has not been empirically proven, at least since 2010. This study seems to be the first to estimate the discrimination in the evaluation of HIV/AIDS prevention programs based on human capacity levels available in healthcare facilities.

Stigmatization is another social component that has characterized the evaluation of HIV/AIDS programs worldwide [25,26]. Stigma and discrimination against infected persons have been recorded, notably in work and access to health treatment, and they frequently extend to family members [27,28]. Stigmatization may delay or hinder treatment among

high-risk individuals living with HIV/AIDS [29,30]. This may contribute to the disease's continued spread within the community, influence healthcare services, and undermine efforts to end the pandemic or curtail its spread [31,32]. According to [33], stigma and discrimination towards persons infected or participating in high-risk behaviors that lead to infection play a pernicious role in spreading HIV/AIDS. The authors in [33] added that if there is stigma and prejudice, people are less likely to seek testing to determine their infection status or other treatments that lower their risk of infecting others.

Studies on stigmatization have focused on its prevalence [34,35]; whilst others have related it to other variables such as racial/ethnic disparities [36], HIV medication [37,38], HIV testing [39,40]. Furthermore, some scholars have assessed stigmatization concerning HIV related risk behavior [41,42], HIV status disclosure [43], and HIV prevention [44,45]. However, past studies seem to have made little effort in associating stigmatization with the evaluation of HIV/AIDS prevention programs. Studies on HIV prevention programs have assessed "couple-focused prevention programs" [46,47], HIV prevention programs for school effectiveness [48,49], care and support [50], parents' HIV prevention program [51], rural prevention programs [3,52], and programs aimed at raising the awareness of youths and adolescents [53,54] and so on. Nevertheless, none of the cited studies considered stigmatization in evaluating HIV/AIDS prevention programs.

The current study was designed based on this premise to quantify the degree to which funding, stigmatization, and human capacity impact the evaluation of HIV/AIDS prevention programs in the Southern Senatorial District of Cross River State, Nigeria. Specifically, we determined differences in evaluating HIV/AIDS prevention programs based on varying funding levels for healthcare facilities. We also assessed the extent to which the evaluation of HIV/AIDS prevention programs differs across healthcare facilities with different levels of human capacity. The study also analyzed the differences in evaluating HIV/AIDS prevention programs based on the level of stigmatization for people living with AIDS. For the investigation, the following null hypotheses were proposed:

1. There is no significant difference in evaluating HIV/AIDS prevention programs based on the funding healthcare facilities receive.
2. There is no significant difference in evaluating HIV/AIDS prevention programs in health facilities with different levels of human capacity.
3. There is no significant difference in evaluating HIV/AIDS prevention programs based on stigmatization in an area.

## MATERIALS AND METHODS

### Research Design

This study used a descriptive survey design within the framework of quantitative research methods and drawing from the philosophy of positivist epistemology. This design was chosen because it allows for observations from a sample to characterize observable occurrences in the population. Besides, it is used based on sample data to verify, describe, and

**Table 1.** Sample of respondents recruited from each group of public health employees

Categories	Population	Sample (40.10% of the population)
Doctors	31	12
Nurses	453	182
Pharmacists	54	22
Laboratory staff	58	23
Total	596	239

Note. Source: Authors' computation

**Table 2.** Scale content validity indices of relevance and clarity for the instrument based on computed average and universal agreement procedures

Content areas	Number of items	Clarity		Relevance	
		S-CVI AVE	S-CVI UA	S-CVI AVE	S-CVI UA
Funding	6	.96	.86	.92	.86
Human capacity	6	.94	.71	.94	.71
Stigmatization	6	.90	.57	.96	.71
Evaluation of HIV/AIDS	6	.92	.93	.92	.86
Instrument total	26	.93	.71	.93	.79

Note. S-CVI AVE: Scale content validity index computed based on average ratings by experts; & S-CVI UA: Scale content validity index computed based on universal agreement among experts

explain the existing condition of the phenomena being researched or that does not exist [55].

### Population and Sample of the Study

The population of this study comprised all public health workers (doctors, nurses, pharmacists, and laboratory staff) in the Southern Senatorial District of Cross River State. According to the information gathered from the Cross River State Ministry of Health [CRSMH], there are 932 health facilities in the state which offer HIV/AIDS related services; the majority of these are publicly owned. Critical cadres of service providers include 56 doctors, 868 nurses, 86 pharmacy staff and 145 laboratory staff [56]. The sample for this study comprised 239 respondents selected from 596 public health workers in the Southern Senatorial District of Cross River State. The sample represents 40.10% of the population, as presented in **Table 1**.

A priori power analysis was conducted using G\*power [57, 58] to determine whether the sample size of 239 respondents was large enough for the study [59,60], given the 95% confidence level and 5% error rate. The analysis revealed that a sample of 30 respondents is large enough to achieve an effect size of 0.80 using one-way ANOVA with three groups. This means that our sample is about eight times larger than is required to achieve a statistical power of 96.7%.

### Instrumentation

The "socioeconomic factors and the evaluation of HIV/AIDS prevention programs questionnaire" (SFEHAPPQ) collected data for this study. The researchers created the questionnaire based on items derived from a review of extant literature. However, the items were tailored to suit the study's sample and based on the conceptualization of the variables. Further, domain experts' inputs were used to assemble a pool of items. The first draft of the instrument was divided into three sections. Section A contained a detailed cover letter, which specified the study's objectives, intended participants, and expected completion time. Section B obtained respondents' demographic details such as gender, age, experience, and occupation. Section C was designed with 32 open-ended items clustered in four domain areas, each comprising eight items. The response options were, as follows: strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD). A sample item for funding is "the Centers for Disease Control and

Prevention (CDC) provides HIV prevention funding to applicants." A sample item for human capacity is "in my facility, there is an epidemiologist". A sample item for stigmatization is "some HIV/AIDS infected patients complain about hostility from family members due to their status." A sample item for the evaluation of HIV/AIDS prevention is "the risk of transmission per contact can be easily estimated using available resources (such as data, facilities, expertise, among others)."

### Validity and reliability

The instrument was submitted to a panel of seven independent experts (three psychometrists and four public health experts) to assess the clarity and relevance of the items. The public health experts were asked to focus on the number of items measuring a domain and to ensure that item pools covered a broad spectrum of the domain requirements for different aspects of the variables. The psychometrists were asked to assess the outlook of the instrument and determine a suitable scaling option for each represented domain. The psychometric experts also ensured that the scale length was consistent with acceptable practices. Based on the suggestions of the expert assessors, six items were dropped. The quantitative approach to content validity [61-63] was performed using the independent ratings provided for clarity and relevance across all the retained items. The computation was based on the degree of universal agreement (UA) and the average proportion of responses. Items with indices of .99 had universal agreement indices of 1.00 but were adjusted to .99 for ease of computation [62]. Items with I-CVI of .80 or higher are retained for clarity and relevance; items between .70 and .79 were revised, whereas those below .70 were eliminated [63]. Following this criterion, the items in the questionnaire were reduced to 24. The scale content validity evidence is summarized in **Table 2**.

Exploratory factor analysis was used to analyze the factorial structure and dimensionality of the instrument. A pilot study was conducted on 71 medical personnel included in the population of this study but not a part of the main study. We selected, at random, 20% of the medical personnel not earmarked for the main study. The pilot sample comprised doctors (n=4), nurses (n=54), pharmacists (n=6), and laboratory scientist (n=7). Copies of the instrument were administered to them once and retrieved for analysis. Because the data

gathered passed the normality test, we used the maximum likelihood (ML) estimation approach. The varimax rotation was used with the extraction based on eigenvalues greater than one and suppress factor loadings less than .30. Convergent and discriminant validity was further performed for construct validity. For internal consistency, composite reliability was performed based on the ratio of the sum of the squared factor loadings after accounting for error variance.

### Ethical Consideration

Ethical clearance was waived for this study as per the national research guidelines, exempting survey-based studies due to the decreased chances of potential harm in responding to a survey. Before administering the instrument, we explained the importance of the exercise and why they should provide honest responses to the items in the instrument. Respondents were also assured that the information they provided would be used purely to achieve the purpose of the study; their details or identity shall not be disclosed to anyone. Written informed consent was obtained from all respondents who signed a form indicating that they understood the study objectives and were willing to participate since there was no potential harm in filling out a questionnaire.

### Data Collection

Primary data were obtained in this study by administering copies of the instrument. The researchers contacted the selected respondents based on the scheduled date allocated for each category. Before administering the instrument to the selected respondents, the researchers sought informed consent from the targeted participants. Fortunately, the 239 respondents all voluntarily consented to participate in the study after the researchers had explained the purpose, benefits, and implications of participating in the study. All copies of instruments administered were collected without loss at the end of the exercise, signifying a return rate of 100 per cent of the instrument's administered copies.

### Data Analysis Procedure

The serial numbers earlier assigned for easy identification were considered in scoring the items. Positively phrased items

on the Likert scale (questionnaire) were scored in reverse order for negatively worded items. After the scoring, all the responses to the items were coded on a person-by-item matrix for analysis. Since six items were used in the final questionnaire to measure funding, stigmatization, human capacity, and the evaluation of HIV/AIDS prevention programs using a four-point Likert scale, a baseline mean value ( $M=2.50$ ) was derived from the average of the response options per item. Across the six items in each variable, the overall baseline mean value ( $M=15.00$ ) was derived by multiplying the item baseline mean value of 2.50 by the six items. A health facility is considered to have high availability of human capacity or funding if the average of all responses is above 15.00. Availability of human capacity or funding is moderate if the average of responses is approaching 15.00, whereas average response scores below 15.00 is a low indication. The same procedure was applied to categorize the level of stigmatization faced by people living with AIDS. For the dependent variable, the average of each respondent's scores across the six items was derived but was not split into three categories. This was done to maintain continuous scores for the dependent variable. The three groups (high, moderate, and low) in funding, human capacity and stigmatization were compared using a one-way ANOVA. The aim was to determine whether there was any significant difference in the evaluation of HIV/AIDS prevention programs among these groups. All statistical analyses were performed using the SPSS version 26 program.

## RESULTS

### Exploratory Factor Analysis

The Kaiser-Meyer-Olkin (KMO) test of sampling adequacy returned a value of .73, suggesting that the sample size of 71 medical staff used in the pilot study was sufficient to do factor analysis of the data (**Table 3**).

The minimal KMO cut-off value is .60 or above. With 276 degrees of freedom, Bartlett's sphericity test returned a Chi-square value of 1,798.67, which was statistically significant at the .05 alpha level. This indicates no redundancy of parameters

**Table 3.** Dimensionality of the instrument using exploratory factor analysis

Item	M	SD	Skew.	Kurt.	$\lambda$	$\lambda^2$	$\epsilon$	Factor
F1	2.33	1.03	.11	-1.15	.87	.76	.24	Funding variance explained=13.6%
F3	2.46	1.06	-.04	-1.21	.77	.59	.41	
F4	2.34	1.06	.09	-1.24	.76	.58	.42	
F6	2.53	1.09	-.15	-1.26	.73	.53	.47	
F2	2.43	1.02	-.01	-1.10	.68	.46	.54	
F5	2.41	1.10	.06	-1.31	.64	.41	.59	
Sum	14.50	6.36	.06	-7.27	4.45	3.33	2.67	
HC6	2.41	1.11	0.16	-1.31	.87	.76	.24	Human capacity variance explained=15.5%
HC5	2.27	1.09	0.27	-1.23	.85	.72	.28	
HC3	2.29	1.05	0.32	-1.07	.79	.62	.38	
HC4	2.36	1.06	0.20	-1.17	.78	.61	.39	
HC1	2.54	1.18	-0.08	-1.48	.74	.55	.45	
HC2	2.34	1.06	0.24	-1.15	.73	.53	.47	
Sum	14.21	6.55	1.11	-7.41	4.76	3.79	2.21	
ST4	2.53	1.07	0.03	-1.24	.92	.85	.15	Stigmatization variance explained=18.8%
ST1	2.51	1.10	0.00	-1.31	.91	.83	.17	
ST3	2.33	1.07	0.17	-1.23	.89	.79	.21	
ST6	2.66	1.12	-0.12	-1.36	.87	.76	.24	
ST2	2.33	1.10	0.32	-1.20	.82	.67	.33	
ST5	2.39	1.16	0.23	-1.40	.79	.62	.38	
Sum	14.75	6.62	0.63	-7.74	5.20	4.52	1.48	

**Table 3 (Continued).** Dimensionality of the instrument using exploratory factor analysis

Item	M	SD	Skew.	Kurt.	$\lambda$	$\lambda^2$	$\epsilon$	Factor
EH2	2.50	1.19	0.00	-1.52	.96	.92	.08	Evaluation of HIV prevention program: variance extracted=23.9%
EH6	2.63	1.17	-0.12	-1.47	.94	.88	.12	
EH4	2.53	1.18	0.01	-1.49	.94	.88	.12	
EH3	2.49	1.26	0.03	-1.66	.94	.88	.12	
EH5	2.40	1.23	0.14	-1.59	.94	.88	.12	
EH1	2.66	1.25	-0.23	-1.60	.90	.81	.19	
Sum	15.21	7.28	-0.17	-9.33	5.62	5.25	.75	

**Table 4.** Correlation matrix latent factors for discriminant validity

Factors	AVE	CR	1	2	3	4
(1) Funding	.56	.88	<b>.75</b>			
(2) Human capacity	.63	.91	.02	<b>.79</b>		
(3) Stigmatization	.75	.95	.03	.00	<b>.87</b>	
(4) Evaluation of HIV/AIDS	.88	.98	.00	.00	.01	<b>.94</b>

Note. Bolded values are square roots of the AVE; Values below the bolded values are correlation coefficients; Convergent validity is achieved when AVE is greater than .50; & Discriminant validity is achieved when the bolded value is greater than the correlation coefficients below it

**Table 5.** One-way analysis of variance result of evaluating HIV/AIDS prevention programs across facilities with three funding levels

Funding levels	N	Mean	SD	SE	95 % CI %
High	78	21.49	4.64	.53	(20.44, 22.53)
Moderate	79	18.27	5.41	.61	(17.05, 19.48)
Low	82	11.68	4.84	.54	(10.62, 12.75)
Total	239	17.06	6.44	.42	(16.24, 17.88)
Source of variation	SS	df	MS	F	Sig.
Between groups	4,014.52	2	2,007.26	81.11	.00
Within groups	5,840.66	236	24.75		
Total	9,855.18	238			

and that the observed correlation matrix deviates from the identity matrix, showing that ML's data reduction is appropriate [64,65]. After six iterations, convergence was achieved with a four-factor solution cumulatively accounting for 71.81% of the overall variance. The first factor (evaluation of HIV/AIDS prevention programs), second factor (stigmatization), third factor (human capacity), and the fourth factor (funding) explained 23.88%, 18.76%, 15.53%, and 13.64% of the shared variance, respectively. Item loadings on the factors varied from .64 to .96 (Table 3).

Composite reliability coefficients such as .88, .91, .95, and .98 were obtained, respectively for funding, human capacity, stigmatization, and the evaluation of HIV/AIDS prevention programs. These values exceeded the benchmark value of .70 (Table 3).

### Convergent and Discriminant Validity

The convergent validity of the instrument was determined by examining the average variance extracted (AVE) per construct. The a priori is that the AVE for each factor must be greater than .50 [66-68]. Table 4 reveals that the AVE for funding, human capacity, stigmatization, and evaluation of HIV prevention programs are .56, .63, .75, and .88, respectively. These values are all greater than the a priori. This implies that convergent validity is established for the four constructs. Thus, the six items measuring each construct are theoretically related [69]. According to Table 4, discriminant validity was achieved for the four factors since the square root of the AVE for all factors are greater than their correlations with other factors.

### Hypotheses Testing

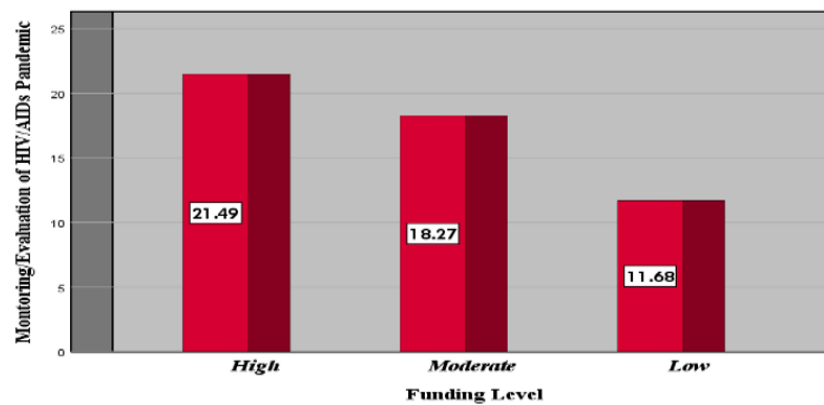
#### Hypothesis 1

The first hypothesis of this study states that there is no significant difference in the evaluation of HIV/AIDS prevention programs based on funding. The independent variable is funding in this hypothesis, categorized into three ordinal levels—high, moderate, and low. The categorization was done using a mean response threshold to demarcate respondents in highly funded facilities from those in moderately and poorly funded facilities. Continuous data were obtained for the dependent variable (evaluation of HIV/AIDS prevention programs) by summing up the Likert scale scores across the six items per respondent. The hypothesis was tested at the .05 level of significance using the one-way ANOVA.

Table 5 indicates that 78, 79, and 82 respondents reported being workers in facilities with high, moderate, and low funding levels. We discovered that the evaluation of HIV/AIDS prevention programs is highest in facilities with a high level of funding (mean=21.49), followed by those with moderate (mean=18.27) and low funding levels (mean=11.68) in that order (Figure 1).

The analysis of variance showed a significant difference in the evaluation of HIV/AIDS prevention programs between facilities with high, moderate, and low funding levels ( $F[2, 236]=81.11, p<.05$ ). Our hypothesis was not supported based on this result, paving the way for adopting the alternate hypothesis. Thus, there is a significant difference in evaluating HIV/AIDS prevention programs across the three funding levels. Since the one-way ANOVA is an omnibus test, the Tukey HSD test of multiple pairwise comparisons was used to evaluate if there are significant differences across funding levels. The Tukey HSD analysis revealed a significant mean difference





**Figure 1.** A bar chart showing the difference in the HIV/AIDS pandemic evaluation across the three funding levels

**Table 6.** One-way analysis of variance result of evaluating HIV/AIDS prevention programs based on human capacity

Levels of human capacity	N	Mean	SD	SE	95 % CI %
High	93	20.02	5.80	.60	(18.83, 21.22)
Moderate	90	17.43	5.85	.62	(16.21, 18.66)
Low	56	11.54	4.62	.62	(10.30, 12.77)
Total	239	17.06	6.44	.42	(16.24, 17.88)
Source of variation	SS	df	MS	F	Sig.
Between groups	2,537.19	2	1268.60	40.91	.00
Within groups	7,317.99	236	31.01		
Total	9,855.18	238			

(MD=3.22,  $p<.05$ ) in evaluating HIV/AIDS prevention programs between facilities with a high and moderate level of funding, favoring the high category. There is a significant mean difference between facilities with high and low funding levels (MD=9.80,  $p<.05$ ) in evaluating HIV/AIDS prevention programs, favoring the former. Lastly, in the comparison between facilities with moderate and low levels of funding, a significant mean difference (MD=6.58,  $p<.05$ ) was recorded in the evaluation of HIV/AIDS prevention programs in favor of the moderate category (**Figure 1**).

### Hypothesis 2

The second null hypothesis of this study states that there is no significant difference in evaluating HIV/AIDS prevention programs in health facilities with different levels of human capacity. The independent variable of this hypothesis is human capacity, which was operationalized into three levels (high, moderate, and low). The dependent variable (evaluation of HIV/AIDS prevention programs) was measured continuously at the interval scale of measurement. This made it appropriate to apply the one-way analysis of variance to compare the evaluation of HIV/AIDS prevention programs across the three levels of human capacity.

**Table 6** shows that 93 respondents were in facilities with a high level of human capacity, while 90 and 56 respondents were in facilities with moderate and low levels of human capacity, respectively. It was also discovered that the evaluation of HIV/AIDS prevention programs was higher in facilities with a high level of human capacity.

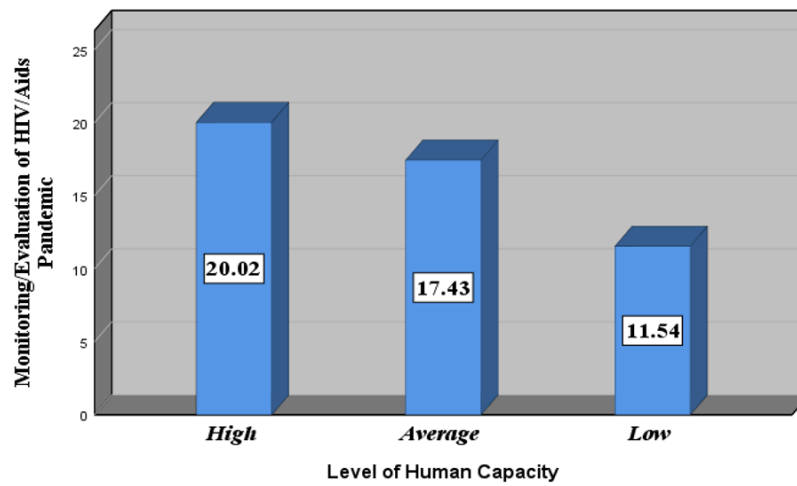
This is followed by facilities with moderate and low levels of human capacity, in that order (**Figure 2**). At 2 and 236 degrees of freedom, **Table 6** revealed an F-statistic of 40.91, with a p-value of .00 less than the .05 alpha level. Our hypothesis was not supported; instead, the alternate hypothesis was upheld. Therefore, there is a significant

difference in evaluating HIV/AIDS prevention programs based on the level of human capacity available.

Further pairwise comparison of the three levels of human capacity using the Tukey honest significant difference (HSD) test was performed. The comparison between high and average levels of human capacity revealed a significant mean difference in evaluating HIV/AIDS prevention programs (MD=2.59,  $p<.05$ ), favoring the high level. The result also revealed a significant mean difference between health facilities with high and low levels of human capacity in evaluating HIV/AIDS prevention programs (MD=8.49,  $p<.00$ ), in favor of the former. Lastly, the comparison between average and low levels of human capacity revealed a significant mean difference in evaluating HIV/AIDS prevention programs (MD=5.90,  $p<.00$ ), favoring the average category. This is illustrated graphically in **Figure 2**.

### Hypothesis 3

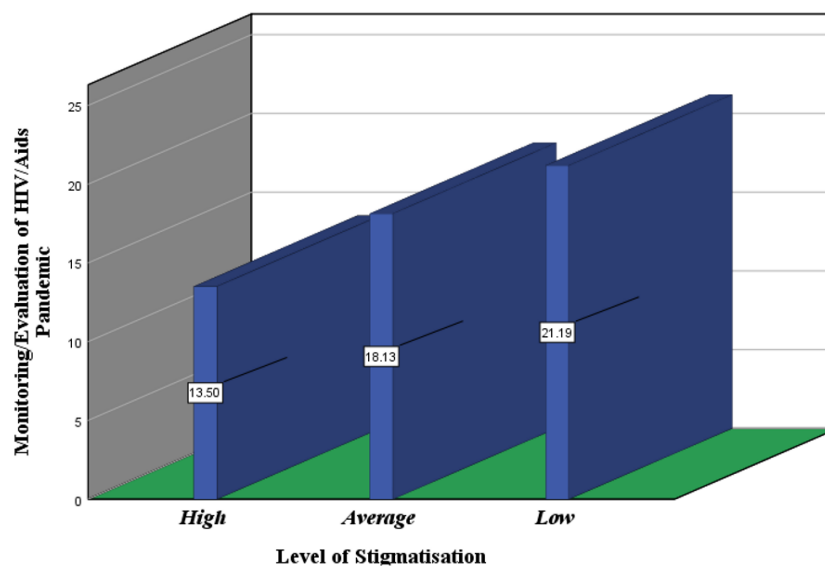
The third hypothesis states that there is no significant difference in evaluating HIV/AIDS prevention programs based on stigmatization in an area. The independent variable of this hypothesis (stigmatization) was classified into high, moderate, and low levels, while the dependent variable (evaluation of HIV/AIDS prevention programs) was measured with continuous data. This made it appropriate to adopt the one-way analysis of variance as the statistical tool for hypothesis testing. **Table 7** shows that 101 respondents indicated a high stigmatization level in their area. In comparison, 69 respondents revealed that the level of stigmatization was moderate and low. **Table 7** also indicates that the evaluation of the HIV/AIDS prevention program is lower in areas with a high rate of stigmatization. This is followed by areas with a moderate level of stigmatization. Nevertheless, the greatest extent in evaluating HIV/AIDS prevention programs was recorded in areas with low stigmatization. The analysis of variance results confirmed a significant difference in the evaluation of HIV/AIDS prevention



**Figure 2.** A bar chart showing difference in evaluation of HIV/AIDS prevention programs across the three levels of human capacity

**Table 7.** One-way analysis of variance results of the difference in evaluating HIV/AIDS prevention programs based on the level of stigmatization

Levels of stigmatization	N	Mean	SD	SE	95 % CI %
High	101	13.50	6.02	.60	(12.32, 14.69)
Moderate	69	18.13	5.56	.67	(16.80, 19.47)
Low	69	21.19	4.86	.59	(20.02, 22.36)
Total	239	17.06	6.44	.42	(16.24, 17.88)
Source of variation	SS	df	MS	F	Sig.
Between groups	2,531.56	2	1265.78	40.79	.00
Within groups	7,323.62	236	31.03		
Total	9,855.18	238			



**Figure 3.** A simple bar chart of mean difference in evaluating HIV/AIDS prevention programs across three levels of stigmatization

programs between areas with high, moderate, and level stigmatization ( $F[2, 236]=40.79, p<.05$ ). Drawing on this result, we rejected our hypothesis favoring the alternate hypothesis.

A further analysis was performed to compare the mean of the evaluation of HIV/AIDS prevention programs across the three levels of stigmatization. The aim is to see if there are significant differences between pairs and uncover the source of variation responsible for the significant F-value. To this end, the Tukey HSD test of multiple pairwise comparisons was employed. It was revealed that there is a significant mean difference ( $MD=4.63, p<.00$ ) in the evaluation of the HIV/AIDS

prevention programs between areas with high and moderate levels of stigmatization (in favor of the moderate category).

Between the high and low categories of stigmatization, there is a significant mean difference ( $MD=7.68, p<.00$ ) in the evaluation of HIV/AIDS prevention (in favor of the low category). There is a significant mean difference between the average and low category of stigmatization ( $3.06, p<.00$ ) in evaluating the HIV/AIDS prevention programs. Therefore, the significant F-value was due to the significant differences among the various levels of stigmatization (**Figure 3**).

## DISCUSSION

Through the first hypothesis, this study discovered that the availability of funds significantly influences the evaluation of the HIV/AIDS prevention programs. This finding was expected because, through the availability of funds, all the needed materials for a smooth evaluation of the HIV/AIDS prevention programs can be procured and maintained. The qualified workforce necessary for the evaluation exercise can be recruited and remunerated for effective service delivery. The availability of funds from the government and voluntary and non-governmental sources can support the acquisition and deployment of tracking tools, software, and hardware packages necessary to keep an up-to-date database and management information system for accessible data collection and retrieval. This explains why a higher evaluation rate was recorded in areas with a high funding rate. This study backs up the claims of Schneider et al. that preventing the spread of HIV and AIDS requires substantial funding [11]. As a result, many impoverished and developing countries rely on international donations to execute HIV/AIDS prevention, treatment, and care programs [11]. According to the National Agency for AIDS Control in Nigeria, monitoring and assessment are critical elements of the Nigerian multi-sectoral HIV/AIDS reaction [70]. Initially, it was developed by HIV sensor monitoring pregnant women seeking prenatal treatment in medical clinics and centers, following WHO international health norms. Nigeria now uses a combination of routine data gathering and occasional surveys to track the HIV/AIDS pandemic and the country's response [70]. However, to achieve this, funds are required.

The analysis of the second hypothesis established in this study that the availability of human capacity significantly influences the evaluation of HIV/AIDS prevention programs. Higher evaluation rates were recorded for health facilities with a high level of available human capacity, such as epidemiologists, statisticians, data scientists, counselling psychologists, professional communications specialists, database administrators, clinical psychologists and so on. These experts can aid in a collaborative effort where each person brings the unique expertise needed to function in an integrated team to attain collective results. The availability of a diverse but synergetic team creates an adequate human capacity where skilled members assume responsibilities based on their specialization, giving room for a division of labor, efficiency, and effectiveness. This conclusion endorses UNAIDS' report that increasing human resource capacity is essential if the proposed surveillance/evaluation of activities and development systems is successfully implemented [19].

Similarly, some scholars maintained that capacity building is crucial for developing surveillance/evaluation systems; networks can be built to access external talents where necessary capabilities cannot be maintained within the national program [71]. This means that efforts must be made to ensure that critical human capacities are always available to evaluate activities. On the contrary, an erosion of human resources in public health facilities means its capacity to develop an effective response to the HIV/AIDS pandemic within a comprehensive development approach is severely jeopardized. It has been claimed that owing to personnel shortages, services may be inaccessible or of low quality [20]. Poor-quality services and the unfavorable attitudes of certain healthcare providers, particularly toward adolescents and

essential groups, may impede continued access to HIV services [22].

The results of the third hypothesis disclosed a significant influence of stigmatization on evaluating HIV/AIDS prevention programs. High evaluation rates of HIV/AIDS prevention programs are associated with lower rates of stigmatization. This implies that the evaluation of HIV/AIDS prevention programs has a higher chance in areas with low than high stigmatization. A possible reason for this finding may be social interactivity among people living with HIV/AIDS (PLWHA), which is likely to be higher with a low rate of stigmatization. It must be noted that social acceptance of PLWHA is likely to increase social ties, communication activities and interpersonal connections with non-infected individuals. Therefore, it is easier and more likely that HIV-infected individuals may reveal important information needed during evaluations to those who relate well with them than those who despise them. Infected people are more likely to be confident around people who love and care for them without minding their status. This is per the belief that stigmatization can lead to delays, failures in seeking treatment and delays in detecting those with high risk [29,30].

This can significantly contribute to the constant progression of the virus in the community, affect healthcare coverage in general and prevent the pandemic from being curtailed [31,32]. Another exposition, which aligns with the result of Bhanot et al., disclosed that stigma and discrimination towards people affected or engaging in high-risk behaviors that lead to infection play an insidious role in the spread of HIV/AIDS [33]. Stigma and discrimination against people sick have been recorded, notably in work and access to health treatment, and they frequently extend to family members [27]. This implies that even close relatives and associates can stigmatize infected relatives. Such stigmatization and discrimination affect how the evaluation of HIV/AIDS prevention programs can be implemented. Therefore, combating HIV/AIDS-related discrimination in society is vital to protect the rights of PLWHA and to increase the effectiveness of HIV/AIDS prevention and testing services [72].

Despite the results' importance, this study faces a few limitations arising from the small sample of respondents covered. This weakens the degree to which generalizations could be made to a broader population. Thus, future studies should consider expanding this study's scope by covering a broader scope. Secondly, the study's use of the quantitative method did not provide detailed information about the funding activities, stigmatization practices encountered by people living with AIDs, and the available human capacity. It is, therefore, suggested that future studies adopt a qualitative or mixed methods approach to replicate this study.

## CONCLUSION AND IMPLICATIONS

This study examined three socioeconomic factors and their influence on evaluating HIV/AIDS prevention programs. This study uncovered some important variation in the monitoring and evaluation of HIV/AIDS prevention programs based on the status of the socioeconomic factors. This study's findings provided evidence that funding, human capacity, and stigmatization affect how HIV/AIDS prevention programs can be effectively evaluated. This study implies that additional responsibility is required for public health workers to promote



quality service delivery across different health facilities. The study will also enable healthcare providers to decide how such challenges can be mitigated for effective and quality service delivery within their authority. The study will also be relevant to health policymakers such as the Ministry of health to identify areas with a shortage of funds and human capacity for evaluating HIV/AIDS prevention programs and make efforts to improve supply. The study is also relevant to society, especially areas with a high rate of stigmatization, by informing them of the consequences of their behavior towards people living with HIV/AIDS. The study is relevant because donor agencies may become aware of how their funds are used to implement HIV/AIDS programs. Through the findings of this study, donor agencies may find a reason to provide funds that should be used to evaluate the programs designed. The study's findings will also give a cause for various non-governmental organizations (NGOs) to strengthen the monitoring and assessment of the initiatives they conduct. This will strengthen the hope of enhancing project performance and responsibility to stakeholders regarding resource utilization and the effect of the projects they undertake.

Based on the study's conclusion, public health facilities or areas with a high success rate in evaluating HIV/AIDS prevention programs should persist in engaging in similar activities needed to sustain the high rate of success recorded. Facilities or areas with poor success rates should strive to improve the quality of HIV/AIDS monitoring/evaluation. A team of professionals comprising at least an epidemiologist, a statistician/data scientist, a counselling psychologist, a communications specialist, a database administrator, and a clinical psychologist should be recruited to anchor HIV/AIDS evaluation activities in each public health facility in the district. The government should organize sensitization campaigns at all levels and in rural communities to enlighten the populace on how to relate to people living with HIV/AIDS. This will help reduce the stigmatization levelled against HIV/AIDS victims and promote the rate of monitoring/evaluation of the pandemic prevention programs in urban and rural areas.

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**Consent to participate:** The authors state that the consent to participate in this study was obtained from all participants. There was an explicit agreement between the researchers and the participants that their data shall only be aggregated without disclosing personal identities. The analysis and presentation of results were also treated aggregately based on the agreement reached with the participants.

**Declaration of interest:** No conflict of interest is declared by authors.

**Data sharing statement:** Data supporting the findings and conclusions are available upon request from the corresponding author.

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