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Limburgs Universitair Centrum
Center for Statistics

Reproductive Health in Sierra Leonean Refugees in Guinea: a Knowledge, Attitude and Practice survey

Telemu Kassile

Supervisor: Dr. Matthias Borchert

Internal Supervisor: Prof. dr. Marc Aerts

FOR REFERENCE
ONLY

Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Applied Statistics.

2001-2002

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1 Abbreviations

RHG	:Reproductive Health Group
RH	:Reproductive Health
IEC	:Information, Education, Communication
GTZ	:Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Co-operation)
KAP	:Knowledge, Attitude, Practice
STIs	:Sexually Transmitted Infections
STDs	:Sexually Transmitted Diseases
UNHCR	:United Nations High Commissioner for Refugees
AIDS	:Acquired Immunodeficiency Syndrome
PLWA	:People Living With AIDS
HF	:Health Facility
GEE	:Generalized Estimating Equations

2 Abstract

Sexually transmitted diseases (STDs), including HIV/AIDS, spread more fast where there is poverty, powerlessness and social instability. The disintegration of community and family life in refugee situations leads to the break-up of stable relationships and the disruption of social norms governing sexual behavior. In refugee situations, populations that have different rates of HIV/AIDS prior to becoming refugees may be mixed. In addition, many refugee situations are like large urban settings and may create conditions that increase the risk of sexually transmitted diseases, including HIV. Therefore, in order to have effective health promotion programs, knowledge on behavioral aspects is required to identify at-risk populations and develop targeted prevention programs with appropriate prevention messages.

The objective of this thesis is to assess the prevalence of relevant knowledge and attitude with respect to STDs and AIDS and to identify subgroups, which are in particular need of the RHG's intervention. More specifically: to assess knowledge about how to prevent and recognize STDs, to identify the most important source of information on STDs, to assess perceived incidence of genital ulcer and genital discharge, to learn about treatment seeking behavior, to assess knowledge about AIDS prevention, to assess perceived risk to attract AIDS and to have an indication whether knowledge and perception have influenced sexual behavior among refugees of reproductive age (15-49 years).

In order to accomplish this goal, logistic regression models, which have become the standard analyzing tool for binary responses in a variety of disciplines, were used to describe the relationships between the responses and the explanatory variables of age, sex, education level, religion, time of arrival in Guinea, civil status, marital status and presence of partner.

Teenagers, non-reproductive health group clients and non-school attendants had less STD symptoms knowledge than the older age groups, reproductive health group clients and school attendants ($\widehat{OR}$=0.186, CI: 0.072, 0.479), ($\widehat{OR}$=0.402, CI: 0.204, 0.793), ($\widehat{OR}$=0.221, CI: 0.095, 0.517) respectively. Women were about 2.5 times more likely to describe STD symptoms than men (CI: 1.206, 5.024).

Non-school attendants and non-RHG clients had less STD prevention knowledge than those who have attended school and RHG clients ($\widehat{OR}$=0.609, C.I: 0.447, 0.829) and ($\widehat{OR}$=0.483, C.I: 0.349, 0.667) respectively.

Over one-quarter (27%) of all the respondents reported that they had experienced genital discharge, genital ulcer or both within the past one year. The perceived incidence for women was 30.3% and 23.6% for men. The most affected refugees were of ages between 20 and 29 years. For this group, the odds of STD incidence were about 53% more than the odds of STD incidence for respondents aged 30 years and above (CI: 1.051, 2.222).

Approximately 78% of all perceived STD patients sought advice at a health facility although women were less likely to seek advice at a health facility than men ($\widehat{OR}$=0.483, CI: 0.241, 0.970). In contrast, women were about 2.1 times more likely to visit traditional healers than men (CI: 1.123, 4.027). 71.4% of all STD patients reported that they told their partners about their symptoms. Those who sought advice at a health facility were more likely to tell their partners than those who did not seek advice at a health facility.

Women scored high in knowledge about AIDS and were also more likely to perceive themselves to be at high risk for HIV than men ($\widehat{OR}$=1.531, CI: 1.138, 2.059). However, they were less likely to report personal changes in their sexual behavior to avoid HIV transmission than men ($\widehat{OR}$=0.710, CI: 0.527, 0.955).

3 Introduction

A massive influx of refugees to the West African nation of Guinea began in 1989 when the Liberian civil war first forced several waves of civilians across the borders. When the Liberian warring factions united with destabilizing forces in Sierra Leone in the early nineties, refugees from Sierra Leone joined the Liberian refugees in the Forest Region of Guinea. The united nations high commissioner for refugees' (UNHCR) attempts to repatriate Liberian refugees which began in 1997 were not successful because the Guinean camps filled up again in 1997/98 when rebels in Sierra Leone started their campaign of slaughter and mutilation of civilians. By 1999 Guinea was host to over 500000 mostly Sierra Leonean refugees[1]

In 1995 refugee women and midwives in the Guéckédou and Kissidougou districts of Guinea founded a non-governmental organization (NGO), the Reproductive Health Group (RHG), which aimed to improve the reproductive health (RH) situation of their fellow refugees and Guinean citizen. RHG's midwives run safe motherhood and family planning (FP) programs and provides treatment for, and prevention of sexually transmitted infections(STIs) and AIDS. Since 1995, the RHG has tried to improve reproductive health (RH) services for Sierra Leonean and Liberian refugees in refugee affected areas of Guéckédou and Kissidougou prefectures. While particular emphasis has been put on FP, prevention of STDs and prevention of AIDS, antenatal and obstetric care are also in the scope of RHG's activities.

Since many refugee situations consist of people from different cultural backgrounds, integration and transformation of knowledge about individuals and groups of people into specific standards, policies, practices, and attitudes used in appropriate cultural settings to increase the quality of health care; thereby producing better health outcomes may require a lot of efforts and resources. To successfully promote behavioral change, it is critical to understand the socio-cultural systems in which the change is implemented and the manner in which it is introduced.

This report presents results of a knowledge, attitude and practice (KAP) survey, which was conducted, based on structured interviews using a questionnaire among a clustered random sample of the source population, stratified according to sex.

[1]Source: UNHCR 1999 census.

This survey was conducted between August and September 1999 among refugees of reproductive age (15-49 years). Although the target population of the reproductive health group intervention consists of mainly three different groups; refugees living in camps, refugees living outside camps (village and towns), it includes also Guineans who choose to use RHG's services. Due to technical reasons and limited resources, the survey was restricted to refugees living in camps, which are covered by the reproductive health group. This area accommodated 77% of the refugee population as a whole and 88% of refugees living in camps.

The aim of this study was to assess knowledge, attitude and practice concerning FP, STDs, AIDS and maternal health of refugees of reproductive age in the Guéckédou and Kissidougou districts of Guinea. However, this report focuses on STDs and HIV/AIDS only. Matters on FP and maternal health are not discussed in this report (see section 16).

4 Objectives of the Study

4.1 General Objectives

The general objectives of the study are:

- to measure prevalence of relevant knowledge, attitude, and practice concerning family planning, sexually transmitted diseases, and AIDS.
- to identify subgroups who are in particular need of RHG s intervention

4.2 Specific Objectives

The specific objectives of the study are:

4.2.1 STDs

- to assess knowledge about how to prevent and recognize STDs
- to identify the most important source of information on STDs
- to assess perceived incidence of genital discharge and genital ulcers
- to learn about treatment seeking behavior

4.2.2 AIDS

- to assess knowledge about AIDS prevention
- to assess perceived risk to attract AIDS
- to indicate whether knowledge and perception have influenced sexual behavior

5 Source Population, Sampling Methodology, Data Collection and Analysis

5.1 Source Population

The sample was drawn amongst refugees of reproductive age (15-49 years) living in the 48 camps served by RHG, which accommodate 77% of the refugee population as a whole and 88% of refugees living in camps.

5.2 Sampling Methodology

The sample size to obtain results significant at the 95% confidence level was obtained using EPI INFO 6; a total of 895 subjects were selected in 45 clusters each containing 20 individuals consisting of 10 males and 10 females. The EPI cluster sampling method was used, identifying clusters with a probability proportional to camp size (based on UNHCR list of figures per camp) and selecting households at random. All household members of reproductive age, who were not permanently absent, were eligible to be interviewed. If the household member was temporarily absent, two further visits were made to try and meet him or her.

5.3 Data Collection

The data set rhg8 was collected based on structured interviews using a questionnaire among a clustered random sample of the source population, stratified for sex.

The questionnaire was designed using items from other validated questionnaires examining knowledge, attitudes and practices in relation to RH. It had 14 pages and consisted of 7 sections: interview information, socio demographic information about the respondent, FP, STIs, AIDS, antenatal care and obstetric care. In relation to STIs and AIDS, respondents were asked if they had ever heard about STIs, their most important source of information about them and which STI symptoms they knew for men and women. To check their knowledge about STI and AIDS prevention, they were given several (partly correct, partly false) statements as to how they could protect themselves, with which they could agree or disagree. In addition they were asked if they had suffered from genital discharge or genital ulcer during the past twelve months and, if so, what they had done about it. Finally, respondents were asked if they saw themselves at any risk to "catch AIDS" and whether and how they had changed their sexual behavior because of the AIDS threat.

5.4 Analysis

To assess whether the variables mentioned in section 4 vary with age, sex, education, religion, time of arrival in Guinea, civil status, presence of partner, age at first intercourse, age at marriage and number of children, logistic regression models, the standard analyzing tool for binary responses in a variety of disciplines are used to describe the relationships.

It is worth noting that a crucial point in standard logistic regression analysis is that observations are independent of one another. Violations of this assumption result in invalid statistical inference. In many areas of application, however, the experimental or survey design is such that variation is present at several levels or strata. In the absence of external effects, units in the same cluster tend to be more alike or positively correlated than units in different clusters. Thus this analysis was done taking into account the possible correlations of individuals within individual clusters. The SAS system, R and/or S-Plus software packages were used in the analysis.

6 Exploratory Analyses

Table 1: Code sheet for selected categorical variables in the rhg8 data set

Variable	Abbreviation
Sex of respondent (Male or Female)	SEX
Country of origin	FCOUNTRY
Religion	RELIGION
Attend school	ATTENDSC
Level of schooling	LEVELSCH
Ever married	MARRIED
Lives with partner in camp	WPARTNER
Have ever heard about STDs	SEXTRANS
Have ever heard about AIDS	HEARDAID

FCOUNTRY: had three levels: Sierra Leone, Liberia and Other.

RELIGION: had 6 levels: 1=catholic, 2=Protestant, 3=Muslim, 4=Traditional, 5=No religion, 7=other. This variable was reduced from 6 levels to 2 levels: 1=Christian and 2=Muslim.

ATTENDSCH: had 2 levels: 1=yes and 2= no, while the variable LEVELSCH had 4 levels: 1=Primary, but not finished, 2=Primary finished, 3=Secondary finished, and 4=Higher finished. For inference purposes, these two variables were combined to form the variable EDLEVEL: 1=Literate and 0=Illiterate.

MARRIED: had 2 levels: 1=yes and 2=no.

WPARTNER: had 2 levels 1=yes and 2= no.

SEXTRANS: had 2 levels: 1=yes and 2= no.

HEARDAID: had 2 levels: 1=yes and 2= no.

Note: The Zero-one coding was used in the analysis for variables with two levels and the variables MSTATUS and PARTNER were used instead of variables MARRIED and WPARTNER respectively.

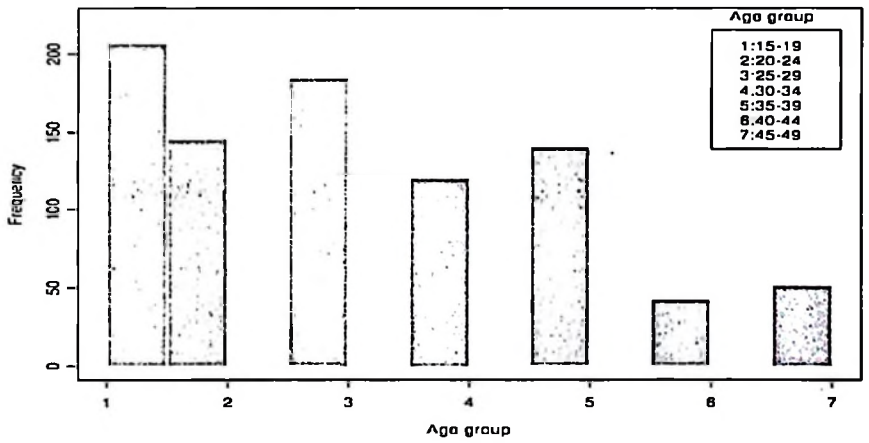
6.1 Distribution of Respondents by Age group and Sex

6.1.1 Age group

Before we attempt to describe how the response variables are related with the covariates, it is intuitively plausible to first describe the data while paying particular attention to age and sex, as these may be important covariates in this study.

Figure 1 below presents a summary of the distribution of the respondents by Age in the range 15-49 years. We observe that teenagers (15-19 years) had the highest proportion-23% (207) of the total sample (895) followed by 21% (185) in the age group 25-29 while respondents in the age groups 40-44 and 45-49 years had respectively 5%(43) and 6% (52) of the total sample.

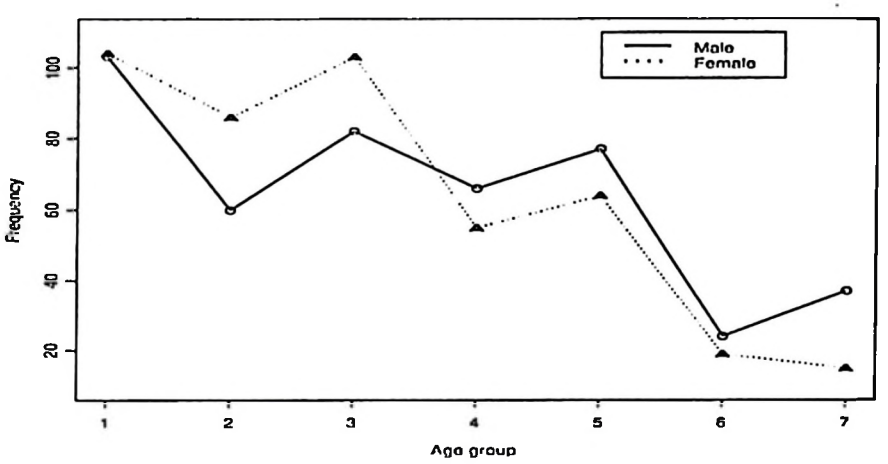
Figure 1: Distribution of Respondents by Age group



6.1.2 Sex

Figure 2 below summarizes the distribution of the respondents by sex. We observe that in each of the age groups 1 through 3 the proportion of females was higher than that of males while in the age groups 4 through 7 had more males than females. However, the difference in proportions between males and females is statistically insignificant at the 5% level of significance (C.I:-0.062, 0.069).

Figure 2: Distribution of Respondents by Sex



Below is a cross-classification of the response variable HEARDAID, if the respondent had heard about AIDS (1= yes, 0= no) by age group. By FREQUENCY, we mean the number of subjects in the cell. For example, 30 respondents in the age group 1 (teenagers) had never heard about AIDS. The second number, COL PCT, is the column percent. Of all the teenagers, 14.5% had never heard about AIDS and 85.5% had heard about it. The association of this explanatory variable (AGRP) with the response variables given in section 4 will be assessed together with the other explanatory variables summarized in Table 1 above.

Table of HEARDAID by AGRP

HEARDAID AGRP

Frequency Col pct	1	2	3	Total
0	30	32	45	107
	14.49	9.67	12.61	11.96
1	177	299	312	788
	85.51	90.33	87.39	88.04
Total	207	331	357	895
	23.13	36.98	39.89	100.00

7 Methodology

Regression models have become an integral component of any data analysis concerned with description of the relationship between a response variable and one or more explanatory variables. It is often the case that the outcome variable is discrete, taking on two or more values. Many distribution functions have been proposed for use in the analysis of dichotomous outcome variable (see Cox and Snell, 1989 for mathematical details). There are two primary reasons for choosing the logistic distribution. First, from a mathematical point of view, it is an extremely flexible and easily used function- possibility of calculating prognoses of the event of interest- and second, it lends itself to a clinically meaningful interpretation.

For a binary response Y and a quantitative explanatory variable X, let $\pi(x)$ denote the "success" probability when X takes value x. This probability is the parameter for the binomial distribution. The logistic regression model has linear form for the logit of this probability,

$$logit\,[\pi(x)]=log\left(\frac{\pi(x)}{1-\pi(x)}\right)=\beta_0+\beta_1 x. \qquad (1.1)$$

This expression implies that $\pi(x)$ increases or decreases, as an S-shaped (typical form for a risk curve) function of x.

The logistic regression equation for multiple explanatory variables is similar to the case where there is just one explanatory variable. When there is more than one explanatory variable, the logistic regression model can be written as:

probability of an event happening, $\pi(x)=\frac{e^z}{1+e^z}$ where e is the natural logarithm base, and z is the linear (systematic) component of the model and equals

$$\beta_0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3+\ldots,+\beta_k x_k$$

that is, $logit\,[\pi(x)]=\beta_0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3+\ldots,+\beta_k x_k$

7.1 Fitting the Logistic (standard) Regression Model

Suppose that we have a sample of independent observations of the pair (x_i, y_i), i=1,2,...,n where y_i denotes the value of the independent variable for the i^{th} subject. Furthermore, assume that the outcome variable has been coded 0 or 1, representing the absence or presence of the characteristic, respectively. Therefore, to fit the logistic regression model to a set of data requires that we estimate the values of β_0 and β_1, the unknown parameters.

In linear regression, the method used most often for estimating unknown parameters is *least squares*. In this method we choose those values of β_0 and β_1 which minimizes the sum of squared deviations of the observed values of Y from the predicted values based upon the model. Under the usual assumptions for linear regression the method of least squares yields estimators with a number of desirable statistical properties (Neter *et al* 1996). Unfortunately, when the method of least squares is applied to a model with a dichotomous outcome the estimators no longer have these same properties.

The general method of estimation that leads to the least squares function under the linear regression model (when the error terms are normally distributed) is the *maximum likelihood*. This method provides the basis of estimation with the logistic regression model.

If Y is coded as 0 or 1 then the expression given in equation (1.1) provides (for an arbitrary value of β=(β_0, β_1), the vector of parameters) the conditional probability that Y is equal to 1 given x, denoted as $P(Y = 1|x)$. It follows that the quantity $1 - \pi(x)$ gives the conditional probability that Y is equal to zero given x, $P(Y = 0|x)$. Thus, for those pairs (x_i, y_i), where y_i =1, the contribution to the likelihood function is $\pi(x)$, and for those pairs where y_i =0, the contribution to the likelihood function is $1 - \pi(x)$, where the quantity $\pi(x_i)$ denotes the value of $\pi(x)$ computed at x_i. Since the observations are assumed to be independent, the likelihood function is the product of the terms $\pi(x_i)^{y_i}[1 - \pi(x_i)]^{1-y_i}$. That is,

$$l(\beta)=\prod_{i=1}^{n} \pi(x_i)^{y_i} \ [1 - \pi(x_i)]^{1-y_i} \qquad (1.2)$$

The principle of maximum likelihood demands that we use as our estimate of β the value, which maximizes equation (1.2). However, in most standard software packages the estimates are given. Fitting the multiple logistic regression model requires that we obtain estimates of the vector β'=$(\beta_0, \beta_1, \ldots, \beta_p)$. The method of estimation used in the multiple regression case is the same as in the simple regression case-maximum likelihood.

7.2 Overdispersion

The correlation between individuals from the same household or clusters (in the case of our data) arises from their sharing specific but unobservable properties of the respective household /cluster. Therefore, fitting logistic regression models to correlated data results into a model, which understates the standard error(s) and thus wrongly inflates the test statistics, and the level of significance. In other words, the variability in the data is in excess of the binomial variation, which is assumed by the logistic regression, a phenomenon that is termed as overdispersion. In our analysis, to correct for overdispersion we used the scaled deviance and Pearson chi-square and the generalized estimating equations procedures described in sections 9.2. The beta-binomial model and scaled Williams (for modeling event/trials) are also used for modeling clustered data, however, these methods are not used here (see McCullagh and Nelder, 1989 for details).

7.2.1 Causes

Overdispersion is common in practice and can arise in a number of ways. The simplest and perhaps the most common mechanism is what we have mentioned above: clustering (dependence among the responses) in the population. However, there are several other possible causes:

- misspecification of the linear component η
- one or more outlier
- incorrect link function

7.3 Modelling Overdispersion

In this section we briefly describe the methods that explicitly account for overdispersion.

7.3.1 Scaled Pearson chi-square or scaled deviance

One way of correcting overdispersion is to multiply the covariance matrix of the parameters by the value of the overdispersion parameter ϕ i.e.,

-the scaled deviance, χ^2_D/DF or

-the scaled Pearson chi-square, χ^2_P/DF

In this correction process, the parameter estimates are not changed. However, their standard errors are adjusted (increased), affecting their significance levels (reduced)

7.3.2 Generalized Estimating Equations (GEE)

The GEE method estimates the regression parameters assuming that the observations are independent. It uses the residuals from this model to estimate the correlations among observations from the same subjects, and the correlation estimates to obtain new estimates of the regression parameters. This process is repeated until the change between two successive estimates is very small.

Correlated data are modeled using the same link function and linear predictor set-up (systematic component) as the independence case. The random component is described by the same variance as in the independence case, but the covariance structure of the correlated measurements must also be modeled.

Fitting Algorithm

Finding the GEE solution requires the following steps:

- Relate the marginal response $\mu_i j=E(Y_{ij})$ to $x'_{ij}\beta$ with a link function, i.e., $g(\mu_{ij}) = x'_{ij}\beta$
- Specify the variance function, i.e., $\text{var}(Y_{ij})=\text{var}(\pi_{ij})\phi=\pi_{ij}(1-\pi_{ij})\phi$
- Compute an initial estimate of β
- Compute the working correlation matrix R_i. Unstructured, autoregressive, exchangeable, m-independent and independent are some of the working correlation structures one can choose. For example, for exchangeable, the working structure is

$$corr(Y_{ij}, Y_{ik}) = \begin{cases} 1 & j = k \\ \alpha_{jk} & j \neq k \end{cases}$$

- Compute an estimate of the covariance matrix:

$$V_i = \phi A_i^{\frac{1}{2}} \hat{R}_i(\alpha) A_i^{\frac{1}{2}}$$

- Update β:

$$\beta_{r+1} = \beta_r - \left[\sum_{i=1}^{k} \frac{\partial \mu_i'}{\partial \beta} V_i^{-1} \frac{\partial \mu_i}{\partial \beta}\right]^{-1} \left[\sum_{i=1}^{k} \frac{\partial \mu_i'}{\partial \beta} V_i^{-1}(Y - \mu_i)\right].$$

- Compute residuals and update V_i
- Iterate until convergence.

The beta-binomial model and scaled Williams (for modelling event/trials) are commonly used for modelling clustered data, however, these methods are not discussed here (see McCullagh and Nelder, 1989 for details).

7.4 Variable Selection

The criteria for including a variable in a model may vary from one problem to another and from one scientific discipline to another. The traditional approach to statistical model building involves seeking the most parsimonious model that explains the data. The rationale for minimizing the number of variables in the model is that the resultant model is more likely to be numerically stable and more easily generalized.

The more variables included in a model, the greater the estimated standard errors become, and the more dependent the model becomes on the observed data. In epidemiological studies, it is suggested that we include all clinically and intuitively relevant variables in the model regardless of their statistical significance. The rationale for this approach is to provide as complete control of confounding as possible within the given data set. This is based on the fact that it is possible for an individual variable not to exhibit strong confounding, but when taken collectively, considerable confounding can be present in the data.

There are several steps that can be used in the selection of variables for a logistic regression model. Listed below are some of the steps.

- Careful simple regression analysis of each variable
- Upon completion of simple regression analyses, we select variables for the multiple regression analysis. Any variable whose univariate test has a p-value < 0.25 is a candidate for the multiple regression along with all variables with known clinical importance. It is however important to take note of the observation made by Hosmer and Lemeshow (2000:95) who have noted that "Use of a more traditional level (such as 0.05) as a screening criterion for variable selection often fails to identify variables known to be important".[2] Once the variables have been identified, we begin with a model containing all of the selected variables.

[2]Hosmer and Lemeshow. Applied Logistic Regression.(Wiley, 2000), p.95

7.4.1 Model Selection-Stepwise Logistic Regression

A stepwise selection procedure for selection or deletion of variables from a model is based on a statistical algorithm that checks for the importance of variables, and either includes or excludes them on the basis of a fixed decision rule. The importance of a variable is defined in terms of a measure of the statistical significance of the coefficient for the variable.

To screen the covariates for significant association with the response variables in our analysis, we employed stepwise selection procedure. The significance of the variable was assessed via the likelihood ratio chi-square test.

At any step in the procedure the most important variable in statistical terms, was the one that produced the greatest changes in the log-likelihood relative to a model not containing the variable (i.e., the one that resulted in the largest likelihood ratio statistic, G). In other words, at any step the most important variable was the one with the smallest p-value and therefore considered to be a candidate for entry into the next step of the algorithm. We used p=0.05 to judge the importance of variables. That is, a variable was judged important to be included in the model if the p-value for G was less than 0.05.

Since the covariates AGRP and FCOUNTRY had three levels, we used age group 3 as our reference group while for FCOUNTRY we used country 1 as our reference country. That is, we compared AGRP1 vs. AGRP3 and AGRP2 vs. AGRP3, country 2 vs. 1 and country 3 vs. 1 respectively. For zero-one covariates we modelled using one as the reference code.

7.4.2 Interaction Terms

In a model involving more than one covariate, the association between the covariates and the outcome variable can either be the same within each level of the risk factor (i.e. group) or can differ and/or depend in some way on the level of the covariates, that is, the covariate modifies the effect of the risk factor. To investigate the presence or absence of interaction(s) we fitted all our models limiting the interaction terms to only two variables, that is, first order interactions.

7.5 Assessing the fit of the model

In assessing the fit of the model we used both the deviance and Pearson chi-square statistics. If the p-value is small, then we have evidence that the model does not fit the data.

Goodness-of-fit statistics are global summary measures of lack of fit. Thus, to investigate further the fit of the model, we checked the Pearson residuals. Values larger than 2 in absolute value are "large".

7.6 Interpretation of the Fitted Logistic Regression Model

The interpretation of any fitted model requires that we are able to draw practical inferences from the estimated coefficients in the model. The question being addressed is: *What do the estimated coefficients in the model tell us about the research questions that motivated the study?* For most models this involves the estimated coefficients for the independent variables in the model. On occasion, the intercept coefficient for the independent is of interest; but this is the exception, not the rule.

In simple logistic regression, we interpret the parameter β_1 from equation (1.1) in section 7 as the change in logit($\pi(x)$) resulting from a unit change in x. In other words, β_1 represents the log odds of an event happening for a unit change in x . In this case, odds of an event happening is $=e^{(\beta_0+\beta_1 x)}$

The parameter values β (the coefficients for the explanatory variables-multiple logistic regression) show the change in logit($\pi(x)$) that is associated with a unit change in the explanatory variable when all other variables in the model are held constant.

8 Results I: STDs

8.1 General Knowledge

8.1.1 Modelling Results

To explore the relationship between the response variable (sextrans:*whether or not the respondent had heard about STDs)* and each of the covariates listed in Table 1, we fitted simple logistic regression models to the data. With the exception of country of origin (p=0.4298), duration of stay in Guinea (p=0.6711), education level (p=0.3131) and whether or not the respondent lives with his or her partner in camp (p=0.329), there was evidence that each of the remaining variables had some association (p<0.25) with the outcome variable.

Results of fitting a multiple regression model containing the covariates significant at the level 0.25 in the simple regression analyses assuming independence of observations-without adjusting for overdispersion- when compared to results from simple regression analyses indicated a weaker association for some covariates when controlling for other variables. In particular, the significance level for the Wald test for the coefficient for mstatus was p=0.7350 and for sex and religion were respectively 0.2929 and 0.1049.

The quantity value/df for both the deviance and Pearson obtained after fitting a multiple regression model without adjusting for overdispersion was found to be 0.6565 (p= 0.8565) and 0.5664 (p=0.9253) respectively, suggesting absence of overdispersion.

However, to investigate further the presence of overdispersion in our data we fitted a model containing all covariates significant at level 0.25 in the simple regression analyses by using the GEE procedure described in section 7.3.2 In this procedure, the quantity value/df for deviance and Pearson was respectively 0.5847 and 1.0220. The parameter estimates and standard errors for the GEE procedure were similar to those obtained from the fit without adjusting for overdispersion. In addition, both methods gave the same significant covariates.

The deviance/df and Pearson/df values examined above were not much different from unit. Therefore, for the outcome variable -SEXTRANS- we did not consider methods for adjusting for overdispersion in the best model selection procedure.

Table 1.1: Results of fitting the logistic regression to the data for the outcome variable SEXTRANS

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\widehat{OR}$	[95%C.I]
Constant	2.5440	0.2037	156.0180	<.0001		
AGRP1	-0.8815	0.2784	10.0229	0.0015	0.414	(0.240,0.715)
AGRP2	0.1480	0.3039	0.2373	0.6261	1.160	(0.639,2.103)

From Table 1.1 above, we see that only the variable AGRP1 is significant at the 0.05 level, as judged by the accompanying Wald statistics. The deviance and Pearson goodness-of-fit statistic are respectively 115.3 at DF=119 p=0.5791 and 126.7, DF=119 p=0.2969. Thus, these measures supports the model's adequacy for the data.

Therefore, the estimated equation is

$$logit(\hat{\pi}) = 2.5440 - 0.8815 * AGRP1 + 0.1480 * AGRP2$$

The predictive probability of SEXTRANS is

$$\hat{\pi} = \frac{e^{2.5440-0.8815*AGRP1+0.148*AGRP2}}{1+e^{2.5440-0.8815*AGRP1+0.1480*AGRP2}}$$

8.1.2 Model Diagnostic Statistics

8.5% of all observations (895) produced a Pearson residual of greater than 2 in absolute value. Considering the sample size, these cases may not have an influence on the model's adequacy.

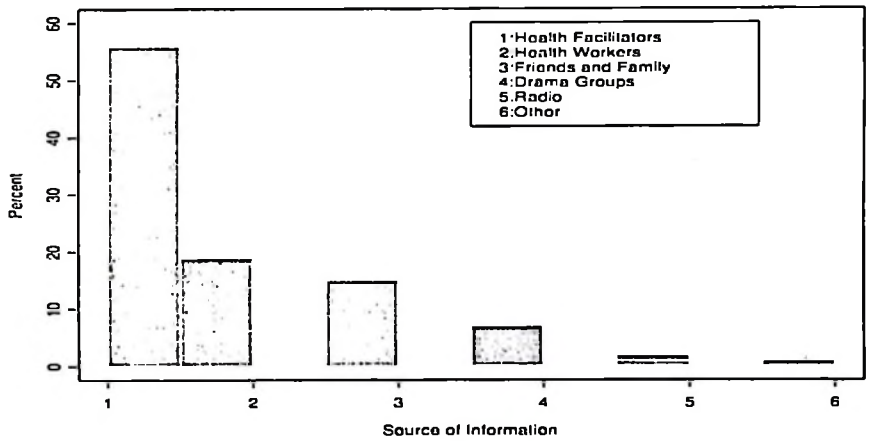
8.1.3 Discussion

Approximately 91% or 815 of all the respondents had heard about STDs while 9% or 80 had never heard about them (C.I: 89, 93) and (C.I: 3, 15.3) respectively. The estimate of the odds ratio for teenagers versus those aged 30 years and above in Table 1.1 is 0.414 with a 95 percent confidence interval of (0.240, 0.715).

Thus, teenagers were approximately 0.41 times less likely to have heard about STDs than those aged 30 years and above and the odds could be as much as 0.24 times or as little as 0.715 times smaller with 95 percent confidence interval. There was no difference in this respect between respondents aged between 20 and 29 years and those aged 30 years and above ($\widehat{OR}$=1.16, C.I: 0.64, 2.10).

8.2 Knowledge on Sources of Information about STDs

Figure 3: Sources of information



The outcome variable: STDFACIL=1 if the respondent named health facilitators as most important source of information, 0 otherwise was modeled against the covariates listed in Table 1. In this case, there was evidence of overdispersion, which was corrected. Tables 1.2 and 1.3 give the results of the stepwise model selection procedure for uncorrected and corrected model respectively.

Comparing results from both Tables 1.2 and 1.3 we see that the standard errors in Table 1.2 are somewhat smaller compared to those in Table 1.3. This is what we pointed out earlier in section 7 that overdispersion tends to underestimate the standard errors and thus wrongly inflate the test statistics and the level of significance as evident from column 5 of the uncorrected results in comparison to those in Table 1.3. However, only the variable AGRP2 (p=0.0413) in Table 1.2 turns out to be insignificant at the 5% level of significance after controlling for overdispersion in Table 1.3.

Table 1.2: Uncorrected results of fitting the logistic regression model to the data for the outcome variable STDFACIL

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\widehat{OR}$	[95%C.I]
Constant	0.0399	0.1309	0.0927	0.7608		
AGRP1	-0.9203	0.2390	14.8276	0.0001	0.398	(0.249, 0.636)
AGRP2	-0.3514	0.1722	4.1618	0.0413	0.704	(0.502, 0.986)
SEX	0.7455	0.1556	22.9534	<.0001	2.108	(1.554, 2.859)
MSTATUS	0.5741	0.2108	7.4129	0.0065	1.775	(1.174, 2.684)

Table 1.3: Corrected results of fitting the logistic regression model to the data for the outcome variable STDFACIL

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\widehat{OR}$	[95%C.I]
Constant	0.0399	0.1464	0.0741	0.7855		
AGRP1	-0.9203	0.2673	11.8528	0.0006	0.398	(0.236, 0.673)
AGRP2	-0.3514	0.1926	3.3268	0.0682	0.704	(0.482, 1.027)
SEX	0.7455	0.1740	8.3483	<.0001	2.108	(1.498, 2.964)
MSTATUS	0.5741	0.2358	5.9256	0.0149	1.775	(1.118, 2.819)

8.2.1 Discussion

As evident from Figure 3 above, more than one-half (55.6%) of all the respondents who had heard about STDs (815), named health facilitators as the most important source of information about STDs (C.I: 51, 60.2). The second most important source of information were health workers named by 19.3% (C.I: 13.1, 25.4) of all the respondents who had heard about STDs. Friends and family were named by 15.3% (C.I: 9.0, 22) as the third most important source of information about STDs. Drama groups and radio were the fourth and fifth important sources of information named by 7.4% (C.I: 0.8, 14) and 1.6% (C.I: -5.2, 8.4) respectively. 0.86% (C.I: -6.0, 8.0) of all the respondents who had heard about STDs named other sources or did not know any source.

Men were less likely to name health facilitators as most important source of information compared to women. 56.7% (C.I: 51.0, 63.0) of all respondents who named health facilitators as the most important source of information were females and 43.3% (C.I: 36.4, 50.2) were males. The odds ratio estimate for sex given in Table 1.3 is about 2.1.

We interpret this to mean that the odds of naming health facilitators for female respondents were about 2.1 (C.I: 1.498, 2.964) times the odds for male respondents.

It is worth noting also from Table 1.3 that teenagers were less likely to name health facilitators as most important source of information about STDs compared to those aged 30 years and above. The odds of naming health facilitators as most important source of information for teenagers were about 0.4 (C.I: 0.236, 0.673) times the odds for similar (with respect to the other covariate in the model) subject for respondents aged 30 years and above.

Dependent variable: STDFRIEN=1 if respondents named friends and family as most important source of information, 0 otherwise.

Table 1.4: Results of fitting the logistic regression model to the data for the outcome variable STDFRIEN

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\widehat{OR}$	[95%C.I]
Constant	-1.8447	0.1876	96.6771	<.0001		
SEX	-1.0465	0.2233	21.9657	<.0001	0.351	(0.227, 0.544)
EDLEVEL	0.9445	0.2317	16.6136	<.0001	2.571	(1.633, 4.050)

In contrast to the results in Table 1.3, 65.6% (C.I: 55.3, 76.0) of all respondents who named friends and family were male while females were 34.4% (C.I: 20.2, 48.6). Thus, being male significantly increases the odds of naming friends and family as most important source of information. Equivalently, the odds of naming friends and family for female respondents were 0.351 of the odds for male respondents.

Non-school attendants were more likely to name friends and family than those who ever attended school. ($\widehat{OR}$=2.571, 95% C.I: 1.633, 4.050).

Dependent variable: STDDRAMA=1 if respondents named drama groups as most important source of information, 0 otherwise.

Table 1.5: Results of fitting the logistic regression model to the data for the outcome variable STDDRAMA

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\hat{OR}$	[95%C.I]
Constant	-3.9920	0.4120	93.8893	<.0001		
AGRP1	2.6129	0.4533	33.2223	<.0001	13.638	(5.609, 33.161)
AGRP2	1.2631	0.4752	7.0658	0.0079	3.536	(1.393, 8.975)

Of all the respondents who named drama groups as the most important source of information, 58.33% were teenagers, while 41.67% were those aged 20 years and above. Thus, teenagers were more likely to name drama groups than the older age groups. The odds ratio estimate indicates that the odds of naming drama groups as most important source of information for teenagers were about 14 of the odds for those aged 30 years and above (C.I: 5.609, 33.161). That is, being teenager significantly increases the odds of naming drama groups. The same is true for respondents aged between 20 and 29 years because for them the odds of naming drama groups were about 3.5 of the odds for those aged 30 years and above (C.I: 1.393, 8.975).

8.3 Symptoms and Prevention Knowledge

Dependent variable: STDSYMP=1 if respondents described at least one significant[3] STD symptom. 0 otherwise

8.3.1 Symptoms

Table 1.6: Results of fitting the logistic regression model to the data for the outcome variable STDSYMP

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\hat{OR}$	[95%C.I]
Constant	4.9626	0.5541	80.2084	<.0001		
AGRP1	-1.6836	0.4836	12.1176	0.0005	0.186	(0.072, 0.479)
AGRP2	-1.0253	0.4476	5.2470	0.0220	0.359	(0.149, 0.862)
SEX	0.9008	0.3640	6.1234	0.0133	2.462	(1.206, 5.024)
RHGCLIEN	-0.9105	0.3460	6.9245	0.0085	0.402	(0.204, 0.793)
EDLEVEL	-1.5080	0.4325	12.1567	0.0005	0.221	(0.095, 0.517)

[3]Significant STD symptoms for both men and women are indicated by dagger (†) in Table (a) of appendix

From the results in Table 1.6 we see that, respondents' knowledge on significant STD symptoms is related to age, sex, RHG's influence and education. Neither duration of stay in Guinea nor presence of partner had an influence on respondent's knowledge on significant STD symptoms, as they are all not included in the final model.

The results show that teenagers were less likely to describe at least one significant STD symptom than the other age groups. In other words, teenagers had less knowledge on significant STD symptoms than the older age groups. The odds ratio estimate indicates that teenagers were 0.186 times less likely than those aged 30 years and above (C.I: 0.072, 0.479). While those aged between 20 and 29 years were about 0.4 times less likely than those aged 30 years and above (C.I: 0.149, 0.862).

Non-RHG's clients were less likely to describe STD symptoms than RHG's clients (e.g. those who named health facilitators and drama groups as the most important sources of information in matters of STDs) ($\widehat{OR}$=0.402, CI: 0.204, 0.793).

We observed earlier in Table 1.1 that sex and education level were not important covariates in predicting respondent's chance to have heard about STDs. Here both sex and education are all significant and we observe that males' knowledge on significant STD symptoms was less than that of females. The odds ratio estimate show that females were about 2.5 times more likely to describe significant STD symptoms than males (C.I: 1.206, 5.024). Non-school attendants were less likely to describe STD symptoms than those who ever attended school ($\widehat{OR}$=0.221, C.I: 0.095, 0.517).

8.3.2 Prevention

The majority of the respondents who had heard about STDs were aware of the correct methods (i.e., staying with one faithful partner 92.8% and using condoms during sexual intercourse 91.4%) to protect themselves from STDs. However, there were also respondents who wrongly believed that swallowing a tablet before sex 37.2% or avoiding public toilets 44.3% or washing after sex for women 28.3% prevents STDs. The majority of these were those who never attended school and non-RHG clients. Thus, non-school attendants and non-RHG clients had less STD prevention knowledge than those who have attended school and RHG clients ($\widehat{OR}$=0.609, C.I: 0.447, 0.829) and ($\widehat{OR}$=0.483, C.I: 0.349, 0.667) respectively.

8.4 Perceived incidence of genital discharge and genital ulcer

Dependent variable: STDINC=1 if the respondent experienced genital discharge, genital ulcer or both, 0 otherwise.

Table 1.7: Results of fitting the logistic regression model to the data for the outcome variable STDINC

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\widehat{OR}$	[95%C.I]
Constant	-0.6428	0.1687	14.5089	0.0001		
AGRP1	-0.1373	0.2834	0.2348	0.6280	0.872	(0.500, 1.519)
AGRP2	0.4242	0.1910	4.9351	0.0263	1.528	(1.051, 2.222)
STDKNOWL	-0.9236	0.3548	6.7780	0.0092	0.397	(0.198, 0.796)
MSTATUS	-0.7798	0.2508	9.6689	0.0019	0.458	(0.280, 0.750)
EDLEVEL	-0.4131	0.1769	5.4540	0.0195	0.662	(0.468, 0.936)

There is some evidence that AGRP2, respondent's knowledge about STDs, respondent's marital status, and education level are determinants (p= 0.0263, 0.0092, 0.0019, and 0.0195 respectively) of perceived STI incidence during the past 12 months.

27% (241) of all the respondents (895) said that they had experienced genital discharge, genital ulcer or both during the past one year. The perceived incidence for women was 30.3% while for men was 23.6%.

Those who never married and those who never attended school were less likely to experience an STI symptom during the past one year than those who got married and attended school ($\widehat{OR}$=0.458, C.I: 0.280, 0.750 and ($\widehat{OR}$=0.662, C.I: 0.468, 0.936) respectively.

Refugees who had knowledge (symptoms and prevention) about STDs were more likely to experience genital discharge, genital ulcer or both during the past one year than those who had no knowledge about STDs ($\widehat{OR}$=0.397, CI: 0.198, 0.796).

Respondents aged between 20 and 29 years were more likely to experience an STI symptom than those aged 30 years and above. From the odds ratio estimate we see that those aged between 20 and 29 years were about 1.5 times more likely to experience an STI symptom in the past one year than those aged 30 years and above.

In other words, the odds of experiencing a genital discharge, genital ulcer or both for respondents aged between 20 and 29 years were about 53% more than the odds for respondents aged 30 years and above. (C.I: 1.051, 2.222). There was no difference in this respect between teenagers and those aged 30 years and above, ($\widehat{OR}$=0.872, C.I: 0.500, 1.519).

It is however important to note that being female is found to significantly increase the likelihood of experiencing an STI (simple regression analysis results, p=0.0243- details not shown) but not consistently so. When considered in a model that includes all the covariates, being female is not significant.

8.4.1 Reaction on STIs

Dependent variable: SEEKADVI=1 if the respondent sought advice at a health facility, 0 otherwise.

Table1.8: Results of fitting the logistic regression model to the data for the outcome variable SEEKADVI

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\widehat{OR}$	[95%C.I]
Constant	2.0509	0.3415	36.0662	<.0001		
AGRP1	-1.1929	0.4553	6.8650	0.0088	0.303	(0.124, 0.740)
AGRP2	-0.3043	0.3715	0.6709	0.4127	0.738	(0.356, 1.528)
SEX	-0.7271	0.3492	4.3370	0.0373	0.483	(0.244, 0.958)

Over three-fourths (77.6%) of all perceived STI patients sought advice at a health facility (CI: 71.6, 83.6). There was no difference between refugees aged between 20 and 29 years and those aged 30 years and above. However, young refugees were less likely to seek advice at a health facility compared to those aged 30 years and above. For them the odds of seeking advice at a health facility were about 0.3 times the odds of seeking advice for those aged 30 years and above (C.I: 0.124, 0.740).

Neither having STD knowledge nor being an RHG's client was found to be a significant factor in determining perceived STD patients' behavior both to seek advice at a health facility and stop having sex. 71.1% of all female STI patients sought advice at a health facility, while for men, 86% of all STI patients sought advice at a health facility. Thus, females were less likely to seek advice at the health facility than males.

The odds of seeking advice at a health facility for females were about half (0.483) of the odds for males (C.I: 0.241, 0.970). In contrast, females were more likely to visit a traditional healer than males. 29% female against 16% males ($\widehat{OR}$=2.127, C.I: 1.123, 4.027).

Of all the respondents who experienced genital discharge, genital ulcer or both, 77.6% said that they stopped having sex when they experienced these symptoms. Men were more likely to stop sex than women ($\widehat{OR}$=0.048, C.I: 0.014, 0.159): 97.2% males against 62.2% females.

71.4% of all STD patients reported that they told their partners when they experienced one or more STD symptoms. However, those who did not seek advice from a health facility were less likely to tell their partners than those who sought advice at a health facility ($\widehat{OR}$= 0.322, CI: 0.171, 0.606).

9 Results II:AIDS

9.1 General Knowledge

9.1.1 Modelling Results

As for the outcome variable SEXTRANS, in an attempt to obtain a general understanding of the covariates associated with the outcome variable HEARDAID (*whether the respondent had heard about AIDS*). The variables sex, country of origin and duration of stay indicated weak association with the outcome variable (details not shown). As one would expect, the variable EDLEVEL was highly associated (p<0.0001) with the outcome variable.

Model fit to the data without adjusting for overdispersion identified the same variables as those identified by the GEE procedure. The parameter estimates and standard errors were also similar in both procedures. There was also no indication of overdispersion of the model to the data as both the deviance and Pearson value/df in the standard and GEE procedures were respectively 0.8145 and 0.7898 for standard and 0.6844 and 0.9823 for the GEE.

Table 2 shows the results of the model selection procedure, in contrast to the model for the dependent variable SEXTRANS from which we observed that respondent's education was not an important covariate in predicting whether he/she had heard about STDs. Here we see that education level steals significance from the other variables and becomes the most important predictor variable (p<0.0001). The variable AGRP1, which was significant in Table 1.1 barely fails to meet the 5% significance test.The deviance and Pearson goodness-of-fit statistics are respectively 100.2 on DF=118, p=0.8810, and 103.2 DF=118, p=0.8324 suggesting no evidence of model's inadequate to the data.

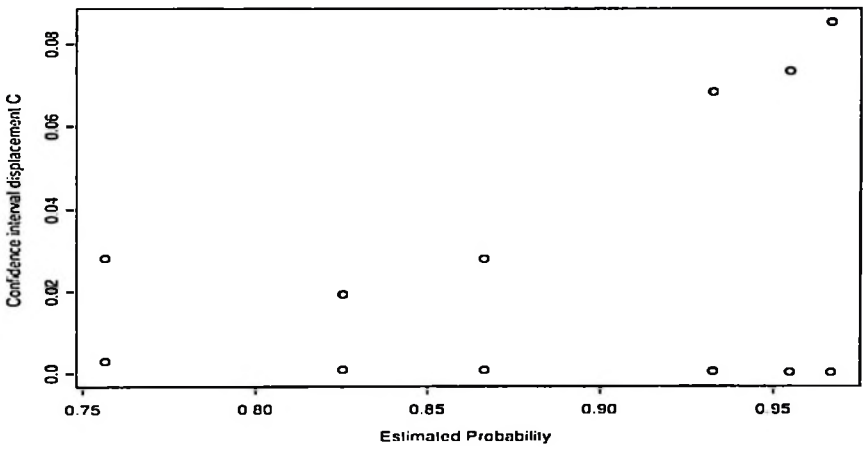
Table 2: Results of the stepwise selection procedure for dependent variable HEARDAID

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\hat{OR}$	[95%C.I]
Constant	3.0462	0.2827	116.1420	<.0001		
AGRP1	-0.4208	0.2638	2.5449	0.1170	0.656	(0.391, 1.101)
AGRP2	0.3160	0.2488	1.6125	0.2041	1.372	(0.842, 2.234)
EDLEVEL	-1.4924	0.2732	29.8422	<.0001	0.225	(0.132, 0.384)

9.1.2 Model Diagnostics

In Figure 4 below we see some few points that lie somewhat away from the rest of the data. The values themselves are not especially large, as all are less than 0.3. Hosmer and Lemeshow (2000) have argued that the influence diagnostic must be larger than 1 for an individual covariate pattern to have an effect on the estimated coefficients.

Figure 4: Plot of $\Delta\hat{\beta}$ versus the estimated probability from the fitted model in Table 2



Thus, the estimated equation is

$$logit(\hat{\pi}) = 3.0462 - 0.4208 * AGRP1 + 0.3160 * AGRP2 - 1.4924 * EDLEVEL$$

The predictive probability of HEARDAID is

$$\hat{\pi} = \frac{e^{3.0462 - 0.4208 * AGRP1 + 0.3160 * AGRP2 - 1.4924 * EDLEVEL}}{1 + e^{3.0462 - 0.4208 * AGRP1 + 0.3160 * AGRP2 - 1.4924 * EDLEVEL}}$$

9.1.3 Discussion

Approximately 88% of all the respondents had heard about AIDS (CI: 85.7, 90.6) while 12% (C.I: 5.8, 18.2) had never heard about it. There was no difference in terms of number of respondents who had heard about AIDS between the sexes: that is 44% females and 44% males. In this case teenagers were not less likely to have heard about it than those aged 30 years and above ($\widehat{OR}$ =0.656, C.I: 0.391, 1.101).

There was no difference also in this respect between respondents in the age group 20-29 and those aged 30 years and above (CI: 0.842, 2.234).

Non-school attendants were less likely to hear about AIDS than those who have attended school: the odds of hearing about AIDS for non-school attendant refugees were 0.225 of the odds for those who have attended school. In other words, the odds of hearing about AIDS for literates were about 4.4 times the odds for illiterates (C.I: 0.132, 0.384).

9.1.4 Knowledge and attitude

This section explores self-perceived knowledge about HIV prevention, beliefs about who is at risk and concern about the epidemic. Results for several HIV/AIDS knowledge items are presented in Table(c) of the appendix. The majority of respondents who had heard about AIDS knew that staying with one faithful partner prevents AIDS (95.81%, CI: 94.4, 97.2). Over three-quarters of those surveyed knew that assuring clean injection needle and using condoms prevents AIDS (94.4%, CI: 92.0, 95.5) and (93.7%, CI: 90.7, 94.5) respectively.

While 84.63% of the respondents who had heard about AIDS knew that an HIV-infected pregnant woman can infect her unborn child (CI: 82.0, 87.4), 70.43% of the respondents wrongly believed that infected individuals always look sick (CI: 67.7,73.2): only 23.48% knew that he/she may look healthy (CI: 17.4, 29.6).

Although the majority of the respondents indicated to have AIDS prevention knowledge, over one-half (53.81% CI: 49.1, 58.6) believed that mosquitoes transmits AIDS, thus, avoiding being bitten by them prevents AIDS.

Dependent variable: AIDSKNOWL=1 if the respondent scored at least 5 points on AIDS knowledge items summarized in Table (c) of the appendix, 0 if less than 5. 1 point for each correct answer, maximum 10 points.

As evident from the results in Table 2.1 above, both females and school attendants had more AIDS knowledge than males and those who never attended school, ($\widehat{OR}$=2.078, CI: 1.433, 3.011) and ($\widehat{OR}$=0.477, CI: 0.327, 0.697) respectively.

Table 2.1: AIDS Knowledge

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\widehat{OR}$	[95%C.I]
Constant	1.4403	0.1523	89.4962	<0.0001		
SEX	0.7312	0.1894	14.9114	<0.0001	2.078	(1.433, 3.011)
EDLEVEL	-0.7392	0.1934	14.6174	<0.0001	0.477	(0.327, 0.697)

Approximately half (49.2%) of all respondents who had heard about AIDS did not perceive themselves to be at risk for HIV (CI: 44.3, 52.4). Roughly 34 percent (CI: 28.0, 39.2) felt that their chances of getting infected with HIV is low, while only 10 percent believed that their risk is high (CI: 3.1, 16.4).

48.5% of the women perceived themselves to be at high risk for HIV, while for men, 38.1% perceived themselves to be at high risk for HIV. Thus, females were more likely to perceive themselves to be at high risk for HIV than males (OR=1.531, CI: 1.138, 2.059).

Neither being at high risk for HIV nor their higher knowledge about AIDS influenced female respondents to change their sexual behavior to avoid AIDS transmission. Females were less likely to report personal changes in their sexual behavior than males ($\widehat{OR}$=0.710, CI: 0.527, 0.955): 62.7 percent females reported to have changed their behavior while 70.3 percent males reported to have changed their personal behavior to avoid HIV transmission.

Among those who reported to have changed their behavior due to the AIDS threat, approximately three quarter (74.8%, CI: 70.5, 79.1) said that they started making these changes a long time ago while the remaining quarter (25.2%, CI: 17.8, 32.6) started making the changes within the past 12 months.

65.7% of all respondents who reported to have changed their behavior to avoid being infected with HIV they decided to stay faithful (CI: 60.6, 70.7). 81.4% of all women who decided to change their behavior, staying faithful was their chosen option in contrast to men (51.6%).

Having less casual partners[4], as a strategy to avoid HIV infection was the chosen option by the majority of men than women: 15.9% men versus 6.5% women.

[4]Casual partners were defined as "any partners that were not part of a long-term or committed relationship"

Table 2.2: Results of fitting logistic regression model to the data for dependent variable USECONDO (1= used condoms, 0 otherwise)

Variable	Coef.	StdErr.	WaldChisq	Pr>Chisq	$\widehat{OR}$	[95%C.I]
Constant	-0.5764	0.1972	8.5451	0.0035		
SEX	-1.8521	0.3790	23.8831	<.0001	0.157	(0.075, 0.330)
DURSTAY	-0.5861	0.2896	4.0950	0.0430	0.557	(0.315, 0.982)
EDLEVEL	-0.8652	0.3045	8.0715	0.0045	0.421	(0.232, 0.765)

As pointed out in the above section, females' knowledge and perception about AIDS did not influence their behavior because less than 5 percent of all women who reported to have changed their behavior said they are now using condoms with casual partners 2.4% or always 1.6%. On the other hand, approximately 25% (24.6%) of the men said they are now using condoms with casual partners 13.4% or always 11.2%. Thus, women were less likely to use condoms either with casual partners or always than men ($\widehat{OR}$=0.138, CI: 0.068, 0.280).

Recent arrival refugees and those who have never attended school were also less likely to use condoms. For them, the odds of using condoms either with casual partners or always were respectively 0.557 (CI: 0.315, 0.982), and 0.421 (CI: 0.232, 0.765) of the odds for those who had already spent some time in Guinea and school attendants.

Roughly 8% reported that they have stopped having sex. It is worth mentioning that refugees who were living with their partners in camps were less likely to report this behavioral change than those who were not living with their partners in camps ($\widehat{OR}$=14.8, CI: 5.461, 40.578).

Respondents who had heard about AIDS were asked to ascertain their opinions regarding the existence of AIDS. 98.7 percent (CI: 97.9, 99.5) said AIDS really exists while 1.3 percent said AIDS does not really exist.

10 Conclusions and Recommendations

10.1 Conclusions

Our analysis of the data indicates that the single most important covariate in determining whether respondents had heard about STDs is AGE. We found that young refugees were about 0.41 times less likely to have heard about STDs than those aged 30 years and above (CI: 0.64, 2.10).

Among those who had heard about STDs, our results indicate that there was some evidence which shows that respondent's age, sex, education level and reproductive health group's influence were important explanatory variables in determining respondents' STD symptoms knowledge. Teenagers, males, non-school attendants and non-RHG clients were less likely to know STD symptoms than the older age groups, females, school attendants and RHG clients respectively. In contrast to STD symptoms knowledge results, the variable RHG was found not to have any influence on refugees' STD prevention knowledge. The variable EDLEVEL remained to be statistically significant in predicting respondents' STD prevention knowledge.

Health facilitators, health workers, friends and family were the most common sources of information in matters of STDs accounting for 56%, 19%, and 15% of the respondents who had heard about STDs respectively. The majority of teenagers also identified drama groups to be the most important source of information.

A total of 241 or 27% of all respondents (895) experienced genital discharge, genital ulcer or both in the past 12 months. The perceived STD incidence for women was 30.3% and 23.6% for men. However, in determining the perceived STD incidences within the past one year we found that, age, STD symptoms and prevention knowledge, marital status and education level were the most important covariates. Refugees aged between 20 and 29 years were the most affected ones ($\widehat{OR}$=1.528, CI: 1.051, 2.222).

Evidence shows that female STD patients were about half (0.483) times less likely to seek advice at a health facility than male STD sufferers (CI: 0.241, 0.970). In contrast, female STD patients were more likely to visit traditional healers than males ($\widehat{OR}$=2.127, CI: 1.123, 4.027).

Neither the effect of STD knowledge nor RHG's interaction with refugees was found to be significant in influencing refugee STD patients' behavior. However, those who did not seek advice from a health facility were less likely to tell their partners about their symptoms than those who sought advice from health facility ($\widehat{OR}$=0.322, CI: 0.171, 0.606).

In assessing knowledge about AIDS, evidence revealed that both age and education level were significant explanatory variables in knowing whether or not the respondent had heard about AIDS. 88 percent of the respondents had heard about AIDS. Non-school attendants were less likely to have heard about AIDS than school attendants (OR=0.225, CI: 0.132, 0.384). Similarly, females and school attendants had more AIDS knowledge than males and non-school attendants ($\widehat{OR}$=2.078, CI: 1.433, 3.011) and ($\widehat{OR}$=0.477, CI: 0.327, 0.697) respectively.

More women perceived themselves to be at high risk for HIV than men ($\widehat{OR}$=1.531, CI: 1.138, 2.059). However, they were less likely to report changes in their personal behavior to avoid AIDS transmission than men. For example, 70.3 percent men reported to have changed their personal behavior due to the AIDS threat compared to 62.7 percent of women .

Although condom use has been shown to decrease the risk for HIV infection (DiVincenzi, 1994), only 4 percent of the women said they are now using condoms with casual partners 2.4% or always 1.6% compared to approximately 25 percent of men said they are now using condoms with casual partners 13.4% or always 11.2%. Recent arrival refugees and non-school attendants were less likely to use condoms than those who had already spent some time in Guinea and school attendants.

Generally, respondents' age, sex, and education level are seen to be the most important explanatory variables in individual's knowledge and attitude with respect to STDs and AIDS.

10.1.1 Practical Limitations

This study was limited in several ways. First, because of limited resources and for technical reasons, the survey was restricted to refugees living in camps, more specifically in 48 camps, which are covered by RHG's activities. Second, the survey was limited to the age group 15 to 49 years. Third, the design (cross-sectional) does not allow to study the time sequence of events. Thus, given these limitations, these results may not be generalized to the entire RHG target population, which consist of three different groups: refugees living in camps, refugees living outside camps (villages and towns) and Guineans who choose to use RHG's services.

10.2 Recommendations

The presence of an STD in either partner can greatly increase the probability of transmitting HIV if either partner is HIV positive. To avoid this risk and to ensure the effectiveness of RHG's STD prevention programs, it is recommended that:

- Health clinics should have a reliable supply of STD drugs and condoms.
- Special program for high risk people (women) is set up.
- Involvement of private practitioners- pharmacists, traditional healers, private doctors and midwives is necessary.
- Important messages related to the effects of STDs should be conveyed to the refugee community through a variety of media (radio, plays/drama, school curriculum) as well as through health care workers. It is crucial that consistent messages be conveyed to the target (high-risk) population through all channels.
- People should be informed about the essential services provided at different health facilities, so that they are used to the best advantage.
- People should be encouraged to recognize STDs, use condoms, and to have only one sexual partner.
- Surveillance should be conducted to identify the most prevalent STDs.

11 Future Analysis

[1] A suggestion for additional analysis would be needed to examine the effects of the explanatory variables (covariates) on knowledge, attitude and/or practice jointly (multivariate response variables) using both conditional and marginal models. Such an analysis may be able to tell whether or not knowledge, attitude, and/or practices are correlated and thus increase our understanding of the most significant explanatory variables with regard to knowledge, attitude and practice. Reference: Fahrmeir, L. and Tutz, G. (1994). *Multivariate Statistical Modelling Based on Generalized Linear Models*, section 3.5. Springer-Verlag, New York.

[2] Family planning (FP) helps save women's and children's lives and preserves their health by preventing untimely and unwanted pregnancies, reducing women's exposure to health risks of childbirth and abortion, giving women who are often the sole caregivers in most African families, more time to care for children and themselves. All couples have the right to decide freely and responsibly the number and spacing of their children and to have access to the relevant information including education and other means. Thus, future analysis remains to be done:

- to assess knowledge about the purpose of FP, its methods and their availability
- to identify the most important source of information on FP
- to establish knowledge about the attitude towards FP
- to assess ever and current user of FP
- to learn about reasons for not using FP
- to identify preferred supply sources and reasons for this preference
- to know the opinion concerning FP sensitization of young people

In a situation like this (where households have different probabilities of being selected into the sample) to ensure that the survey results could be generalized to the greater population, normally weights are developed to account for different probabilities of selection of a household into the sample. Thus, in the suggested future analysis, weights will be developed (in STATA) to account for different inclusion probabilities.

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13 Appendix

Table (a): STD symptoms description by sex

N=815*

Symptoms	Percent
Females	
Abdominal pain	33.9
†Discharge from vagina	66.3
Itching in genital area	40.6
†Burning pain on urination	44.9
Pelvic pain during sex	25.4
†Genital ulcers/open sores	38.4
Swelling in the genital area	7.0
Blood in urine	19.4
Failure to pass urine	6.4
Loss of weight	16.2
Inability to conceive	2.5
Males	
Abdominal pain	11.4
†Discharge from penis	77.6
Itching in genital area	16.3
†Burning pain on urination	71.7
Pain during intercourse	9.9
†Genital ulcers/open sores	47.9
Swelling in the genital area	16.1
Blood in urine	28.8
Failure to pass urine	14.9
Loss of weight	14.4
Impotence	4.7

* Only respondents who had heard about STDs.
† Significant STD symptoms.

Table (b): STD prevention knowledge and treatment seeking behavior by sex

N=815*

Method	Percent	
	Female	Male
+Using condoms during sexual intercourse prevents STDs	91.3	91.6
+Staying with one faithful partner prevents STDs	93.9	91.6
−Swallowing a tablet before sex prevents STDs	32.5	41.9
−Avoiding public toilets prevents STDs	43.1	45.8
−Washing after intercourse for women prevents STDs	33.0	23.6
Reaction		
Seek advice from a health facility	71.3	85.9
Visit a traditional healer	29.5	16.0
Buy medicines in a pharmacy	16.3	67.0
Buy medicines on the market or in shops	17.8	29.3
Tell partner(s) about the symptoms	66.7	77.4
Stop having sex	62.8	97.2
Use condom when having sex	3.9	2.8

*Only respondents who had heard about STDs.
+ True STD prevention knowledge.
−Wrong beliefs.

Table (c): AIDS knowledge and attitude by sex

N=788‡

Method	Percent	
	Female	Male
+Staying with one faithful partner prevents AIDS	97.8	94.9
+Assuring clean injection needle prevents AIDS	95.7	93.0
+Using condoms during sexual intercourse prevents AIDS	94.9	92.5
+Infected mother gives birth to infected child	88.0	81.7
−Avoiding public toilets prevents AIDS	45.0	43.7
−Avoiding touching PLWA prevents AIDS	22.0	28.6
−Avoiding sharing food with PLWA prevents AIDS	21.7	36.7
−Avoiding being bitten by mosquitoes prevents AIDS	46.1	60.9
−Eating good diet prevents AIDS	19.2	23.2
−A person with AIDS looks sick	74.8	66.3

‡Only respondents who had heard about AIDS.
+True AIDS prevention knowledge.
−Wrong beliefs.
PLWA: People living with AIDS.

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