Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.36, 2017

Determinants of Clients Satisfaction in HIV Testing and Counseling: A Multilevel Logistic Regression Analysis on Ethiopian Service Centers

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Abstract
HIV testing has been a cornerstone of HIV prevention efforts since 1985 when an accurate and reliable test for the HIV antibody became available. This study investigated determinants of client satisfaction in HIV counseling and testing at Hawassa city. The data were collected from eleven service centers administered by Government, NGO and private sector using Stratified random sampling design. Due to Hierarchical nature of the data, multilevel logistic regression models were used to analyze the data. The descriptive analysis showed that the HIV counseling and testing service satisfaction distribution among the eleven centers ranges from 39.7% to 67.1% with about 52.4% average satisfaction. The Multilevel analysis showed that about 2.4% of the variation in clients' satisfaction was due to unobserved service center characteristics (with a VPC of 0.024). The random intercept model showed that income, age, prior expectation, actual service rating of client level predictors and client-physician interaction, convenience of service center, waiting time of the service center level predictors were found statistically significant. The Random coefficient/slope model with income as a random factor across service centers resulted that except prior expectation, all the predicators significant in the random intercept model were still statistically significant. Generally, the study identified clients' income, age, prior expectation, actual service rating, client-physician interaction, convenience of service center, waiting time in the service centre as a determinants of clients satisfaction at the HIV counseling and testing.
Keywords: Multilevel analysis, HIV testing, Client satisfaction, Ethiopia

1. Introduction

By the end of 2007, about 31 million adults and 2.5 million children were living with HIV. More than 25 years into the AIDS pandemic, HIV infection rates remain very high, with 2.5 million people newly infected with HIV in 2007. Sub-Saharan Africa continues to carry the greatest burden of disease. With just about 12% of the world's population (PRB, 2007), Sub-Saharan Africa is home to nearly 68% of all people living with HIV. In 2007 alone, an estimated 1.7 million people became newly infected in Sub-Saharan Africa, with more than 1.6 million dying of AIDS which is 76% of all AIDS deaths globally (UNAIDS & WHO, 2007).

The first HIV infections in Ethiopia were identified in 1984, and the first AIDS cases reported in 1986. In 1987, the government established an HIV/AIDS department within the Ministry of Health, and in 1988, an HIV surveillance system was established. In 1989, the Health Bureau of the Addis Ababa City Administration began HIV sentinel surveillance. Currently, there are 34 HIV sentinel surveillance sites reporting to the MOH. As the overwhelming majority of them are in urban areas, an enormous segment of the rural population remains uncovered by the current system, despite that 85 percent of the population lives in rural areas.

HIV/AIDS increased rapidly during the 1990s. By 1989, HIV prevalence among the general adult population was estimated at 2.7 percent, increasing to 7.1 percent in 1997 and to 7.3 percent in 2000. In 2001, this figure was 6.6 percent. However, the MOH does not believe that this fall indicates that the HIV epidemic in Ethiopia is declining; rather, it is primarily a result of the reclassification of one sentinel site. The MOH (2001) estimates that 2.2 million Ethiopians were living with HIV/AIDS in 2001, of whom 2 million were adults. During the early stages of the HIV/AIDS epidemic, there was a major effort to conduct series of surveys in Addis Ababa and other major urban centers among core transmitter groups. However, post-1990, there are very few data to indicate the level or progression of the epidemic among sex workers and truck drivers, as well as traders/merchants and the military. .

AIDS case reporting began soon after the establishment of the HIV/AIDS department within the MOH in 1987. AIDS cases are grossly underreported. Among women, AIDS cases peak between ages 20 and 29; for men, between ages 25 to 34. The group with the highest HIV prevalence in the country is women ages 15 to 24. Data from blood donors, visa applicants, and police and army recruits indicate that HIV prevalence among men peaks between ages 25 and 29. This is likely related to age mixing, wherein young women have older male sex partners, primarily for economic reason (Garbus, 2003).

The Government of the Federal Democratic Republic of Ethiopia has taken several measures to fight the disease and mitigate its impact. In 1985 (before the first AIDS case had been officially diagnosed), it established a national HIV/AIDS task force and issued the first AIDS control strategy. In 1987, it established an HIV/AIDS department within the Ministry of Health, and in 1988, an HIV surveillance system was established

with a major effort to conduct sero-surveys in Addis Ababa and other major urban centers among core transmitter groups. In 1989, the MOH drafted a four-point policy statement on AIDS prevention, and the first draft of a national policy was created in 1991, though not approved until 1998.It resulted in the five-year Federal Level Multi-Sectoral HIV/AIDS Strategic Plan and accompanying Regional Multi-Sectoral HIV/AIDS Strategic Plans. These plans were synthesized into the Strategic Framework for the National Response to HIV/AIDS in Ethiopia for 2001-2005/10.

Over the last few years, there have been some achievements in the area of HIV/AIDS prevention and control activities. In addition to the production and dissemination of various guidelines, the Ethiopian strategic plan for intensifying multi-sectoral HIV/AIDS response and accelerating access to ART have been launched. Nationwide, the numbers of VCT sites has increased several folds (Damene *et al.,* 2005).

1.1 Statement of the Problem

HIV testing has been a cornerstone of HIV prevention efforts since 1985 when an accurate and reliable test for the HIV antibody became available (CDC, 1994,2001; WHO, 1990). At present, changes in the technology of testing (e.g., rapid point-of-care testing, home testing) and the enhancement of services for specific populations (such as repeat testers or pregnant women) put even greater emphasis on the need for a clear understanding of what happens when the test is applied and the effectiveness of the pre-test and post-test encounters for HIV prevention and/or treatment. In this study, quality of HIV testing and counseling service will be investigated from clients'/Patients' perspectives (on, and conceptualizations of, testing services). Hence, the questions to be addressed will be:

- What are determinants of patients satisfaction in HIV testing and counseling (accounting for both patient and service center level)
- How much is the variation at patient level accounting for patient satisfaction in HIV testing and counseling.
- How much is the variation at service center level accounting for patient satisfaction in HIV testing and counseling.

1.2 Objective of the Study

The main purpose of this study is to identify factors that affect patient's satisfaction in HIV testing and counseling in Hawassa City by using multilevel logistic regression model.

Specific Objectives of the Study

- To identify client level determinants of satisfaction in HIV testing and counseling
- To identify Service center level determinants of client Satisfaction in HIV testing and counseling
- To investigate client satisfaction variation across HIV testing and counseling health centers
- To specify the over all determinants of patient satisfaction in the HIV testing and counseling taking in to account the Hierarchical nature of the data

2. Literature Review

2.1. Quality in Health care System

There is no single, universally accepted definition of health care quality. This is because health care quality involves descriptions of many different, complex aspects of care from several different perspectives. Quality may be measured in terms of outcomes, the end results of care and treatment, or it may be evaluated in terms of process, the way in which the care is delivered. The definition also depends on who is describing quality. Researchers, health care providers, government, and consumers may all assess health care quality differently. In the book 'Managing the quality of health care in developing countries', Geyndt (1995) presented the following are some of the definition. Good medical care is a kind of medicine practiced and taught by the recognized leaders of the medical profession at a given time or period of social, cultural and professional development in a community or population group (Lee and Jones, 1962). Standards of quality of care should be based on the degree to which care is available, acceptable, comprehensive, continuous and documented, as well as on the extent to which adequate therapy is based on an accurate diagnosis and not on symptomatology (Eselstyn, 1958). Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired outcome and are consistent with current professional knowledge (Institute of Medicine,1990).

2.2 Indicators of Quality of Health care

Quality indicators are specific and measurable elements of practice that can be used to assess the quality of care. They are usually derived from retrospective reviews of medical record or routine information sources. Good quality indicator should define care that is attributable and different within the control of the person who is delivering the care. Quality Indicators are different from guidelines, which are statements of good practice, often loosely defined, that can be used prospective to guide care. Quality indicators are also different from standards.

Quality of care can be defined and measured from the following three angles (Geyndt, 1995):

Structure measurement: Structure denotes the attribute of the setting in which the provision of health care occurs. Structural inputs are concrete, countable, measurable and often visible. Major categories are: physical inputs, staffing, Finance and Organizational arrangement

Process measurement: The process of patient care transforms inputs (structure) into outcomes and has been likened to the "black box" concept in engineering. Process denotes what is actually done to and for the patient in giving and receiving care. It includes the patient's activities in seeking care and carrying it out as well as the practitioner's activities in making a diagnosis and recommending or implementing treatment. Process measures seek to identify problems that interfere with the proper delivery of health service. It also assesses the functions carried out by health worker or physicians and how well they do them.

Outcome Measurement: Outcome denotes the effects of care on the health status of patients and populations through a less impairment of function, less pain and suffering, and less illness. Outcomes are the end results of the process of patient care and of the timely availability of the necessary inputs. They also include the "improvement in the patient's knowledge, changes in the patient's behavior… and the degree of patient's satisfaction with care". The five D's: death, disease, disability, discomfort and dissatisfaction have been suggested as out come measure (Elinson, 1987). Patient satisfaction measures address various aspects of patient experience in comparison to their expectations. Well-developed instruments for measuring the effects of changes in systems of care are in a variety of care setting and are increasingly sophisticated. Outcome measures is in some ways the ultimate form of quality measurement because what interests most people is whether care improved the patient's health (Donaldson, 1999).

2.3. Determinants of client satisfaction in HIV testing and counseling

2.3.1 Patient level factors

Including patient's characteristics in the analysis of satisfaction is important, because quality problems should not be entirely attributed to service providers (Fontana & Vargas, 2001). Accordingly, the following client level factors are considered in this work.

Age: Older respondents generally record higher satisfaction (Pope and Mays, 1993; Williams and Calnan, 1991; Owens and Batchelor, 1996) - possible explanations include lower expectations of health care and reluctance to articulate their dissatisfaction. (Irish society for quality and safety in health care,2003). Age is a well known determinant of the patient satisfaction Index (PSI) with older scoring more highly and being more satisfied than young and middle aged patients (Rahmqvist, 2001).

Gender: Gender is also another demographic factor that most studies including quality of health care are studied with. Both gender groups will not react to the studies on this area and many others in the same manner (Pol and Thomas, 2000).

Educational level: Patients' educational level is one of the determinants of clients' satisfaction with care delivered. A study conducted by Rochester & Cleveland Showed that lower patients' education was associated with a higher proportion of time spent on the counseling and questioning (Kevin *et al*., 2002).

Health status: while some studies have found that sicker patient/clients and those experiencing psychological stress are less satisfied, with the possible exception of some chronically ill groups, distinguishing between the experience of sickness or experience of health service treatment or other factors as causes of dissatisfaction has proven difficult (Hall and Milburn, 1998; Cleary *et al*, 1992)

Income: people seek inexpensive health care providers and the poor are especially likely to seek less expensive. Empirically, price is often correlated with quality: more expensive facilities tend to have higher quality. Since there are few high quality facilities, on average patients are further away from such providers and have to pay more both for the travel and for care. There is, therefore, a trade-off between quality and cost (Atanga, 2003).

Marital status: marital status is also another demographic factor in line with the above mentioned ones that determines the quality of the care provided. Married people will not react in the same manner to the unmarried ones (Pol, & Thomas, 2000).

Waiting Time: better clinic organisation needs more systematic data upon which to be based. Evidently, it is necessary to have a systematic recording basis for both patient arrivals, patient appointment times and the lengths of their consultations. The amount of time spent waiting in outpatient clinics has often been a source of dissatisfaction (Hart and Dyson, 2004).

Service Expectation: It refers to the clients/patient expectation towards the HIV testing and counseling service before coming to the Hospital/Clinc/Health Center.

2.3.2 Service center level Factors

Physician –Patient/client interaction: there is consistent evidence across settings that the most important health service factor affecting satisfaction is the patient/client-practitioner relationship, including information and technical competence (Crow et al, 2003).As with other chronic diseases, the patient-provider relationship plays a critical role in patient outcome within the HIV/AIDS population. According to Robinson (1998), patient

satisfaction with health care is a primary outcome measure of quality of care (Keleekai, 2004).

Physicians are angry, frustrated, and working harder than ever to adapt to changes and pressures and to continue to deliver high quality medical care despite the obstacles. Patients are angry, frustrated, and working harder than ever to learn how to cope with changing rules and doctors. The cornerstone i.e. physician patient interaction, has been chipped, eroded somewhat, but not destroyed and is still recognizable easily whenever some circumstance, scheduled or otherwise, brings together the physician and patient no matter the setting. (Rogers, 2007). Physician lack of warmth and friendliness was one of the most important variables related to poor levels of patient satisfaction and compliance. patients and doctors disagree over the relative importance of imparting different types of medical information; patients place the highest value on information about prognosis, diagnosis and causation of their condition while doctors overestimate their patient's desire for information concerning treatment and drug therapy (Kindelan and Kent, 1987) . Doctors in turn seemed to speak as if their patients understood all that they said. Physicians deliberately used highly technical language to control communication and to limit patient questions - such behaviour occurred twice as often when doctors were under pressure of time (Svarstad, 1974). The longer the doctor waits before interrupting at the beginning of the interview, the more likely she is to discover the full spread of issues that the patient wants to discuss and the less likely will it be that new complaints arise at the end of the interview (Beckman and Frankel, 1984).

Appropriate time spent with patients : ccompared with all other strategies, having more time with patients is seen as very effective in improving quality of care by the greatest number of physicians. One-half of physicians (52%) believe that having more time to spend with patients would be very effective in improving the care they provide (Marie *et al*., 2005).

Team work and communication: Medicine is necessarily an interpersonal endeavour that requires communication and coordination among people of differing background and status – in other words, teamwork. (Helmreich, *et al*.). Teamwork can be defined as a "set of interrelated behaviours, actions, cognitions and attitudes that facilitate the required task work that must be completed." Lack of teamwork has been identified as leading sources of adverse events in medicine. Team behaviour and coordination, particularly communication or team information sharing, are critical for optimizing team performance. Healthcare should be considered a team sport. Teams take care of patients. Furthermore, healthcare teams operate in an environment characterized by acute stress, heavy workload, and high stakes for decision and action errors. Individuals have limited capabilities. When the limitations are combined with organizational and environmental complexity, human error becomes virtually inevitable (the Royal College of Nursing and the British Geriatrics Society, 2000).

Continuous training: For the physicians to provide quality care through which a patient gets satisfied their knowledge status is very determinate. To provide a quality HIV testing and counseling, in addition to their existing previous knowledge, they should be given a continuous training regarding the recent research finding on the area. As the issue of HIV is a soft-spot and needs higher privacy level, different countries are continuously revising their national policies on it. When new policies are also developed, the training regarding the national policy should be given so that the respective physicians can have enough knowledge (Thomas *et al*., 2005).

Salary and incentives: Health workers need to be educated and trained, remunerated and paid adequately (wages/salaries that meets their and their families' basic needs); and provided with decent workplaces. In most, if not all countries, the authority and responsibility for these components of health systems and workforce management are not with the health sector but in other sectors like education, finance and civil service. The poor salaries and incentives of doctors and other health professionals is a fundamental factor that leads to even bigger problems: increasing costs /charges for services (the poor suffer more); increase private practices; demoralizing workers, limiting access to safe and quality care, loss of trust by doctors in the system; and loss of public trust in health professionals – thus those with money go abroad for medical care. Tackling these issues need high level leadership and coordination among key players (WHO report, 2007).

Poor working conditions: The inability of employers of health workers to create safe, satisfying and rewarding work conditions is a significant factor in the health care worker shortage in all countries. We know that health workers are very likely to reduce their hours at, or leave, health care workplaces that do not guarantee proper working conditions. Some health care workers will migrate to other countries in pursuit of a better work environment. Others will abandon the health profession entirely. The attrition of the health workforce is a very pressing issue. At a time when many countries are failing to produce sufficient numbers of new health workers, it is essential that urgent steps are taken to secure the existing pool of health care workers and ensure that avoidable causes of health worker attrition are swiftly addressed. It is stressful for workers not to have the basic "tools of the trade" available to them and demoralizing to know that their efforts are impaired. Health care workers may find themselves infected with disease because of lack of adequate protections in the workplace and this is a common trend in the poor countries. This, in turn, leads to illness and death of the health care workers and their families. Buchan and Calman (2003) call this "Critical Challenge #1" for the global shortage of registered nurses (Buchan and Calman, 2003). The impact of this challenge is felt most acutely in Sub-Saharan Africa in countries with a high incidence of HIV/AIDS (Brien & Gostin, 2009).

Work Load: In Africa, many staff work double shifts and work through their holidays in order to make up for staff shortages. At the same time as dealing with increasing amounts of work under challenging conditions, many health care workers, particularly nurses, report dissatisfaction with many aspects of the workplace culture and management (Brien & Gostin, 2009).

3. Methodology

3.1 Study population: The target population of this study was people that took HIV testing and counseling in both Government and private owned hospitals/Health center/Clinics

3.2. Sampling Design and Techniques: Multilevel analysis problem concerns population with hierarchical structure of data. A sample from such a population can be described as multistage stratified sample (here two-stage). There were three strata i.e Government owned service centers, private owned service centers and those owned by NGOs'. Hence the sampling design followed the procedure below. From all the Hospitals/Health centers/Clinics, at first stage, a sample of service centers that provide the HIV testing and counseling service were selected and at the second stage a sample of patients within the selected Hospitals/Health centers/Clinics were selected. This leads to multistage stratified sampling.

3.3. Sample Size Determination : Using the proportional allocation of Stratified sampling formula, the sample size was (Chocran, 1977).

$$n = {}^{n_0}\!\Big/\!_{(1+{}^{n_o}\!/\!_{N})}$$

Where:

$$n_o = \frac{Z^2 \sum w_h p_h q_h}{d^2}$$ h=1, 2, 3 denotes the three strata

$w_h = {}^{N_h}\!/\!_{N}$; N_h is the total number of population in stratum h. and w_h is the weight attached to each stratum h.

p_h is the proportion of patients' satisfaction with HIV testing and counseling for h stratum and they are: p_1 = 0.6 (Thatsanai T.,2007), p_2 = 0.52 (Ny Net, 2007), p_3 = 0.63 (Amin K. M., 2007). The desired level of precision, d= 0.07 is estimated accounting for the cost, time and other constraints, though it is known that the larger the sample, the more precise the estimates will be. $Z_{\alpha/2}$ =1.96 is the critical value for a 95 % confidence interval in a normal probability table. Hence 255, 153 and 102 will be the proportional to size allocated sample of the three strata respectively.

3.4 Data Collection Method: The data collection was carried out from the service centers (Hospitals/Clinics/Health centers), from both Government owned and private owned, that provide HIV testing service and the patients within each service center.. Both primary and secondary data (on the details of the patients) were made use of. Primary data was collected using Questionnaire and Interviews, as per the situation. Trained manpower was employed for the data collection and a continuous supervision of the researcher have backed it up. Furthermore; the consent of participant patients and physicians was confirmed being fully informed of the study objectives prior to either the interview or filling the questionnaire.

3.5 Study Variables

Dependent variable: Patients satisfaction is taken as a dependent variable. As it takes categorical values, it was classified as "satisfied" and "Not satisfied" outcomes.

Independent variable: The independent variables are categorized as patient and Service center level variables.

Patient Level Variables: include age, gender, marital status, health status, income, and knowledge status and service expectation.

Service center Level Variables: include physician patient interaction, appropriate time spent with patient, team work and communication, continuous training, salary and incentives, poor working conditions and physicians work load.

3.6. Method of Data Analysis

Descriptive analysis for the service center and patient-level factors including cross tabulation between the dependent and the explanatory variable was made. This was used to identify possible variables linked to patient satisfaction in the HIV testing and counseling process and to constructs a basic model for the multilevel analysis. Accounting for the hierarchical nature of the data, multilevel logistic regression model was used to identify factors affecting patients' satisfaction during HIV testing and counseling and to distinguish the variance in the satisfaction uniquely at each level.

Software: Data editing and Descriptive analysis was carried out using SPSS where as detail Multilevel analysis was carried out with MLwin 2.02 (Rasbash *et.al*., 2005)

3.7.1. Multilevel logistic regression model

As the response variable in this thesis assumes discrete value of '0' = Not satisfied and '1' = Satisfied, multilevel binary logistic regression was used. At first, the Null model with no predictor variables was fitted and the significance was checked. The Random intercept model was fitted after the null model by including predictors but assuming they are fixed across service centers. Finally, taking the significant explanatory variables from the Random intercept model and adding other Service center level predictors, the Random Coefficient/Slope model was fitted. This model assumes that either one or more than one of the patient level predictor variables may vary across service centers which was more sounds quite realistic.

3.7.2. Model Specification

The General model: The general model containing patient and service center level variable will be (Steel, 2009):

$$\text{Log}\left(\pi_{ij} \big/ 1-\pi_{ij}\right) = B_0 + \sum_{k=1}^{p} B_k X_{kij} + U_{0j} + \sum_{k=1}^{p} U_{kj} X_{kij}$$

Where U = $\left(U_{0j} U_{1j} U_{2j} \ldots U_{pj}\right)'$ has a (p+1) variate Normal distribution with mean

0 = $\left(0 \ldots\ldots\ 0\right)_{1\times(p+1)}$ and Covariance matrix Ω_u , where Ω_u is a (p+1)x(p+1) symmetric matrix.

The Null model /Variance Component model: This model only contains random groups and random variation within groups. It can be expressed in a form where the dependent variable is the sum of a general mean, a random effect at the group, here service center, level and a random effect at the individual, here patient, level. This model is important because it provides the basic partition of the variability in the data between the two levels (Snijders & Bosker, 1999).

$$y_{ij} = \beta_o + u_{oj} + e_{0ij}$$

Where: $y_{ij} \sim$ Binomial $(1, \pi_{ij})$ $u_j \sim N(0, \sigma_u^2)$ $e_{ij} \sim N(0, \sigma_e^2)$

y_{ij} is the outcome variable β_o is a fixed intercept term, u_{oj} is the random intercept associated with the Service center level, e_{0ij} is the random intercept associated with the clientlevel.

As one of the purposes of the empty model is to estimate the Variance partitioning coefficient, VPC, ρ , which measures how clientsatisfaction within a service center compares with the clientsatisfaction in another service centers its computation has complex. Unlike the normal case, the level 1 variance depends on the expected value, var(y_{ij}) = π_{ij} (1- π_{ij}) and the fixed predictors in the model depends on the value of the explanatory variable. Therefore, as we were considering a function of the predictor variable say x_1 , a simple VPC is not available, even though there is only a single level 2 variance. Furthermore, the level 2 variance, σ_u^2 , is measured on the logistic scale so is not directly comparable to this level 1 variance. Hence, there are four methods of computing VPC in binary response model (Goldstein, 2010). Namely; Therefore, the final VPC will be calculated as:

$$\rho = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_e^2}$$

Where : σ_u^2 is varance of the service center level residual. $\sigma^2{}_e$ is the variance of the patient/client level

residual and as indicated in Hox (2002), usually fixed as $\pi^2/3 \approx 3.29$

The Random Intercept model: Consider a 2-level structure where a total of n individuals (at level 1) are nested within j groups (at level 2) with n_j individuals in group j. We denote by Y_{ij} the response for individual i in group j and by X_{ij} an individual level explanatory variable. Hence, the random intercept model for continuous y will be (Steele, 2009):

$$Y_{ij} = B_0 + B_1 X_{ij} + U_j + e_{ij} \quad \text{.....(1)}$$

Where the (group effects) or level 2 residuals U_j and the level 1 residuals e_{ij} are assumed to be independent and to follow a normal distribution with zero means:

The Random slope model: Extending the random intercept model considered above to include random effect due to the explanatory variable result in a Random slope model (Steele, 2009):

$$\text{Log}\left(\pi_{ij} / 1-\pi_{ij}\right) = B_0 + B_1 X_{ij} + U_{0j} + U_{1j} X_{ij}$$

$$\text{U} = \left(U_{0j} U_{1j}\right)' \sim \text{MVN}\left(0, \Omega_u\right)$$

MVN is for 'Multivariate normal' and 0 denotes a vector of two zeros, i.e 0 = (0 0)' and Ω_u is a (3x3) symmetric matrix of the covariance matrix of the random effects. The slope of the linear relation ship between x and the log-odds that y=1 is $B_1 + U_{1j}$ for group j. The covariance between the random effects, σ^2_{U01} , is the covariance between the group intercepts and slopes.

3.7.3 Assumptions: The assumptions as indicated in Snijders and Bosker,(1999) are:

A) Linear dependence of the dependent variable, Y, on the explanatory variables and the random effects.
B) Mutual Independence of the residuals at both lower and higher level(s)
C) Residuals of both levels are normally distributed with mean zero and their respective variances

Results and Discussions

4.1 Socio demographic Charactertics

The result (Table 1) below can be seen that the satisfaction of a client increases with age and large increase of proportion of satisfaction is observed on age category 26-35 years compared to the age group 18-25 years. The satisfaction across educational status reveals that majority (70%) of the clients having no education got higher satisfaction than those with education. Comparing client based on their occupation, clients leading their life based on agriculture had highest level of satisfaction than others whereas few (satisfaction (10.9%)) students were satisfied compared to respondents engaged in other occupation.. Additionally, civil servants were more satisfied than clients who lead their life on their own private business (i.e. 73% to 62.9%). Clients who had an income of below 500 birr had the least (15.9%) satisfaction than those whose income was 500 to 1500 birr (80%) and more than those earning 1500 birr or more (84.3%).

Table 1: Socio-Demographic characteristics versus Level of Satisfaction

		Satisfied		Not Satisfied	
		n	**%**	**n**	**%**
Age	Below 18 yrs	4	8.7	42	91.3
	18-25 yrs	44	18.9	189	81.1
	26-35 yrs	150	93.2	11	6.8
	36-44 yrs	50	98	1	2
	45 and more	19	100	0	0
Sex	Male	155	62.2	94	37.8
	Female	112	42.9	149	57.1
Marital Status	Single	131	38.6	208	61.4
	Married	116	80	29	20
	Divorced	14	70	6	30
	Widowed	6	100	0	0
Educational Status	No educ	14	70	6	30
	Primary educ	29	46	34	54
	Secondary educ	105	51.5	99	48.5
	Certificate/Diploma	64	45.7	76	54.3
	Degree&Above	55	66.3	28	33.7
Occupation	Farming	9	100	0	0
	Civil Serevant	102	73.4	37	26.6
	Private business	141	62.9	83	37.1
	Student	15	10.9	123	89.1
Income	Below 500 birr	36	15.9	190	84.1
	500-1500 birr	156	80	39	20
	>1500 birr	75	84.3	14	15.7

4.2 Determinants of Client Satisfaction with HIV Testing and Counseling

1/ The Null model /variance component/

The Null model is fitted with no explanatory variables and further continuation to either Random intercept or Random Slope model is possible only after testing that the random effect estimates are statistically significant. Hence, The Null model was also fitted (Table 2) using Penalized Quasi Likelihood two (PQL2) estimation by taking Mariginal Quasi Likelihood one (MQL1) estimates as a starting value for ease of convergence.

Table 2 Estimates of the Null Model

Parameter	**Estimate**	**Standard error**	**Wald test**
Constant	0.119	0.131	
σ_u^2 (B/n-service center variance)	0.082	0.076	1.181(0.0277)

Testing for the significance of the variance of the Null model using the Approximate Wald statistic for the null hypothesis that σ_{u0}^2 equals zero, the Z-value computed as 1.181 with a p-value of 0.0277, which is significant at 0.05 level of significance. The test indicates evidence that the service center variance is non-zero. Hence, it's possible for further multilevel logit model analysis. The log-odds of clientgetting satisfied in an average service center (with u_{oj} =0) is estimated as as $\hat{B}_0$ =0.119. The intercept for service center j is 0.119+ u_{oj} where the variance of u_{oj} is estimated as $\hat{\sigma}^2_{uoj}$ =0.082

The Variance Partitioning coefficient which measure the total residual variance due to between service center variation using the method of Latent variable approach the VPC was found to be 0.0243 indicating nearly 2% of the residual variation in the propensity to client satisfaction is attributed to unobserved service center characteristics.

2/ The Random intercept model:

The Random intercept model was fitted by including the explanatory variables which were categorized either under client level or Service center level. Different Random intercept models were fitted to compare and best model was selected.

Table 3: The Random Intercept Model Estimates

Parameter	Final Model		
	Est.	**S.E**	**Z value (Sig)**
Constant	-2.89	0.419	-7.048(0.007)
Income Below 500 birr (Ref.)			
500-1500 birr	0.794	0.133	5.969(0.014)
>1500 birr	0.916	0.186	4.92(0.026)
Actual Service Low (Ref.)			
Medium	1.342	0.145	9.255(0.002)
High	2.168	0.184	11.78(0.000)
Prior expectation Low (Ref.)			
Medium	-1.37	0.292	-4.692(0.03)
High	-1.839	0.299	-6.151(0.013)
General health status Healthy (Ref.)			
Not healthy	-0.495	0.173	-2.86(0.09)
Sex Male (Ref.)			
female	-0.332	0.108	-3.07(0.079)
Waiting Time Strongly Disagree (Ref)			
Disagree	-0.315	0.168	-1.875(0.17)
Agree	4.143	0.187	22.155(0.000)
Strongly Agree	4.198	0.237	17.713(0.000)
Patient-physician Interaction Uncomfortable (Ref.)			
Medium	0.482	0.152	3.17(0.074)
Comfortable	2.011	0.198	10.157(0.001)
Convenience of Service center Strongly Disagree			
Disagree	0.341	0.208	1.639(0.2)
Agree	0.552	0.221	2.497(0.115)
Strongly Agree	1.646	0.246	6.6911(0.009)
Work Over load Strongly Dis/Disagree			
Agree	-0.708	0.22	-3.218(0.072)
Strongly Agree	-0.66	0.224	-2.946(0.085)
Random effect			
σ_u^2 (Service center level)	0.032	0.03	

From table 3 which included income, prior expectation, general heath status, sex, patient-physician interaction, actual service, waiting time, client-physician interaction, convenience of service center and Work over load of the physicians we can see that :

Controlling for service center differences, we'd expect the odds of client satisfaction of those with 500 to 1500 birr to increase twice, in comparison with those earning below 500 birr, for each 1-unit increase is income. Additionally, the odds of satisfaction of client with income level of more than 1500 birr increased by a factor of 2.5, In comparison with those earning below 500 birr, for 1-unit increase in income. Comparing the odds of satisfaction of the clients based on their prior expectation, with those who had High prior expectation would decrease by a factor of 6.2, while odds of satisfaction of those who had a 'Medium' prior expectation would decrease by a factor of nearly four, in comparison with those having a low prior expectation, after taking in to account the service center variation

3/The Random Slope model:

The Random Coefficient/Slope Model which was fitted in table 4 included all the variables from the final Random intercept model. The effect of income of '500-1500 birr' on the log-odds of client satisfaction in service center j is estimated as $1.431+u_{1j}$ and the between service center variance due to income of '500-1500 birr' is estimated as 1.824. The between service center variance in the log-odds of client satisfaction at the income level of below 500 birr is 0.576.

Table 4: The Random Coefficient/Slope model with and without service center level variables.

	Est.	S.E	Z value (sig)
Bo (constant)	-5.326	0.502	-10.61 (0.001)
Income Below 500 birr (Ref.)			
500-1500 birr	1.431	0.436	3.282(0.05)
>1500 birr	2.22	0.166	13.373(0.000)
Actual Service Low (Ref.)			
Medium	2.131	0.118	18.059(0.000)
High	3.545	0.147	24.116(0.000)
Prior expectation Low (Ref.)			
Medium	-1.726	0.138	-12.507(0.000)
High	-2.375	0.276	-8.605(0.003)
General health status Healthy (Ref.)			
Not healthy	-0.822	0.156	-5.269(0.022)
Sex Male (Ref.)			
female	-0.837	0.091	-9.3(0.0022)
Waiting Time Strongly Disagree (Ref)			
Disagree	0.178	0.161	1.1056(0.293)
Agree	6.977	0.185	37.714(0.000)
Strongly Agree	6.965	0.239	29.142(0.000)
Patient-physician Interaction Uncomfortable (Ref.)			
Medium	0.734	0.138	5.319(0.021)
Comfortable	3.073	0.171	17.971(0.000)
Convenience of Service center Strongly Disagree			
Disagree	0.447	0.188	2.378(0.123)
Agree	0.798	0.205	3.892(0.048)
Strongly Agree	2.672	0.22	12.145(0.000)
Work Over load Strongly Dis/Disagree			
Agree	-1.328	0.355	-3.741(0.05)
Strongly Agree	-1.122	0.374	-3.00(0.08)
Random effect			
σ_u^2 (Service center level)	0.576	0.219	
σ_{u1}^2 (inc. var, 500-1500)	1.824	0.851	
σ_{u01} (Intpt-incom covar.)	-0.866	0.404	

The negative covariance (i.e σ_{u01} = -0.866) indicates that service centers with above average client satisfaction ($\hat{u}_{0j}$ >0) tend to have below average effect of income ($\hat{u}_{1j}$ >0).

While still letting the middle income category specified to vary across the service centers, the odds of satisfaction of clients who had a high prior expectation has decreased by a factor of five and that of those with Medium prior expectation has decreased by a factor of 5.5, in comparison with Low prior expectation ones. Client -Physician interaction affected the odds of their satisfaction in such a way as that of those with reported comfortable interaction increased with a significant factor than those with Medium interaction, in comparison with those who reported they had Uncomfortable interaction with their physician. It can be seen also that the odds of satisfaction of clients 'Agreed' for the presence of work over load has decreased by three fold in comparison with 'Strongly Disagreed or simply Disagreed' ones and still income of '500-1500' birr is varying across service centers. The odds of satisfaction of females clients is twice than that of their male counter parts. The increment factor of the odds of satisfaction of clients with monthly income of '1500 or more' birr is greater than those with earnings of '500-1500' per month. Finally, the odds of satisfaction of clients rated the actual service as 'Medium' and 'High' has increased compared to those who rated the service as 'Low'.

The odds of satisfaction of clients earning between 500-1500 birr increased by a greater factor than those earning 1500 birr or more, in comparison to those earning below 500 birr per month. This may happen due to clients with higher income expecting higher standard of service. This result was in agreement with Maria (2008). It was also found out that the odds of satisfaction of clients with 'High' prior expectation has decreased in comparison with clients who had a Low prior expectation. It has to be noted that through out the analysis,

service center differences has been accounted for. As it was obvious to understand, clients with 'General health status reported as 'healthy' had better odds of satisfaction than those who were not and this result agreed with Bashaier (2008) which was conducted in Palastine and also Luca Baker (2009). Similar to Maria(2008), client-physician interaction was a significant factor and the odds of satisfaction of those who said they had comfortable interaction has increased in comparison with those who had an uncomfortable interaction .

The odds of satisfaction of clients with income of '1500 or more birr' and between 500-1500 has increased , in comparison with those getting below 500 birr per month but this time Income of '500-1500 birr' category was varied across service centers. This has shown an increase than that reported in the Random intercept model. From the three service center variables included work over load and Convenience of service centers were statistically significant.

Conclusions and Recommendations

The null model, has shown that service center level variance was significantly different from zero and the then followed variance partitioning coefficient also showed that about two percent of the variation in satisfaction of the client during the taste was due to unobserved service center level residual. Hence it can be concluded that the over all determinants of patient/client satisfaction in HIV test were: income, general health status, patient-physician interaction, prior expectation, marital status, convenience of service center and physicians work load. As it was found out that only two of the service center predictors were came out determinant i.e. Physician Work load and Convenience of Service centers, Effort has to be made more than ever before to address this problems. Health sector work force has be trained to fill this gap and Physicians have to be given a work which they can do for sure with the potential. Officials of the service center has to check whether the physicians are working up to their potential i.e. not over loaded, and have to hire other physicians as the condition necessitates. The other client level variables which became significant were income, general health status, patient-physician interaction, prior expectation and marital Status. The responsible government offices and other stakeholders have to work together to improve the health service delivery in order to improve the health status of the society. Additionally organized effort has to be made for the betterment of the livelihood of the society so as to achieve a better income level. Physicians have to also review their interaction with their clients and make regular adjustments.

8. References

Amin Khan Mandokhail (2007). Patient satisfaction toward outpatient department services of medicine in Banphaeo Autonomous hospital, Samut province, Thailand. Mahidol University.

Anne-Marie J. Audet, Michelle M. Doty, Jamil Shamasdin, and Stephen C. Schoenbaum, Physician's view on the quality of care: finding from the common wealth fund National survey of physicians and quality of care.

Antony Fielding and Harvey Goldstein (2007). Cross classified and multiple membership structures in multilevel models: An introduction and overview, August 20065/ UNAIDS & WHO,

Arvey I. Rogers (2007). The corner stone of Medicine: the physician-patient relationship ,University of Miami, School of Medicine.

Barbara Wexler (2002). Gale Encyclopedia of Nursing and Allied Health. The Gale Group Inc.,Gale, Detroit

Bashaier Fathi Tawfeq Al Sharif (2008). Patient's satisfaction with Hospital services at Nablus District, West Bank, Palastine.Al-Najah National University.

Bekele chaka (2005). Adults patients satisfaction with nursing care. Addis Ababa University. Ethiopia.

Buchan and Calman (2003). Development Goals: Improving Health Workforce Performance, Issues for Discussion: The Global Shortage of Registered Nurses, Vol 24.

Catherine A. Worthington (2001). Being Tested: Client Views of HIV Testing Services .University of Toronto.

Center for disease control and prevention (2005). Confidential HIV Counseling & Testing Protocol, Revised November 2005. Department of health and human services,

Centers for Disease Control and Prevention (2001) and World Health Organization (1990).

Donald Hedeker and Rober D. Gibbons (2006). Longitudnal data analysis. John Wiley & Sons, Inc.

Fiona Steel (2009). Multilevel Models for Binary Responses: Practical. Center for Multilevel Modeling. University of Bristol.

Fiona Steel (2009). Multilevel Models for Binary Responses: Concepts. Center for Multilevel Modeling. University of Bristol.

Harvey Goldstein (2010). Multilevel Statistical Models.A John Wiley and Sons, Ltd, Publication. United Kingdom.

Irish society for quality and safety in health care Measurement of Patient Satisfaction Guidelines (2003). Health Strategy Implementation Project.

Jullian Lucas Baker (2009).Examining the effect of satisfaction with health care providers on the sexual risk of African American women living with HIV/AIDS. Drexel University.

Kevin Fiscella, Meredith A.Goodwith and Kurt C. Stange (2002). Does patients' educational level affect office visits to family physicians? *Journal of the national medical association; vol 94.*

Lan T.H. Vu (2005). Multilevel Determinants of Children health outcomes. University of Saskatchewan, Saskatchewan, Canada.

Leew and Erik Meijer (2008). Handbbok of Multilevel analysis. Springer Science+Business Media, LLC, 233 Spring Street, New York City.

Lisa Garbus (2003). HIV/AIDS in Ethiopia. AIDS Policy Research Center, University of California San Francisco

Louis G. Pol and Richard K.Thomas (2001). The demography of health and health care. Kluwer Academic/Plenum Publishers. New York.

Mikael Rahmqvist (2001). Patients satisfaction in relation to age, health status and other background factors: a model for comparison of care units. International journal for quality of health care 13: 385-390

Mike Hart and Simon Dyson (2004).Implementing monitoring systems for out-patient clinics-the contribution from IT, De Montfort University, Leicester.

Molla S. Donaldson (1999). Measuring the Quality of Health Care. National Academy Press, Washington, D.C.

Maria Yui Kwan Chow (2008). Client needs and satisfaction in an HIV facility. The University of Sydney.

Nowai L. Keleekai (2004). Associations Between Engagement in the Patient-Provider Relationship and Quality of Life and Adherence Among Persons Living with HIV/AIDS. The Ohio State University

Ndeso-Atanga (2003). Health care quality and choice of care providers: Cameroon II. University of Buea, Cameroon.

Ny Net (2007). Patient satisfaction toward the health services at the out patient department clinic of Wangnumyen community hospital, Sakaeo province, Thailand. Mahidol University.

Pamela Jimenez Fontana and Juan Rafael Vargas (2000). Patient satisfaction and self-assessed health delivery. University of Costa Rica.

Paula O'Brien and Lawrence O.Gostin (2008). Health Worker Shortages and Inequalities: The Reform of United States Policy. Global Health Governance, Volume II, No. 2

Ranjan Kumar Som (1996). Practical sampling technique.

Robert L. Helmreich, FraeS and J. Bryan Sexton (2005). Managing Threat and Error to Increase Safety in Medicine. The University of Texas at Austin.

T.A.B Snijders and Roel J. Bosker (1999). Multilevel analysis: An introduction to basic and advanced modeling. Sage Publications Ltd, London.

Thatsanai Tangmankongworakoon (2007). Client satisfaction toward the service of Lad Yao Hospital, Lad Yao district, Nakhonsawan province, Thailand. Mahidol University.

W. G. Chocran (1977). Sampling Techniques. John Wiley & Sons, Inc.

WHO report (2007). Briefing notes high level coordinating body for human resources for health.

Willy De Geyndt (1995). Managing the quality of health care in developing countries. The World Bank. Washington, D.C.