Addis Ababa University
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ASSESSING THE PREDICTIVE VALIDITY OF SELECTION CRITERIA FOR DEFENSE COLLEGE OF HEALTH SCIENCE

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ASSESSING THE PREDICTIVE VALIDITY OF SELECTION CRITERIA FOR DEFENSE COLLEGE OF HEALTH SCIENCE

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ACRONYMS AND ABBREVIATIONS

ESLCE- Ethiopian School Leaving Certificate Examinations

EGSECE - Ethiopian General Secondary Education Certificate Examinations

HAS - High school Average Score

GPA- Grade Point Average

CGPA- Cumulative Grade Point Average

AAU- Addis Ababa University

DCHS- Defense College of Health Science

NOE - National Organization for Examinations

ABSTRACT

The increase of enrolment with limited resources makes it necessary for institutions of higher learning to establish selection procedures designed to identify among a large number of applicants, those who are most likely to succeed. For better prediction of success and screening of the candidates who are academically competent, establishing empirically valid and reliable selection devices is therefore very important. Taking such steps might help in decision making concerning the admission of candidates to the college of Health Science.

The main purpose of this study was to determine the predictive power of the selection criteria for the Defense College of Health Science.

The subjects for the study were 49 Nurses, 34 Laboratory Technicians, 40 Pharmacists and 23 Radiographers who were admitted in 2004 and graduated in 2005 academic years. The data were gathered from the personal file of each student which are kept securely in the Registrar's Office of the College. The data included, students' GPA earned in the college both in the first year and second year which are criterion variables; and the predictor variables are EGSECE/ESLCE GPA, Entrance examination results and high school average scores.

The data analysis was done using correlation and regression techniques. And based on the results of the study conclusions and recommendations were made.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Fields such as education and psychology are concerned with prediction about human behavior particularly in relation to his/her learning capacity, potential growth, success and adjustment by increasing man's ability to foretell human behavior under prescribed conditions. Such fields make them possible for man to make decisions about future courses of action which have a greater probability of fulfilling his goal or purposes (Gleser,1960)

Tests are used for many purposes. They are used to get information about pupils to evaluate their success and failure and to identify their assets and liabilities. Tests are also used for administrative purposes in decision making such as for selection, description, placement and classification of individuals who are going to be employed and so on.(Thorndike, 1971; Walash,1989,Yusuf, et al 1994).

There are numerous situations in which such decisions could be made about people. In education, such as hiring of school teachers, selecting students for admissions to colleges, decisions to promote or fail students and illustrate the varied need for prediction (Anastasti, 1976; Jameson and Ottobre, 1976; Ogunniyi, 1984)

As Worthen and Sanders (1987) indicated, in most advanced nations, education is increasingly viewed as a primary means for solving social problems. In some cases future welfare of nations has been placed mainly on the shoulders of schools and universities. So selection of students who demonstrate higher

academic performance in training program is the goal of most admission criteria. Hence, candidates should be typically selected on several variable which are used as predictors of their potential to perform successfully, in training program. (Anastasi, 1976; Fraenkel and Wallen ,1993).

In Ethiopia, the Ethiopian School Leaving Certificate Examination (ESLCE) was used as a sole instrument of selection and placement of students in higher institutions. Many researches have been conducted to identify the reliability and validity of this examination. Investigation of the predictive validity of the ESLCE was the point that drew the attention of most researchers.

Many researchers had conducted predictive validity studies on the ESLCE and given their conclusions and suggestions. Some of these researchers have concluded that the ESLCE was efficient in predicting future success (Belay, 1991; Tamiru,1992) while other disagree with this conclusion (Tibebe,1992;Fantu, et al, 1996). They found ESLCE to be weak in predicting future performance in college. As a result, some researchers have attempted to use other alternative measures such as aptitude tests, achievement tests and high school scores (Kebede, 1991; Mekonnen, et al, 1991). Some studies have been conducted regarding the predictive validity of admission criteria of some training institutions in the country (Belay, 1991; Meressa,1994; Shenkute, 1991). Each of this studies was done on different institutions because they have their own admission criteria for selecting candidates. Regarding this, some researchers like Leners, et al. (1996) suggested that the screening instruments should be reevaluated yearly for their validity and usefulness. The findings of each of the institutions can not be inferred from other institutions due to their difference in selection criteria.

Defense College of Health Science, as one of the higher institutions in .Ethiopia needs evaluating the predictive power of its selection criteria. The college plays a great role in the education, health and research areas in the country, specially in the National Defense. So it is expected that the college will

bring better change in the defense force as a whole in Ethiopia. From the statement of the college command and dean the main objective of the college is to find solutions for the basic health problems of the defense force, and produce skilled manpower to meet the demand of the National Defense Health Sectors and also in the country.

The College runs different programmes in various fields of study in different departments. Based on the future plan of the college to expand the departments and research both in quality and quantity, the college is required to consider seriously the plans it is making. So it is better to assess whether the criteria that are set to admit candidates to the college of Health Science really predict the success in the different departments.

Some institutions suffer when inaccurate selection decisions are made either from losing a potentially productive individual or devoting precious resources to a person who does not fit in the institutions (Gottheil and Michael, 1957). However the selection of students who demonstrate a higher probability of successful academic performance in training program is the goal of most admission criteria. The objective of admission criteria is in fact, to identify candidates for certain training program who will also do well and profit from the training program (Jameson & Ottobre, 1976). The value of selection criteria then may be appraised by the degree to which it can fulfill such objectives.

Evaluating such selection criteria for selecting potentially talented individuals to the college might help to reduce wastage of resources. In addition the interest of the National Defense is best served when such selection is made through valid measuring devices. Thus this study attempts to asses the selection criteria in order to draw valid conclusion regarding their prediction power.

The former school of health assistants later named as Defense College of Health Science (DCHS), was established in 1996 to launch, coordinate and

administer health science programs. Now the college is offering Diploma programs in the fields of Nursing, Laboratory Technology, Pharmacy Technology, Radiography and Environmental Health and Degree programs in Nursing, Health Officers and Medical Science (MD) fields of studies.

The college had set admission criteria to its programs. As it was mentioned above the applicants should meet the requirements set by the college. Ethiopian General Secondary Education Certificate Examinations(EGSECE) GPA or Ethiopian School Leaving Certificate Examination (ESLCE) GPA and the result of Entrance Examination prepared by the college are the criteria set by the college

1.2 Statement of the problem

The lack of reliable and valid selection criteria accounts for a major part of the problem of the development of more successful outcomes of many training programs (Gottheil and Michael, 1957). Valid selection criteria are not only desirable to reduce the number of students who fail to graduate but also are desirable in order to choose students who will become successful professionals in the above field of studies offered by the college.

Therefore, looking for better predictions of success and screening of applicants who will be well trained in specific area require the use of valid and reliable selection devices. The purpose of this study is to assess the predictive power of the selection criteria, EGSECE/ESLCE GPA and the Entrance Examination Results with respect to College achievement of the trainees . With this purpose, the study tries to answer the following basic questions. .

1) Does Ethiopian General Secondary Education Certificate Examinations (EGSECE) or Ethiopian School Leaving Certificate Examinations (ESLCE) GPA have statistically significant relationship with academic achievement of the trainees in the College?

2) Does the Entrance Examination result have statistically significant relationship with academic achievement of trainees in the College?

3) Do EGSECE / ESLCE GPA and Entrance Examination results collectively have statistically significant relationship with academic achievement of trainees in the College?

4) Which year's academic achievement does the selection criteria predict better?

5) Does high school average score contribute to the prediction of the trainee's academic performance in the college if it were used in combination with the initial predictor variables?

1.3 Objectives of the study

The objectives of this study are

- To assess the predictive power of EGSECE/ESLCE GPA in predicting academic performance of trainees
- To investigate the predictive power of the entrance examinations result in the prediction of academic performance of trainees.
- To evaluate whether the addition of high school average score will improve the prediction of trainees academic performance.

1.4 Significance of the study

Preparing good selection criteria does not only help in the selection of candidates for the Defense College of Health Science, but it also serves as a precondition to produce properly trained and qualified professionals. To fulfill this, designing suitable devices and procedures should be made in selecting and

training candidates for the programs. Therefore the findings from this study are expected to :-

- Assess which predictor /independent/ variables are significant in predicting academic performance of trainees.

- Evaluate which predictor /independent/ variable is likely to be better predictor

- Identify some problems related to the selection of candidates and provide information/suggestion/ for improving the practice of admission to the college.

1.5 Scope and Limitation of the study,

Even if there are civilians selected for the training in the college most of the trainees enrolled in the College are from the military . Therefore, it was limited to the investigation of the predictive validity of the admission criteria used for the Defense College of Health Science. Moreover to make it manageable the study is limited to trainees who were admitted to the college in the year 2004 and graduated in 2005 in the diploma program.

1.6 Operational Definitions

Terms which are used repeatedly in this study are defined operationally as follows,

- Academic achievement – is an average result of the trainee in the whole training program.

- Criterion variables- are the first and second year results of the trainees that are used for validating the selection criteria.

- Predictor variables:- are the GPA'S of ESLCE / EGSECE and results of the entrance examinations which are used for selection of candidates.

- Selection criteria:- is the pre-condition to be fulfilled by the candidate for admission.
- Entrance Examination :- is a written examination prepared by the Defense College of Health Science.

- High school average scores:- is the average of the sum total of candidate's score earned in high school.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

In this chapter of the study relevant literature to the issue under investigation will be presented. Different but supportive literature were consulted when investigating the prediction of success in a training program. So important information for the present study is summarized under the following sub leadings; namely, validity, predictive validity, studies of predictor variables, Academic performance; High school Academic Scores the Ethiopian School Leaving certificate Examination (ESLCE), Admission Test Scores combining predictor variables in predating Academic Success and Admission of Students to Higher Learning Institutions.

2.1 Validity

The degree of validity is the single most important aspect of a test. Validity can be defined as the degree to which a test is capable of achieving certain aims. When discussing validity it is useful to think of two general types of aims: the first is for making predictions about the individual tested and the second is for describing him. Predictive use is dependent up on criterion related validity, and descriptive use is dependent upon content and construct validities. (Meherens and Lehmann, 1975)

Tests and other evaluation instruments serve a variety of purposes in schools and colleges. Although instruments are different in type and how their results are to be used all measurements should possess certain characteristics. The most essential of these is validity. Several researchers (Anastasi, 1976, Nitko, 1983, Slavin, 1994) in Kasim, 1999, Viewed the validity of such instruments with reference to the soundness with which they can be interpreted in a particular way or the usefulness of test scores for a particular purpose.

Gronlund (1976) viewed a number of cautions to be born in mind when using the term validity in relation to testing and evaluation. First, validity refers to the results of a test or evaluation instrument for a given group of individuals not to the instrument itself. We sometimes speak of the validity of a test, for the sake of convenience, but it is more appropriate to speak of the validity of the test results or more specifically of the validity of the interpretation to be made from the results.

The second is, validity is a matter of degree, It does not exist on an all-or-none basis consequently, we should avoid thinking of evaluation results as valid or invalid. Validity is best considered in terms of categories that specify degree, such as high validity, moderate validity and low validity.

The third one is validity is always specific to some particular use. It should never be considered as a general quality. For example the results of an arithmetic test may have a high degree of validity for indicating computational skill, a low degree of validity for predicting success in future mathematics courses and no validity for predicting success in art or music. Thus, when appraising or describing validity it is necessary to consider the use to be made of the results. Evaluation results are never just aid, they have a different degree of validity of each particular interpretation to be made.

2.1.1 Predictive validity

The prediction of success in professional trainings is an important concern of psychometricians. Various definitions and explanations were given on the concept and nature of predictive validity. According to Anastasi (1976) the term "prediction" can be used in the broader sense to refer to the prediction from the test to any criterion situation. The information provided by predictive validity is most relevant to tests used in the selection and classification of personnel. Hiring job applicants, selecting students for admission to college or professional schools and assigning

students to occupational training programs represents examples and sort of decisions requiring a knowledge of the predictive validity.

Ghiselli, et al. (1981) define predictive validity as one type of criterion related validation describing the accuracy with which one can estimate the extent to which some individual characteristics will be manifested in the future from the extent which the individual currently manifests or possesses some other property.

Meherens and Lehmann, (1984) define predictive validity as the extent to which a person's future performance on a criterion can be estimated or predicted from prior test performance.

Hinkle, et al., (1982) gave the definition as follows. Predictive validity, in its simplest sense, is the process of estimating scores on one or more variables(the criterion variables) on the basis of knowledge of scores on another variable or variables (the predictor variable).

Wiersma and Jurs, (1985) said that predictive validity is involved if we are concerned about a test score's relationship with some criterion measures in the future. Infact, the correlation coefficient between the predictor scores and the criterion scores is called predictive validity. Predictive validity can be used in a host of situations: predicting job success, predicating performance in vocational programs, predicting success in professional courses and so on. In some situations those for which the training is very expensive for example-predictive validity is very important. High predictive validity is obtained by selecting predictors that are related to the criterion measure. The stronger this relationship, the greater will be the validity coefficient.

2.2 Studies of Predictor Variables

To benefit from the institutions, the entering candidates should have acquired certain pre-knowledge that enables them fit for the requirements of the training programs, Regarding this, Shwartz (1971) viewed that "no instructional program begins at an absolute zero level of student sophistication". According to him, one of the most straight forward admission procedures is to measure the applicants' achievement of the entry skills and to select the individuals who have not attained the minimum level of the course are most useful in situation where the applicants are known to vary with respect to one or more of the necessary entry skills. He also indicated that if useful prediction can be made from data that are collected and then have no additional costs, such data have the potential of providing appreciable net gain. Hence it is then necessary to consider the availability of data as predictors.

Lewis, (1964), Petery and Craft (1976), revealed that there have been extensive researches about identifying the variables or combinations of variable that are used in predicting academic performance of training programs. Accordingly, the studies are mostly concerned with intellectual variables, which mainly include high school achievement test scores or combination of tests as the best predictor variables.

Generally institutions often request applicants to fill out application forms, require scores on admission test and use other miscellaneous devices in addition for instance, there are transcripts, admission test scores and their historical information prior to their admission (Schwartz, 1971). Based on this we now consider the predictor variables, academic performance and admission test scores that are usually examined or used in educational selection.

2.2.1 Academic Performance

Academic achievement is the most frequently used instrument and it is believed to be the best indicator for the success of students in higher learning institutions. The success of students at college level is assessed mainly by the grades they earned in each course, it appears that more emphasis is given to the measurement of the intellective aspect than the non-intellective ones.

The most obvious criterion measure at university level is the college GPA, be it freshman year grade point average or first semester grade point average (Anastasi 1976). This criterion measure is usually employed in the validation of intellective predictor variables that have been used in the admission of students to higher education . The criterion measure is considered to be as the average grade in all courses taken in the freshman year program whether each grade is weighted by the number of course points offered for a specific course. (Anastasi, 1976). Moreover as Schrader(1971) pointed out, the average grade is completed in accordance with certain rules established by the respective colleges and universities. Besides the pattern of courses that enter in to the average would be determined with in a framework established by college rules affecting a student's choice of courses. The average grade may likely embody in a realistic way to the uniformity and variation of student programs.

It was further explained that academic grade point average is the one which is highly meaningful to administration, faculty and students and it is readily available (Schrader, 1971). This is to say that as compared to non-intellective criterion measures, academic average grade appears to be more reliable and can be measured with relatively high accuracy.

2.2.1.1 High School Academic Scores.

One of the variable commonly used for predicting success in an institute of higher learning is the high school academic score. Using this variable as a measure of success in higher institute of learning (Feder, 1965; Fincher, 1974; Michael and Jones, 1963; Hess, 1983) concluded that it is the best single predictor of academic achievement in college.

In another study (Hess, 1983), of all the cognitive and non cognitive variables he used, high school academic score was found to be the most valid predictor of college performance, similarly Fincher (1974) concluded that high school academic score correlates more substantially for all levels of higher learning institutions.

In practice, for educational selection one usually needs to have a readily available transcript of the candidates previous performance. Many investigations (Fraenkel and Wallen, 1993; Halpin and Schaer, 1981; Kebede, 1991; Meresa, 1994; Mekonen et al, 1991; Wesely, 1994) have found the record of performance in high school to be reflected in the criterion of college performance. There frequent cases in which high school achievement better predicted freshman grades than scholastic achievement or aptitude tests (Halpin and Schaer, 1981). However among studies concerned with grade prediction in specific subject areas, Passons (1967) concluded that, although school achievement was the most predictive indicator of future overall college success, test scores were slightly more valid than was high school achievement for predicting grades in specific courses.

The evidences available regarding the effectiveness of the predictive validity of the high school academic score as a predictor of college success, have been summarized from various studies by Giusti (1964). He then concluded that the most significant conclusion studies is the unquestionable superiority and stability of the high school academic scores as a single source of data for predicting college

success. Moreover, while reviewing various studies. Giusti has observed that substantial correlation have been reported by many investigators between college GPA and high school academic scores as well as individual subject scores.

More specifically some validity studies have focused on the predictions of nursing schools measured terms of nursing GPA and scores on state board examination from a number of nursing curriculums related variables (Crane et.al, 1987) In studies concerning the prediction of grades in nursing schools, high school achievement was found to be significantly related to first year GPA of the students in the schools of nursing.

So it would not be surprising in a sense that high school performance is work sample of college performance. Regarding this Vernon cited in Thorndike (1971) and Plapp et al. (1965) have pointed out that these measures show better correlation due to their similarity in form as well as dependence on common underlying attribute. It was further noted that these are rather based on performance over a period of time rather than on one shot evaluation.

Also Meressa (1994) in his study found that there was a positive and significant relationship between high school academic score and freshman first semester GPA. This independent variable also contributed significantly to the prediction of the first year composite score and first semester average score (GPA).

Samson (2007) in his study found that the addition of the variable (high school average scores) to the initial predictors (entrance examination and ESLCE/EHEECE GPA) was observed as the only potential predictor in all fields of study in the Awasa Health Science College. Samson (2007) also revealed that among all the predictor variable used in his study high school average score improved the prediction accuracy in most cases.

The study by Fantu, et al. (1996) also revealed that the twelfth grade class rank significantly predicted first semester freshman GPA. In addition among seven predictors used in college of engineering high school rank was the one having the highest correlation with the criterion variable.

2.2.1.2 The Ethiopian School Leaving Certificate Examination (ESLCE)

Although Ethiopian School Leaving Certificate Examination (ESLCE) has ceased to exist since 2003, candidates of the Defense College of Health Science can submit their ESLCE GPA . The College does this for the reason to give the chance to students who attended their high school education prior to the implementation of currently used EGSECE GPA as one of selection criteria in Defense College of Health Science .

A number of studies have been conducted to examine weather or not the ESLCE GPA predicts students performance in colleges, universities and other institutes However many of the results are not consistent.

Mekonen et al. (1991) studied the comparability of the predictive power of ESLCE GPA with other measures. According to this study the correlation between the first semester college GPA of the 1990/91 regular first year students enrolled in the college of social sciences and faculty of science of Addis Ababa University, their aptitude scores, grade 12. reported average and ESLCE GPA respectively showed statistically significant relations in this cases In this study, though ESLCE GPA was found to be a potential predictor, it is the predictor of the three independent variables mentioned.

Other researchers come up with opposite findings. For instance, Merihatibeb (1993), in his study of the relationship between ESLCE scores and students academic achievement at Bahir Dar Teachers College, reported that they have weak correlation. Hence he concluded that the ESLCE GPA as a whole lack adequate validity to warrant validity as a soul instrument of selection and admission of students to higher education.

Samson (2007) in his study also noticed that, the ESLCE/ EHEECE GPA didn't have significant relation ship with all academic years score in almost all fields of study.

Tamiru (1992) in his study concluded that the ESLCE GPA was not found as valid predictor for departments other than the department of front office. Belay (1991) did also conclude that ESLCE GPA was not a potential predictor of trainee's GPA of vocational and professional courses at teacher training institute.

In general from the research findings concerning ESLCE, some correlation coefficients found were significant and moderate, these might indicate that the part played by ESLCE GPA in predicting the success of students in the higher institutions was not negligible. But now a days the Ethiopian General Secondary Education Certificate Examination (EGSECE) is functionally used for admission of students to TVET diploma programs equivalently as if ESLCE was used in the former time. It can also be noticed that the reports of some of the studies considered the ESLCE as weak predictor of college achievement.

The above all points raised about ESLCE are not because of the fact that ESLCE is functioning today. It is for the aim of showing the existing nationally standardized achievement test was declining in validity through time. So that test developers and policy makers should give attention for the new standardized achievement test that is being administered at grade ten now a days.

2.2.1.3 Entrance Examination Results.

Usually, records of previous academic performance are data readily available for academic selection. In addition to this data such as scores on admission tests have often found to be useful for academic selection, It had been showed by Hills (1971) that the most commonly used admission tests are achievement and aptitude tests which are usually thought to have potential contribution to the prediction of college academic performance. It should also be noted that there is not a very clear distinction between aptitude and achievement in educational testing.

Achievement and aptitude tests can also be distinguished according to the types of prediction for which each is most useful (Gronlund 1985). Because past performance is frequently the best predictor of future achievement. Both types of achievement tests are then useful in predicting future learning. The content-oriented achievement tests can predict how well a pupil will learn new knowledge in the same content area, but it is less valid in predicting future learning in other areas. On the other hand, tests measuring general educational development are more effective predictors of future achievement than are content-oriented tests (Gronlund, 1985). This suggests that tests of educational achievement had been shown as good predictors of general school achievement as aptitude tests.

Some authors (Brown, 1983, Mehrens and Lehmann, 1975) put their argument that certain achievement tests may be better predictors than particular aptitude test for some specified purpose. Also they pointed out that there are many instances where achievement tests are used primarily to predict future performance since past performance is frequently the best predictor of future performance; In this case a training institute may select its students based on the achievement test if the test has been found to be a valid predictor.

Reasonably it appears that admission test scores are more significant and important in predicting training performance. According to Lewis (1964) admission test scores yielded gave significant regression weights and was also the only pretraining variable to yield a significant regression weight for predicting training performance.

In the Ethiopian case some researchers (eg. Fantu et al., 1996; Kebede 1991; Meresa 1994, Mekonen et al., 1991, Tamiru, 1992; Samson,2007) have attempted to assess the effect of admission test scores in selection of students for higher learning institutions. Some of these found that admission test scores to be strongly predicting students' future performance in training institutions for instance. Samson (2007) in his study found that the entrance examination result was a valid indicator of academic performance in the training institute in almost three fields of study but not in mid wife field of study. Therefore when one desires to predict a certain type of behavior, it would be very convenient to use an appropriate admission test and then make decisions accordingly.

2.3 Combining predictor variables in predicting Academic success

In different research works reviewed above only single independent variable has been treated in the assessment of prediction of success of students in the institution of higher learning. However there are other studies which combine various independent variables together to predict the success of students. It was usually been suggested that multiple correlation coefficients have been computed by many investigators to discover the extent to which a combination of predictive factors would improve the correlation with the criterion over that given by a single independent (predictor) variable.

Most of the time several variables are investigated as possible predictors of a criterion rather than a single variable. Then the aim becomes that of selecting those predictor variables, which in combination could give most reliable predictions, and

finding the most effective way of using the combined information. For example, admission officers of training institutions consider student's high school achievement, achievement tests, and other data (Brown, 1983).

In such cases, the important question is how to combine scores on these variables so as to obtain the most reliable prediction. In terms of validation the question is then how to determine the validity of the composite scores. Multiple linear regression is the frequently used approach to the combination of such measures for prediction of a continuous criterion (Brown,1983; Fraenkel and Wallen,1993; Gleser,1960; Kerlinger,1986). This method assumes that predictor measures of two or more unrelated factors underline the criterion to be predicted and that these factors are related to the criterion variable in a manner such that any deficiency in one variable can be compensated for by a sufficiently high level of performance in another variable. It was also indicated that the coefficient to be used for each predictor variable is determined, so that the weighted sum of the predictor variable yields the maximum correlation with the criterion for the sample of individual under study (Brown, 1983; Fraenkel and Wallen 1993; Kerlinger,1986).

Although many predictor variables may found to be predictive of the criterion it has been observed that combining these variables usually yield relatively little gain in prediction over that obtainable by using the best two or three (Brown,1983). Thus an additional measure has value only to the extent that it adds validity beyond that is provided by the initial predictors and each additional measures would be evaluated by its ability to improve upon the existing variable (Sechirest, 1963).

In the study conducted by Mekonen et al, (1991) a relatively significant multiple correlation coefficient was reported when the combination of aptitude test score, grade twelve reported average or high school average and ESLCE GPA were used in the prediction of freshman GPA. The multiple coefficient of correlation was found to be 0.49.

Meressa (1994) in his study, reported that with the exception of predicting the subsequent success of job performance, when all the predictor variables have been combined together, it appeared they were significant predictors for the criterion variable.

Further more, Willingham (1964) found a substantial relationship between college GPA and the combination of high school average and scholastic aptitude test both mathematical and verbal. The multiple correlation coefficient established was 0.60. Also Samson (2007) in his study reported that the combination of predictor variables, ESLCE/EHEECE GPA, Entrance examination and high school average score together relatively predicted better the academic success of students.

In general, results of various studies seemed to indicate that better prediction of success in college education can be made when composites of several predictor variables are used in a certain linear combination.

2.4 Admission of students to Higher Learning Institutions

The continuous increase of the number of students enrolling every year in the institutions of higher learning appears to pose very crucial problem in relation to admission and eventual success of trainees after admission has been attained. Parallel to the increase of students who want to join higher education, the screening of candidates who would succeed in their academic performance at university or any training institute is important.

There are two forms of access to higher education one is referred to as open admission which allows any student who has completed secondary school to attend course work at a higher level and the other is selective admission (Jameson and Ottobre, 1976; Hills, 1971). However there have been arguments indicating that the system of open admissions to higher education for all qualified high school leavers seems problematic (Smith cited in Thorndike, 1971). This is because when access to

higher education from secondary education is widened, and when capacities in some fields of study are not also extended in accordance with the growing number of students.

So, designing admission devices for screening applicants is necessary. This might help to alleviate certain problems that would arise during the selection process as well as in the subsequent academic success of students in professional or technical training institutions and colleges. As Fishman (1958) pointed out the problems associated with the selection of candidates for colleges are usually predictor problems and criterion problems. These problems according to Fishman are related both to academic and non-academic criteria.

Nursing schools like some of the higher institutions require students to have class rank in his/her graduating class and entrance examination results. (Grippando, 1986). However Crane et al, (1987) claim that the problem facing nursing schools is the identification of candidates. Some authors such as (Goldman and Widawsk, 1976), discussed the consequences of either types of selection error of rejecting students who would actually succeed and accept students who would fail.

In the Ethiopian case, the admission requirement to higher learning institutions was the ESLCE. The certificate of completion is awarded to those who have successfully completed the secondary education cycle and pass an examination which is administered nation wide by the Ministry of Education currently through the National Organization for Examination(NOE). Nevertheless the ESLCE ceased to serve as college entrance examination, instead other instruments of selection were devised. As the result of the implementation of the New Educational and Training Policy, college entrance examinations and other examinations have been devised to serve as selecting instruments for admission into higher education institutes of the country. These are the Ethiopian General Secondary Education Certificate Examinations (EGSECE) and the Ethiopian Higher Education Entrance Certificate

Examinations (EHEECE). The first one is used to select students for TVET and preparatory classes, and the second is used to select students for university.

The most important point to note in the admission process is the effect of admission which may help to predict the success of trainees who have academic potential and hence be successful at the institutions of higher learning. The fact which usually seems to be overlooked is that the candidate who fails the required admission criteria may not pursue the training program in higher learning institutions.

The next chapter is about how the study is conducted in order to fulfill the general objectives of the study. So the sub headings consisting subjects included in the study, variables included in the study, procedure of data collection and data analysis are explained in the next chapter.

CHAPTER THERE

METHODOLOGY

The main objective of this study is to assess the potential predictive power of the admission criteria for the Defense College of Health Science. To fulfill this general objective, the main procedures used are treated next in this chapter.

3.1 Subjects

The target populations of this study include all regular trainees who were admitted to the Defense College of Health Science in the year 2004 for Nursing, Laboratory technology, Pharmacy technology and Radiography fields of studies and graduated in 2005 after attending the training given in the college. Number of trainees admitted to the College in 2004 was 168 and 22 of them dropped out and hence 146 graduates were included in the study. This number includes only trainees who were admitted to the college with EGSELE/ESLCE GAP 2.0 and above and those below this GPA were taken out.

Table 1 Number of subjects in the study.

Field of study	Graduates			Dropouts		
	M	F	T	M	F	T
Nursing	34	15	49	13	1	14
Laboratory Technology	32	2	34	4	-	4
Pharmacy Technology	39	1	40	2	-	2
Radiography	22	1	23	2	-	2
Total	127	19	146	21	1	22

3.2 Variables included in the study

3.2.1 Independent variable

The following admission criteria used by the college were been considered as predictor (independent) variables in the study
These are :-

The EGSECE/ ESLCE GPA---------- ---------- X_1
Entrance examination results ---------- X_2
In addition, trainees High School Average Scores ------- X_3

3.2.2 Dependent variable

The criterion (dependent) variable in this study is the academic performance of the trainees while they were in the college. These variables are the scores earned by each subject during first and second years training program.
These are :-

First year average score ---------- Y_1
Second year average score ---------- Y_2

3.3 Procedure of data collection

The main source of the data used in this study was the personal file of each subject included in the study. The information obtained from this source included the EGSECE/ ESLCE GPA, the entrance examination scores, High school average scores, and training scores of trainees found in the file of subjects which is kept in the college.

3.4 Data Analysis

In this study different statistical techniques were used . The means and standard deviations were determined at the beginning to show the general characteristics of the data. Then the interpredictor and the predictor criteria variable correlation matrices were computed for sub-groups separately in order to make it convenient for further analysis by indicating the predictability of each predictor variable.

To know the exact amount of variance accounted for by the independent variables to the total variance in the dependent variable (College achievement) coefficients of determination were obtained through multiple regression. Finally to find the relative contribution of each independent variable to the total variance in the dependent variable while controlling the effects of other independent variables stepwise regression will be also computed.

The F-test of significance of the correlation coefficients in each model and the incremental validity of predictor variables included in the model will be made at the final step.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Results

In this part of the study, the results obtained from the simple descriptive statistical methods, results of correlation analysis and results of regression analysis are presented.

4.1.1. Descriptive statistical Result

In order to show general feature of each predictor and criterion variables descriptive statistics: mean and standard deviation are used. The results are shown in Table 2.

Table 2 Means and Standard Deviations.

Variables	Nursing		Laboratory Technology		Pharmacy Technology		Radiography	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
X_1	2.35	0.38	2.72	0.26	2.80	0.06	2.78	0.15
X_2	63.76	7.03	58.44	5.09	60.50	5.35	61.80	4.71
X_3	64.99	5.49	71.74	4.83	74.02	6.32	73.40	5.15
Y_1	3.38	0.41	2.85	0.47	2.83	0.51	3.35	0.23
Y_2	3.43	0.39	2.97	0.43	3.09	0.45	3.31	0.25

It is shown in the table 1 that number of subjects in the four fields of study varied from 23 to 49. where the least number is in Radiography and the highest is in the Nursing Department. Mean of EGSECE/ ESLCE(X_1) varied form 2.35 to 2.80, where the least is in Nursing Department and the highest is in Pharmacy department. The mean of the entrance examination (X_2) varied from 58.44 to 63.76 where the least is in Laboratory Department and the highest is in Nursing Department. The mean of High School Average Score (X_3) varied from 64.99 to

74.02 where the least is in Nursing Department and the highest is in Pharmacy Department.

The mean of first year college GPA (Y_1) varied from 2.83 to 3.38, where the least is in Pharmacy Department and the highest is in Nursing Department. The mean of second year college GPA (Y_2) varied from 2.97 to 3.43 where the least is in Laboratory Department and the highest is in Nursing Department.

The standard deviation of the criterion variable range from 0.23 to 0.5. This values of standard deviation indicate that the scores of criterion variables are accumulated around their means than some predictor variables. In general the distribution indicates that most variables tend to have relative spread when comparisons are made among variables in terms of their respective standard deviation .

4.1.2. Results of Correlation Analysis

It is not enough computing the correlation coefficient, the main thing is the question of interpretation. While interpreting the relationship between these variables, some researchers (Fraenkel and Wallen, 1993) saw it in three ways of approach in general. These are examining the strength of the relationship, the statistical significance of the relationship and the square of the correlation coefficient in order to answer basic question about two variables. Is there a relationship between two variables? If so, what is the direction of the relationship? And what is the magnitude of the relationship? These approaches are used to interpret the computed correlation coefficients. Tables form table 3 to table 7 show the relationships between predictor and criterion variables in each departments.

Table 3: Correlation Matrix of the predictor and criterion variables in the nursing department (N=49)

Variables	X_1	X_2	X_3	Y_1	Y_2
X_1	1				
X_2	0.200	1			
X_3	0.164	0.333*	1		
Y_1	0.311*	0.389*	0.293*	1	
Y_2	0.301*	0.420**	0.276	0.982*	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

As it can be seen from table 3 above all of the predictor variables in the nursing department have statistically significant positive relationship with the students first year academic achievements (Y_1). All the three predictor variables X_1 ,X_2 and X_3 are statistically significant at 0.05 level.

In the second year academic achievement (y_2) the predictor variables X_1 and X_2 have statistically significant positive relationships with y_2 but X_1 is significantly correlated with Y_2 at 0.05 level and X_2 is significantly correlated with Y_2 at 0.01 level. On the other hand X_3 has positive but no statistically significant correlation with the second year achievement Y_2.

In the table there is also very high correlation between the two criterion variables Y_1 and Y_2. This might tell us that the candidate who achieve high in the year or vice versa.

Table 4 Correlation matrix of the predictor and criterion variables in the laboratory department (N=34)

Variables	X_1	X_2	X_3	Y_1	Y_2
X_1	1				
X_2	0.075	1			
X_3	0.200	-0.411**	1		
Y_1	0.434*	0.166	0.166	1	
Y_2	0.429*	0.111	0.205	0.982**	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

As it can be seen from table 4 above one of the predictor variable in the laboratory department have statistically significant positive relationship with students first year academic achievement (Y_1), for example EGSECE/ ESLCE GPA has moderate correlation with the criterion variable (Y_1), (r=0.434) which is statistically significant at 0.05 level. but the entrance examination scores (X_2), and High school average scores (X_3) both have positive but weak correlation with criterion variable (Y_1), (r=0.166) for both (X_2) and(X_3) which is not statistically significant.

The second year academic score(Y_2) is the same with the first year that only one of the predictor variables, EGSECE/ESLCE GPA(X_1) have moderate positive correlation with the variable (Y_2) (r=0.429). And entrance examination scores(X_2) and high school average scores (X_3) have weak but positive correlation with criterion variable (Y_2) (r=0.111 and r=0.205), respectively X_1 is statically significant at 0.05 level where as (X_2) and (X_3) are not significant statistically.

In general, in table 4 X_1 and X_2 were correlated negatively. This might tell us that the candidate who scored higher in the entrance examination might have low score in his high school average or vice versa, but it would be better if the correlation is positive so the entrance examination need to be revised. Again

there is a high correlation between the two criterion variables Y1 and Y_2, which tell us that the candidate who achieve high in the first year also perform in the second year and vice versa.

Table 5 Correlation matrix of the predictor and criterion variables in the Pharmacy department (N=40)

Variables	X_1	X_2	X_3	Y_1	Y_2
X_1	1				
X_2	0.269	1			
X_3	0.098	0.102	1		
Y_1	-0.009	0.273	0.277 *	1	
Y_2	0.032	0.310*	0.327*	0.940*	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

As in the table 5 above none of the predictor variables in the pharmacy department have statistically significant relationship with the students first year academic achievement (Y_1). For example, ESLCE GPA (X_1) has very low negative correlation with the criterion variable (Y_1),(r=-0.009). this is to suggest that trainees who score low in ESLCE tend to achieve high academic perform in the college and vice versa. Also entrance examination scores (X_2) and high school average scores (X_3) have low correlation with the criterion variable (Y_1).

In the second year academic achievement (Y_2) two of the predictor variables have statistically significant relationship with the criterion variable. For example high school average scores (X_3) has positive but moderate correlation with the criterion variable (Y_2) (r=0.327) and entrance examination scores (X_2) has moderate correlation with the criterion variable (Y_2) (r=0.310). The relationship between the predictor variable (X_2)and(X_3) with(Y_2) is significant at 0.05 level but X_1 has no significant relation with Y_2. But EGSECE/ ESLCE GPA (X_1) has very low but positive correlation with the criterion variable(Y_2).

In table 5, we see there is a negative correlation between the predictor X_1 and criterion Y_1. This might tell us that the one who scored high in ESLCE/ EGSECE has scored slightly lower in his first year and vice versa. So this is telling us X_1 is not predicting Y_1. Hence, care should be taken while using ESLCE/ EGSECE as admission criteria. But this relationship is not significant. And the high correlation between the first and second year achievement might tell us that the candidate who scored high in first year also score high in his second year or vice versa.

Table 6 Correlation matrix of the predictor and criterion variables in the radiography department (N=23)

Variables	X_1	X_2	X_3	Y_1	Y_2
X_1	1				
X_2	0.179	1			
X_3	- 0.028	-0.175	1		
Y_1	0.093	0.123	0. 335*	1	
Y_2	0.074	0.247	0.150	0.867**	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

As can be seen from the table 6 above one of the predictor variables has statistically significant relationship with the students' first year academic achievement (Y_1). For example high school average score (X_3) has positive correlation with the criterion variable Y_1(r=0.335). which is significant at the 0.05 level where as the predictors (X_1)and(X_2) have very low correlation with the criterion variable (Y_1).

In the second year academic achievement (Y_2) all of the predictor variables have no statistically significant relationship with the criterion variable (Y_2). For instance, EGSECE/ ESLCE GPA (X_1), entrance examination score (X_2) and high school average score (X_3) have very low but positive correlation with the criterion variable (Y_2) .

In table 6, X_1 and X_2were negatively correlated with X_3 but not significantly, which is telling us the candidate who scored higher in his EGSECE/ESLCE and entrance examination might have lower high school average score and vice versa, this might tell as X3 is not giving constant measure us EGSECE/ESLCE and entrance examination it was observed that there is a high correlation between the criterion variables Y_1 and Y_2. It might tell us that the one who have high score in his first year has also scored higher in this second year and vice versa.

From the total subjects included in the study 49 students submitted their EGSECE GPA results to the college upon their admission. In order to see the relationship existing between the prediction variables(EGSECE GPA, Entrance examination results and high school average scores) and criterion variables (First and second year academic performance) the correlation matrix is presented as follows.

Table 7 Correlation matrix of the predictor and criterion variables for subjects coming through EGSECE (N=49)

Variables	X_1	X_2	X_3	Y_1	Y_2
X_1	1				
X_2	0.087	1			
X_3	0.520**	-0.128	1		
Y_1	-0.174	0.428**	-0.215	1	
Y_2	0.006	0.336*	-0.075	0.890**	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

As can be seen from the table 7 above one of the predictor variables (X_2) has statistically significant relationship with the students first year academic achievement (Y_1) at the 0.01 level where as the predictors X_1 and X_3 have very

low but negative correlation with the criterion variable (Y_1). X_1 and X_3 have not statistically significant relationship with the criterion variable.

In the second year academic achievement again X_2 has a statistically significant relation with the criterion variable at the 0.05 level. But X_1 and X_3 do not have statistically significant relationship with the criterion variable Y_2.

In table 7, X_1 and X_2 were correlation negatively but not significantly. This might tell us that the candidate who scored higher in his entrance examination might have lower high school average score and vice versa. And we observe the negative correlation between X_1 and Y_1 also between X_3 and Y_1 . This might tell us that candidate who have higher EGSECE/ESLCE GPA and high school average score might score lower in the first year and vice versa. Also there is negative but not significant correlation between X_3 and Y_2 which might tell us that a candidate who have higher high school average score might score lower in the second year and vice versa. There is also high correlation between the criterion variables Y_1 and Y_2 as we saw in the previous tables.

4.1.3. Results of Regression Analysis

In order to assess the gross contribution of all the predictor variables: EGSECE/ ESLCE GPA (X_1), entrance examination scores (X_2) and high school average scores(X_3); all are employed in linear combination for the prediction of the criterion variable. And then after the stepwise regression analysis has been done to see the relative contribution of predator variables in predicting each criterion variable in each academic year. Therefore, in this part of the paper, the first two predictor variables (X_1) and (X_2) were assessed accordingly. On top of that, when predictor variables (X_3) was added to the initial predictors, similar techniques were also used in finding the potential predictors and over all contribution as well. The results of the analysis are summarized in tables 8 to 12.

Table 8. Summary of regression analysis of Y_1 and Y_2 in the field of nursing (N=49)

Variables	Multiple Correlations			F-value	Simple correlation	Dep. Variable
	R	R^2	Change in R^2			
X_1 & X_2	0.456	0.208	-	6.036	-	Y_1
X_1	0.311	0.096	0.077	5.019	0.311	
X_1 to X_3	0.480	0.230	-	4.481	-	
X_2	0.389	0.151	0.133	8.389	0.389	
X_3	0.293	0.086	0.066	4.410	0.293	
X_1 & X_2	0.474	0.225	-	6.674	-	Y_2
X_1	0.301	0.090	0.071	4.672	0.301	
X_1 to X_3	0.420	0.176	-	10.090	-	
X_2	0.420	0.176	0.158	10.040	0.420	

As can be seen from table 8 above, the proportion of variance in $Y_1$and Y_2 accounted for by the linear combination of two predictor variables (X_1 and X_2) are both 21% and 23%, respectively. The F-values indicate the contribution of predictors is statistically significant in all criterion mentioned showing that both variables are successfully explaining the respective criterion variable. The addition of another one predictor variable (X_3) to former variables, explained about 23% and 18%, respectively. In the table the F-value showed that the total contribution of X_1 through X_2 in $Y_1$and Y_2 is statistically significant at the 0.05 level. In addition the results of stepwise regression analysis on Y_1 indicated that all the predictor variables (X_1, X_2 and X_3) were selected by the regression model. Therefore they explain about 10%, 15% and 9% of the variance in Y_1 , respectively. And only predictor variables(X_1, and X_2) were selected by the regression model in Y_2 and they explain about 9%,18% of the variance in Y_2, respectively.

As it was seen above the F-value indicates that the contribution of variables (X_1 through X_3) in combination is statistically significant at 0.05 level in all criterion variables $Y_1$and Y_2 to predict the students achievement in all the criterion variables. It is true again for the contribution of variables ($X_1$and X_2) in predicting all criteria. Also results of stepwise regression show that X_1 was selected between X_1 and X_2. Thus X_1 alone explain about 10% and 9% of the variance in $Y_1$and Y_2, respectively. This might indicate negligibly small contribution of X_1 in predicting . Y_1 and Y_2. From the predictor variables in this study X_3 was not selected by the regression model of Y_2 since it has low correlation with the respective criterion variable.

Table 9. Summary of regression analysis of Y_1 and Y_2in the field of laboratory technology (N=34)

Variables	Multiple Correlations			F-value	Simple correlation	Dep. Variable
	R	R^2	Change in R^2			
X_1 & X_2	0.454	0.206	-	4.019	-	Y_1
X_1	0.434	0.188	0.188	7.414	0.434	
X_1 · toX_3	0.480	0.230	-	2.988	-	
X_1 & X_2	0.436	0.190	-	3.646	-	Y_2
X_1	0.429	0.184	0.184	7.226	0.429	
X_1 · toX_3	0.470	0.221	-	2.830	-	

As it is shown in the above table 9, the proportion of variance in Y_1 and Y_2 accounted for by the linear combination of the initial variables (X_1 and X_2) are 21% and 19%, respectively. When the other variable X_3 was added to those variables , the proportion of variance in Y_1 and Y_2 accounted for was improved to 23% and 22%, respectively in each criterion variable. Thus, we see there is an improvement of 3% In both cases. The F-values of multiple regression analysis show that only X_1 alone make statistically significant contribution at the 0.05 level. In both cases the variable X_1 is entered between X_1 and X_2 in the regression

model in Y_1 and Y_2 then it accounts about 19% and 18% of the variance in Y_1 and Y_2, respectively. Besides this the results of stepwise regression analysis on Y_1 show that only the predictor variable X_1 was selected by the regression model. Therefore it explains about 19% of the variance in Y_1 Again the variable which was selected by the regression model of Y_2 was X_2 and it explains about 18% of the variance in Y_2.

It was seen again from the table 9 the contribution of variables X_1 and X_2 in predicting all criteria. But the variable X_1 alone can explain 19% and 18% the variance in Y_1 and Y_2, respectively. This can indicate the negligible contribution of X_2 in predicting Y_1 and Y_2. From all the predictor variables in this study X_1 was selected by the regression model since it has relatively high correlation with the respective criterion variables. So it appears as a potential predictor variable when the three-predictor variables (X_1, X_2 and X_3) were used in combination. Thus it explains about 23% of the explained variance of Y_1 and 22% of Y_2.

Table 10. Summary of regression analysis of Y_1 and Y_2in the field of pharmacy technology (N=40)

Variables	Multiple Correlations			F-value	Simple Correlation	Dep. Variable
	R	R^2	Change in R^2			
X_1 & X_2	0.286	0.082	-	1.653	-	Y_1
X_1	0.009	0.000	0.000	0.003	0.009	
X_1, to X_3	0.382	0.146	-	2.050	-	
X_1 & X_2	0.314	0.099	-	2.025	-	Y_2
X_1	0.032	0.001	0.001	0.039	0.032	
X_1, to X_3	0.433	0.187	-	2.678	-	
X_3	0.327	0.107	0. 107	4.541	0.327	

In table 10 above, the results of multiple regression analysis show that the contribution of variables X_1 and X_2 together was not statistically significant with all criterion variables Y_1 and Y_2. None of them was also entered to the regression

model. This might happen as a result of having low correlation with each criterion variable what the explain in each dependent variable is almost negligible. For example in predicting Y_1 and Y_2 they account for 8% and 10% of the proportion variance in the respective criterion variable. The proportion variance in Y_1 and Y_2 by its relationship with predictor variables might be increased in some amount when one additional variable X_3 is included in the regression model. In all cases, the total contributions of those variables were not found statistically significant at 0.05 level. Then the variable has improved the explain from 8% to 15% and from 10% to 19% in each of the criterion variables Y_1 and Y_2, respectively.

The Variable X_3 appeared as a potential predictor variable among all the variables (X_1 , $X_2$and X_3) used in the study and entered into the regression model in the criterion variable and it explains about 11% of proportion variance in Y_2.

Table 11. Summary of regression analysis of Y_1 and Y_2in the field of radiography (N=23)

Variables	Multiple Correlations			F-value	Simple Correlation	Dep. Variable
	R	R2	Change in R2			
X_1 & X_2	0.142	0.020	-	0.207	-	Y_1
X_1	0.093	0.009	0.009	0.181	0.093	
X_1 to X_3	0.388	0.151	-	1.125	-	
X_1 & X_2	0.248	0.062	-	0.658	-	Y_2
X_1	0.074	0.005	0.005	0.116	0.074	
X_1 to X_3	0.316	0.100	-	0.705	-	

In table 11 above regression analysis on each criterion variable indicates that contribution of X_1 and X_2 together are not statistically significant with all criterion variables and none of them was selected by the regression model. This might be due to the low correlation with each criterion variable. The extent to which these variables explain variance in each dependent variable is almost negligible. For

instance, in predicting Y_1 and Y_2 they account for 2% and 6% of the explained variance in each criterion variable, respectively. The proportion of variance in each dependent variable by its relationship with predictor variables might be improved in some amount when one additional variable X_3 included in the regression model. In all cases the contribution of those variables are found to be statistically significant at 0.05 level the variable has improved about 13% and 4% of that the variance in Y_1 and Y_2, respectively.

Table 12. Summary of regression analysis of Y_1 and Y_2 in the four departments for subjects coming through EGSECE(N=49)

Variables	Multiple Correlations			F-value	Simple correlation	Dep. Variable
	R	R2	Change in R2			
X_1 & X_2	0.473	0.224	-	6.641	-	
X_1	0.174	0.030	0.030	1.446	0.174	
X_1 to X_3	0.477	0.227	-	4.415	-	
X_2	0.423	0.179	0.179	10.269	0.423	Y_1
X_1 & X_2	0.338	0.114	-	2.965	-	
X_1	0.006	0.000	-0.000	0.002	0.000	
X_1 to X_3	0.338	0.114	-	1.938	-	Y_2
X_2	0.336	0.113	0.113	5.985	0.336	

As it is shown in the above table 12, the proportion of variance in Y_1 and Y_2 accounted for the by linear combination of the initial variables (X_1 and X_2) are 22% and 11%, respectively. When the other variable X_3 was added to those variables, the proportion of variance in accounted for was improved to 23% and in Y_2 it is not changed. Thus we see there is an improvement of 1% in the first case. The F-values of multiple regression analysis show that only X_2make a statistically significant contribution at 0.01 level. In both cases the variable X_2 entered between X_1 and X_2 in the regression model in Y_1 and Y_2 then it accounts about 18% and 11% of the variance in Y_1 and Y_2 respectively. Moreover the results of stepwise regression on Y_1 show that only the predictor X_2 was selected by the regression model. Therefore it explains about 18% of the variance in Y_1.

Again the variable which was selected by the regression model of Y_2 was X_2 and it explains about 11% of the variance in Y_2 from the table it was seen the contribution of variables X_1 and X_2 in predicting all criteria. But the variable X_1 alone can explain only 3% of the variance in Y_1 and do not explain any proportion of the variance in Y_2. This can indicate that the negligible contribution of X_1in predicting Y_1 and Y_2 .From all the predator variable in this study X_2 was selected by the regression model since it has a relatively high correlation with respective criterion variables (table 7). So it appears as a potential predictor variable when the three predictor variables (X_1 ,X_2 and X_3) were used in combination. Thus it explains about 23% of the explained variance of Y_1 and 11% of Y_2.

4.1.4. Summary of stepwise regression analysis

The summary of regression analysis from tables 8 to 12 indicate that the combined effect of EGSECE/ESLCE and entrance examinations results is significant in predicting the criterion variables Y_1 and Y_2 in the two departments. Again EGSECE/ESLCE is also significant in predicting criterion variables in nursing and laboratory departments. And no one of these is significant in table 9 and 10 as indicated in pharmacy and radiography departments.

When other variables are added to those initial variables has improved the explained variance in those criterion variables used in the study. Entrance examination and high school average scores are selected by the regression model respectively.

Finally, there is variability remaining still unexplained. Those remaining variables are too small to add to the value of R-square in this case.

Table 13. Summary of the stepwise regression analysis showing potential Predictor variables.

Departments	Criterion Variables					
	Y_1			Y_2		
Nursing	X_1*,	X_2*,	X_3*	X_1*,	X_2*,	-
Laboratory	X_1**,	-	-	X_1**,	-	-
Pharmacy	-	-	-	-	-	X_3*
Radiography	-	-	X_3*	-	-	-

* $P < 0.05$

** $P < 0.01$

4.2_ Discussion

In the study to investigate the predictive power of the selection criteria that have been used for selecting candidates for the Defense College of Health Science, each of those questions used in this study is again presented and discussed based on the results in the previous section of this chapter.

Question 1: Do the EGSECE/ESLCE GPA and entrance Examination results separately and together have statistically significant relationship with the first and second year academic performance of students in the DCHS?

The correlation matrix results of table 3 to 6 show that the EGSECE/ ESLCE GPA have statistically significant relationship with first year academic performance (Y_1) and second year academic performances (Y_2) of nursing and laboratory departments at 0.01 and 0.05 level, respectively. Correlations ranging from 0.35 to 0.65 are statistically significant beyond 1 percent level. Correlations ranging from 0.65 to 0.85 make possible group predictions that are accurate enough for most purposes.(Cohen and Manion 1994). Therefore the nursing department has correlation which is below the range. Thus, this range have no value in individual

predictions even if it was significant in its contribution. Whereas the laboratory department has statistically significant correlations beyond 1 percent level. Also it has been observed that the explained variance accounted for by this predictor variable in both criterion variables (Y_1) and (Y_2) is the best predictor of college performance. This shows that the EGSECE/ ESLCE result is relevant to the college curriculum. Where as in table 7 EGSECE GPA (X_1) alone does not have statistically significant relationship with both criterion variables (Y_1 and Y_2) Rather it has low and negative correlation with both criterion variables Y_1 and Y_2 . Therefore, it needs to take care while using EGSECE as a selection criteria for admission of students to the College. Where as this EGSECE GPA combined with entrance examination predict better in all fields of study.

With regard to the Entrance examinations results of correlation matrix in tables 3 to 6 indicate that, the entrance examination has statistically significant relationship in both academic year performance in nursing department, in the second year academic performance of pharmacy department at 0.05 level for nursing and pharmacy departments. It appears that the entrance examination is a valid indicator of academic performance in both academic years of nursing department where as it is only valid indicator for second year performance of pharmacy department. According to Cohen and Manion, (1994) Correlations ranging from 0.35 to 0.65 useful when combined with other variables. hence, for nursing department entrance examination has prediction that is useful when combined with other variables. Where as the pharmacy department has correlations which is below range, thus this range are of no value in individual predictions. Even if it was not significant in its contribution, its relationship with second year academic score is better than other year in pharmacy department. Also in table 7 the entrance examination has statistically significant relationship with both criterion variables Y_1 and Y_2,

Therefore, the results of this study are consistent with some research findings for instance, Kebede (1991), Meresa (1994), Mittman (1972), Samson (2007) have found entrance examination results to be strongly predicting students' future performance in training institutions.

In addition, predictions were also made regarding the combined effect of the two predictor variables; EGSECE/ ESLCE GPA and Entrance Examination results. As it can be shown in tables 8 to 12, the combined effect of these predictor variables is again significant in nursing and laboratory departments. But it is not significant in the pharmacy and radiography departments. The value of R^2 shown in the tables can possibly support this statement.

When investigating these relationships with the levels of correlation between each predictor and criterion variables, it shows that there is some advantage of using the combined predictors even if they were mostly not significant separately.

Questions 2: which years academic achievement does the selection criteria predict better?

As it is shown in table 3 EGSECE/ESLCE GPA predict more in the first year than the second but it has significant relationship with all criterion variables. This shows that the first year is better predicted by the EGSECE/ESLCE GPA in the nursing department. When it comes to entrance examinations scores it shows that the second year is predicted more than the first year and again it has significant relationship with all criterion variables even if there is difference in prediction, and it is also shown in table 8 that similar results were obtained when X1 and X_2 were also computed in combination. That is the contribution of these variables together in the first and second year scores are statistically significant by selecting EGSECE/ESLCE GPA only. EGSECE GPA alone do not contribute in the prediction of first and second year academic achievement (Y_1 and Y_2 respectively)

as shown in table 7. Where as the second year score have significant relationship with the two predictor variables. The magnitude of R^2 of the second year looks to predict better than the first year.

The result shown in table 6 is different from others that both of the predictor variables are not significant in predicting both first year and second year performances even if it was not also significant in combination, comparisons could be done among years in terms of their multiple R^2. These results of table 10 show that the explained variance of second year is slightly higher than first year when X_1 and X_2 were combined together.

The result shown in table 4 is different from others in that one of the predictor variables; the entrance examination result was not significant in predicting both criterion variables. But EGSECE/ESLCE GPA is significant in predicting both criterion variables, with slightly better prediction of first year performance. Although it was significant in combination, comparisons in terms of their multiple R^2 show that the explained variance of first year is slightly higher than the second year when X_1 and X_2 were combined together.

The result shown in table 5 again differ from others in that only entrance examination results were significant in prediction of second year performance. Also in table 7 only entrance examination results were significant in prediction of first and second year performances. EGSECE/ESLCE GPA has very low negative relationship with first year performance. But it is not significant in the prediction of both criterion variables. Even if it was not also significant in combination, the comparisons done in terms of their multiple R^2 reveal that in table 9 the explained variance of second year is slightly higher than the first year when X_1 and X_2 were combined together.

Questions 3: Does high school average score contribute for the prediction of the trainees' academic performance in the college if it was used in combination with the initial predictor variables?

The purpose of the third investigation was to see whether the addition of this variable could improve the predictive power of the EGSECE/ESLCE GPA and entrance examination as treated earlier was found to be less efficient in predicting academic performance in some departments of the Defense College of Health Science. For example, the entrance examination was not significant in the laboratory department. But when another additional variable X_3 was included in the regression model, some sort of increament of variance in each criterion variable was observed. Even if it has brought some sort of increment of variance in each criterion variables in table 4 high school average score (X_2) was negatively correlated with the entrance examination(X_2). This might tell us that the candidate who was good at high school have scored less in his entrance examination. But independently these variables have their own impact on the criterion variable.

The same with other fields of studies the addition of one other variable X_3 in the radiography department to the regression model brings some amount of increament of variance in each criterion variable. The same was seen in the pharmacy department and in the nursing department. This indicates that the contributions of the combined variables were significant in predicting criterion variables in tables 8 to 12.

The result of stepwise regression indicate that X_3 has appeared as the potential predictor for criterion variables in the nursing, pharmacy and radiography departments, although it appears as a predictor of Y_1 and Y_2 in radiography and pharmacy departments.

Hence, about 9% of the variance in Y_1 was accounted for by X_3 in the nursing department. Thus the results support the findings of some prediction studies done in similar area; for example, Fraenkel and Wallen, (1983); Haplin and

Schaer,(1981); Kebede, (1991); Meressa, (1994) have found the record of performance in high school to be reflected in the criterion of college performance. According to Samson(2007) the addition of the variable (high school average scores) to the initial predators was observed as the only potential predictor in all fields of studies and high school average score improved the prediction accuracy in most cases.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Most of the time colleges formulate minimum selection criteria that can be practiced by some admission officials. These officials perform their duty based on the predetermined non test official records such as high school achievement rank in a class and others. These days test scores have been used in some colleges, in which admission test score data is important at any time depending on the needs of the training institutes. When the number of applicants is more than the capacity of the college, colleges use the test results for selection of better students for the training and also test results help colleges for spending resources on the potential candidates for the training.

In this study, EGSECE/ESLCE GPA in the natural sciences (including Mathematics and English), a minimum of 50% score on locally prepared entrance examination and high school average scores were used in the selection of trainees. The criteria are required to provide means of reducing the wastage of resources in the colleges of Health Science. Inaccuracy of such selection criteria resulted in losing a qualified individual for the college or loosing resources to unfit individuals in the colleges.

The data were obtained from Defense College of Health Science and then the analysis was done for its accuracy in prediction in the four fields, nursing laboratory, pharmacy and radiography departments separately. Thus, based on the results obtained and discussed in the previous chapter, the following conclusions are given.

5.2 Conclusions

- The EGSECE/ESLCE GPA is a valid indicator of academic performance in the college in the Nursing and Laboratory departments but not in the Pharmacy and Radiography departments.

- Entrance examination result is valid indictor of academic performance in Nursing and Pharmacy departments where as It has not significant relationship with all academic years score in the Laboratory and Radiography departments.

- The combined effect of EGSECE/ESLCE GPA and entrance examination result are significant in predicting all criterion variables in Nursing and Laboratory departments but not in the Pharmacy and Radiography departments.

- EGSECE/ESLCE GPA and entrance examination results in combination are better predictors of the first and second year academic performances in the Nursing and Laboratory departments where as there is not significant relationship in the Pharmacy and Radiography departments

- Only in the nursing department, the entrance examination has better prediction power than EGSECE/ESLCE.

- The use of such inefficient selection criteria brings the has of resources as well as the wastage of efforts of admission officials .

- The addition of other variable; (High school average score) to those initial predictors (EGSECE/ESLCE GPA and entrance examination) was observed as a potential predictor in the Nursing department.

- The addition of High school average score to those initial predictor variables has improved the prediction accuracy in most departments.

- Relatively better prediction was observed when the combination of these three predictor variables together is used.

- Finally the predictive power of the predictor variables used in the study varied from department to department depending on the parts which the researcher is unable to test or control limit point of EGSECE/ESLCE GPA and the conditions within the college which may have an impact to academic performances.

5.3 Recommendations

From the above conclusions the following points can be recommended:

- In order to make the selection criteria accurate, to use the information from students transcript (High school average score) is advisable.

- To improve the prediction of such measures the active participation of colleges is very important, since the colleges have greater responsibility for the practicality of the selection criteria to bring it in to function in all departments.

- This evaluation of selection criteria is not an end by it self, continuous assessment need to be made from time to time to improve the predictive ability of the selection criteria therefore fruitful selection can be made for the college of health science in its all departments.

- The evaluation of such selection criteria is possible only if the necessary documents are available in the college. Therefore, colleges need to admit their

trainees with all the required documents so that it can be easy for any body who is interested to conduct research in the area.

- During the preparation of entrance examination the college officials need to give attention to the items included in the exam that they should measure the required output uniformly all departments as well.

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APPENDIX

Appendix A

Defense College of Health Science

Nursing Diploma Program Course Breakdown.

Year I Semester I

No	Course No	Course title	Credit hours
1	ANAT 101	Human Anatomy and Human Physiology	5
2	Eng 111	College English	2
3	Psyc 111	Introduction to Social Sciences (Sociology , Psychology and Anthropology)	2
4	CNCR 101	Basic Nursing Art	4
5	MIBI 101	Micro biology and Parasitology	3
6	CNUR 111	Nursing Ethics and law	2
7	CNUR152	Clinical Practice I	1
Total			19

Year I Semester II

No	Course No	Course title	Credit hours
1	CNUR 102	Medical and Surgical Nursing I	4
2	CNUR 112	First aid /Accident Prevention	1
3	CNUR 122	Advanced Nursing Art	4
4	CNUR 132	Physical Assessment	1
5	COMH 221	Environmental Health	2
6	CNUR 142	OR Techniques/Anesthetics	2
7	PHAR 102	Pharmacology I (Drugs and Solutions)	2
8	NUIR 102	Nutrition	1
9	CNUR 251	Clinical Practice II	2
Total			19

Cont ...

Defense College of Health Science

Nursing Diploma Program Course Breakdown

Year II Semester I

No	Course No	Course title	Credit hours
1	CNUR 201	Obstetrics and Gynecology I	2
2	CNUR 211	Pediatric Nursing I	2
3	CNUR 221	Medical and Surgical Nursing II	4
4	CNUR 231	Communicable Disease	3
5	CNUR 241	Health Education	2
6	PHAR 201	Pharmacology II (drugs and Solutions)	2
7	CNUR 261	Clinical Practice III	-
Total			19

Year II Semester II

No	Course No	Course title	Credit hours
1	CNUR 202	Obstetrics and Gynecology II	2
2	CNUR 212	Pediatric Nursing II	2
3	CNUR 222	Medical and Surgical Nursing III	4
4	CNUR 232	Health and Nursing Service Management	2
5	CNUR 242	Psychiatric Nursing	2
6	PHAR 252	Family Health (MCH)	2
7	CNUR 262	Team Training program (TIP)	3
8	CNUR 272	Clinical Practice IV	2
Total			19

Appendix B

Defense College of Health Science

Laboratory Technology Diploma Program Course Breakdown

Year I Semester I

No	Course No	Course title	Credit hours
1	ENGL 101	College English	3
2	CHEM 101	General Chemistry	3
3	BIOL 111	General Biology	3
4	CLT 101	Introduction to Med. Lab	3
5	NAPH 101	Anatomy and Physiology	3 4
6	CNUR 101	First Aid	1
7	PHED 101	Physical Education	P/F
		Total	20

Year I Semester II

No	Course No	Course title	Credit hours
1	CLT 101	Parasitology I	3
2	CLT 112	Hematology I	3
3	CLT 122	Bacteriology I	3
4	CLT 132	Urinalysis I	2
5	CLT 142	Serology & Immunology I	3 2
6	SOCS 102	Social Studies	2
7	COMH 132	Bio statistics	2
8	PHED 102	Physical Education	P/F
		Total	20

Cont ...

Defense College of Health Science

Laboratory Technology Diploma Program Course Breakdown

Year II Semester I

No	Course No	Course title	Credit hours
1	CLT 201	Clinical Chemistry	3
2	COMH 201	Epidemiology +CDC	3
3	CLT 211	Bacteriology II	3
4	CLT 221	Parasitology II	3
5	CLT 231	Hematology II	2
6	CLT 241	Urinalysis II	2
7	CLT 251	Serology and Immunology	2
		Total	18

Year II Semester II

No	Course No	Course title	Credit hours
1	CLT 202	Blood Bank	3
2	CLT 212	Clinical Chemistry II	4
3	CLT 222	Quality Control and Lab. Management	1
4	CLT 232	Lab. Equipment Maintenance	1
5	CLT 242	Professional Practice	3
6	CLT 252	Team Training Program	4
		Total	15

Appendix C

Defense College of Health Science

Pharmacy Technician Diploma Program Course Breakdown

Year I Semester I

No	Course No	Course title	Credit hours
1	ENGL 101	College English	3
2	CHEM111	General Chemistry	3
3	BIOL 111	General Biology	3
4	MATH 101	Applied Mathematics	2
5	AN-PH 101	Anatomy and Physiology	4
6	CHEM 101	Organic Chemistry	4
7	PSYC 101	Introduction to Psychology	1
8	PHED 101	Physical Education	P/F
		Total	20

Year I Semester II

No	Course No	Course title	Credit hours
1	MBIO 102	Microbiology and Parasitology	3
2	SPT 102	Pharmaceutics I	4
3	SPT 112	Pharmacology I	3
4	SPT 122	Pharmacognosy	3
5	SPT 132	Pharmaceutical Calculations	1
6	COMH 132	Biostatistics	2
7	COMH 241	Health Administration	2
8	CNUR 102	First Aid	1
9	PHED 102	Physical Education II	P/F
		Total	19

Cont ...

Defense College of Health Science

Pharmacy Technician diploma Program course Break Down

Year II Semester I

No	Course No	Course title	Credit hours
1	SPT 201	Pharmaceutics II	4
2	SPT 211	Pharmaceutical Analysis	4
3	SPT 221	Pharmacology II	4
4	SPT 231	Clinical Pharmacy	3
5	COMH 262	Health Education	1
6	COMH 101	Epidemiology	2
7	CHEM 201	Medical Chemistry	1
		Total	19

Year II Semester II

No	Course No	Course title	Credit hours
1	SPT 202	Good Manufacture Practice(GMP)	2
2	SPT 212	Pharmacy Administration	3
3	SPT 222	Pharmacy Law and Ethics	2
4	SPT 232	Traditional Medicine	1
5	SPT 242	Pharmacy Practice	3
6	SPT 252	Team Training program	3
		Total	14

Appendix D

Defense College of Health Science

Radiography Diploma Program Course Breakdown

Year I Semester I

No	Course No	Course title	Credit hours
1	FLEN 101	Freshman English	3
2	SOC 101	Sociology	3
3	HITM 101	Health Management	2
4	Phys 101	General Physics	3
5	Psyc 101	Psychology	3
6	Ethc 101	Professional Ethics	1
7	Stat 101	Basic Statistics	2
8	Comp 101	Basic Computer skills	2
		Total	19

Year I Semester II

No	Course No	Course title	Credit hours
1	Anat 102	Anatomy	3
2	Phy 102	Physiology	2
3	Crpt 102	Care of patients	3
4	Eqp 102	Radiographic equipment	3
5	Rim 102	Radiographic imaging	2
6	Ros 102	Radiographic positioning	2
7	Imod 102	Introduction to imaging modalities	4
		Total	19

Cont ...

Defense College of Health Science

Radiography Diploma Program Course Breakdown

Year II Semester I

No	Course No	Course title	Credit hours
1	Phy 201	Physiology	2
2	Anat 201	Anatomy	3
3	Pos 201	Radiographic positioning	4
4	Rphys 201	Radiological physics	3
5	Crpt 201	Care of patients	2
6	Eqp 201	Radiographic equipment	3
7	Rim 201	Radiographic imaging	2
		Total	19

Year II Semester II

No	Course No	Course title	Credit hours
1	Anat 202	Anatomy	2
2	Phy 202	Physiology	2
3	Rphys 202	Radiological Physics	3
4	Pos 202	Radiological Positioning	4
5	Rpath 202	Radiological Pathology	3
6	Qut 202	Quality assurance	2
7	Rim 202	Radiographic imaging	2
		Total	18

DECLARATION

This thesis is my original work and has not been presented for degree in any other university and that all sources of material used for the thesis have been acknowledged.

Name: Kassahun Menpesha

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Date: 25/07/2008

Place: Department of Psychology, Addis Ababa University, Addis Ababa

This thesis has been submitted for examination with my approval as university advisor.

Name: _____

Signature: _____

Date: July 25, 2008