Determinants of students’ vulnerability to attrition in higher education: Evidence from Arba Minch University, Ethiopia

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This study aimed at assessing the level and determinants of students’ vulnerability to attrition in Arba Minch University, Southern Ethiopia using a random sample of 547 students. The study revealed that, out of 547 sample students, 207 (38%) students were found highly vulnerable to attrition, 51 (9%) students were moderately vulnerable and the remaining 289 (53%) were not vulnerable. From highly vulnerable categories of students, 132 (64%) were female, while 75 (36%) were male students. With respect to place of origin, out of 207 highly vulnerable students, 119 (57%) of students were from rural areas while 88 (43%) of students were from urban areas. In addition, 40% of students who were placed to a study program without their interest were highly vulnerable. The study also revealed that first year students are more likely vulnerable to attrition than second and third year students. Logistic regression result revealed that gender, students’ satisfaction, study hours, monthly income and faculty of study significantly affect students’ vulnerability to attrition. So, to reduce the number of unfinished degrees and reduce vulnerability to attrition, leaders of higher institution should give due attention to students’ program placement, tutorials for female students and provision of better student services.

Key words: Attrition, vulnerability, logit model, higher education.

INTRODUCTION

Education is a development of physical, mental, moral (spiritual), and social faculties of individuals, for a life of dedicated service (Eshetu, 2002). It is a powerful tool to enable citizens to make all rounded participation in the development campaign (Tiruneh and Petros, 2014). It is important in raising the productivity of a nation and hence can be seen as vital components of growth and development (Todaro and Smith, 2012). Education is the means or the tool that any society has to possess for confronting the current and future socio economic challenges, and indeed to shape our world of tomorrow (UNDP, 2007). Therefore, education is a prime objective of every one (Egenti and Omoruyi, 2011).

The relationship between education and economic development has been recognized in the literature. There are two important points in this regard. According to Gyimah-Brempong (2010) education is seen a product of development process on one hand. Education is a central...
place in accelerating the development of economies through knowledge, skills and attribute change. It affects economic growth, poverty and inequality reduction, health improvement, good governance, institutional development and policy framework (Muhdin, 2016) and (World Bank, 2008). Students are the most essential asset in any educational system. The students’ performance plays an important role in producing the best quality graduates who will be become great leader and manpower for the country thus responsible for country’s economic and social development (Ali et al., 2009). The schools, colleges and universities are for purpose of enabling the students acquire necessary skills and knowledge to participate in the development process (Mushtaq and Khan, 2012) and (Horn, 2014). As estimated by Pascarella and Terenzini (2005) an increase in one letter grade was associated with an increase in earnings between 8 and 9%. Students with exceptionally poor academic performance may face academic probation, enrollment restrictions, or institutional expulsion (Horn, 2014).

The issue of academic performance has received a considerable attention in any academic programs (Mushtaq and Khan, 2012; Mutairi, 2011). In order to succeed students must place a certain value on academic achievement (Soule, 2009). Thus, due attention has been given for students’ academic performance. However, measuring academic performance is a challenging aspect of literature (Mushtaq and Khan, 2012). Besides, factors determining the student’s academic performance is vary from place to place (Ali et al., 2013), from person to person and from country to country (Mushtaq and Khan, 2012) and become one of a long standing and ongoing debate among educators, academics, and policy makers (Harb and Sharawi, 2006; Sarwar and Sarwar, 2012).

One of the greatest assets of a country is its youth; more educated youth can contribute more to the country (Zaheer et al., 2016). If youth are effective and successful in education, they can play a significant role to the development of science and technology of any nation (Gota, 2012). It is empirically proved that those who have a graduate degree can find job more easily than their non-graduate counterparts (Richard and Parker, 2012). This did not only enables them to earn for themselves but also prevent them from becoming a burden on nation’s economy (Zaheer et al., 2016). However, recent evidences confirm that higher education institutions have given more attention towards attracting new students than retaining the already involved students (Zemke, 2000 cited in Zaheer et al., 2016) and this results high attrition and drop out of the students. As cited in Njoroge et al. (2015), Tinto (1975) has defined student attrition as the process of interactions between individual, academic and social systems of the university which determine whether students are retained or drop out. Attrition is considered as a departure from all forms of higher education before completion of degree or other credential (Johnson, 2012). To Rilwani et al. (2014), attrition is the declining level of student retention in a given subject or course of study. According to Hussain and Khader (2014) student attrition is a flow out of the students from the institutions through course change, illness and so on. Attrition refers to the proportion in particular year that neither graduate nor continued studying the following year (Daniel, 2014) and it provides a measure of the proportions of students who drop out of institution each year (Rendon et al., 2000). Recently attrition rate is considered as a measure of quality of higher institutions in conjunction with the other measures (Daniel, 2014).

Student attrition has upsetting and costly impacts (Hussain and Khader, 2014) and it has drawn a considerable attention globally and nationally in colleges and universities (Brockett, 2002) due to negative consequences it has on individual students’ lives, their families and a country’s economies (Njoroge et al., 2015). The result of attrition is a large number of unfinished degrees which have a cost for country, the students and the universities concerned, Schneider (2010), Rumberger and Lamb (2003) and Braunstein et al. (2006).

The causes of student attrition are multifaceted and include factors internal to the students and external factors in various environments including family and institutions (Njoroge et al., 2015). A number of studies have identified student’s academic background and academic school experiences as a major determinants of student attrition (Hussain and Khader, 2014; Zaheer et al., 2016; Jiranek, 2010; Daniel, 2014; Helen, 2010). Other studies considered personal problem, university environment and economic problems as factors for high attrition rate in academic institution (Yeshimebrat et al., 2009; Daniel, 2014). There are also studies suggesting parental support factors as the major determinants of student attrition (Islam, 2014; Njoroge et al., 2015).

Higher education is of paramount importance for development since it expands people’s productive capacity as well as national capacity and competitiveness (Ademe and Singh, 2015). Evidences revealed that higher education enrollment statistics in Ethiopia has been growing from time to time due to strong emphasis of the government on the sector. Moreover, the government has been striving to ensure that some disadvantaged members of the society get access to higher education institutions (Tsehay and Yesuf, 2013). In addition due to formulation of national policy for Ethiopian women in 1993 (TGE, 1994 cited in Helen, 2010) and permission to enter higher education with lower score than required for male (Beyou, 2003 cited in Helen, 2010) number of females entering higher education institutions are dramatically increasing from time to time. However, none is more serious and persistence than poor academic achievement and subsequent academic dismissal of students especially first year students in Ethiopian higher institutions (Gota, 2012). Dropout rate in Ethiopian
The influence of student satisfaction on grades or academic performance is a topic of interest in higher education institutions using descriptive analysis (Njoroge et al., 2009; Daniel, 2014; Wudu and Getahun, 2009; Yeshimebrat et al., 2009; Helen, 2010; Zaheer et al., 2016; Roque et al., 2013; Tiruneh and Petros 2014; Griswold, 2014; Fowler, 2016; Rilwani et al., 2014; Brockett, 2002; Ishitani, 2006; Hannah, 2010; Willging and Johnson, 2004; Fisher and Engmann, 2009; Hussain and Khader, 2014; Geisinger and Raman, 2013; Rodan, 2001; Harvey and Luckman, 2014; Tsehay and YESUF, 2013). Most of these studies took a sample of already dropped, dismissed or re-admitted students to achieve their objectives. Answering such question is partially beneficial when concerned with controlling student attrition. The problem is that even if students are not currently dropped, dismissed or re-admitted, they may have high probability of being so in future academic year, a new forward looking concept. Put differently there are some students who are at risk of or endanger of being dropped out of institution due to academic failure even if they are survived in the current semester. These students are said to be vulnerable to academic attrition. Focusing on vulnerability of students to attrition is highly beneficial because it helps minimize the likelihood that a student will be dropped in future academic year through intervention mechanisms. Such critical issue had never been given attention in any of the previous studies. Motivated by this, the present study aimed at examining empirically the phenomenon of vulnerability of student to attrition and its determinants at Arba Minch University using Econometric analysis.

Arba Minch University is one of the 33 Public Universities in Ethiopia established to contribute to the development of the nation and scientific knowledge creation in the world. Since its inception, this university has shown upward trends in all spheres of activities. So, the main objective of the present study is to examine the determinants of Students’ vulnerability to attrition at Arba Minch University. Specifically the study was devoted to:

(i) Measure students’ level/degree of vulnerability to attrition at higher institution
(ii) Identify the level of students’ vulnerability to attrition by gender, place of origin, program placement, batches and faculty
(iii) Examine the determinants of students vulnerability to attrition at higher institution

METHODOLOGY

Description of study areas

Arba Minch University (AMU) is one of the state-owned Universities found in the Southern Nations, Nationalities and People's Region (SNNPR). It is located at Arba Minch town, 500 km south of Addis Ababa. The main campus of the university is situated at the eastern foot of Gamo mountain ranges and adjacent to the vast low land stretching towards Lake Abaya and Lake Chamo, which form part of the East African Rift Valley. The University was established in June 2004 in the premises of the former Arba Minch Water Technology Institute (AWTI), which was established in 1986 with the objective of producing trained professionals in the field of water resources.

The University has a total of 31870 undergraduate, 2160 second degree and 24 PhD students in all its programs and campuses,
Sampling techniques and sample size determination

The participants of the study were chosen from two colleges and two schools in Chamo campus namely, college of business and economics, college of social science, school of law and school of pedagogical and behavioral science. To insure representativeness, total samples of 547 students were selected using proportionate sampling techniques. Accordingly a sample of 337 students were taken from college of Business and Economics while 210 students were selected from Colleges of Social sciences and Humanities, school of law and school of pedagogical and behavioral science. Finally, sample respondents were randomly selected from nine departments.

Empirical model specification

This study aimed at examining the determinants of vulnerability of student to attrition. Previous related studies focused on the determinants of student's attrition and they relied on descriptive analysis. In this study student vulnerability to attrition is defined as the probability being dismissed or re-admitted in future. It is the ex-ante risk that a student that is currently retained will be re-admitted or dismissed. The assessment of vulnerability is helpful in that it determines those students who are in danger of being readmitted or dismissed and factors affecting this risk. First high performing and low performing students will be grouped based on agreed cut-off point. Accordingly a agreed cut-off point or threshold grade is 2.49. This is because any student having CGPA of less than or equal to 2.49 may be at risk of being readmitted or dismissed from the university. A sampled students were dived into two, high performer and low performer. A dummy dependent variable is generated by giving 1 for low performing student and 0 for high performing student. Then logistic model is estimated to determine the determinants of student’s academic performance.

\[
\ln \left( \frac{Pr(Y_i \leq 2.49)}{Pr(Y_i > 2.49)} \right) = \ln \left( \frac{P}{1-P} \right) = Z_i
\]

The ultimate outcome of our calculations is a set of estimates \( V_i \) of the probability that each student will be dismissed or re-admitted in future. The estimate of vulnerability for each student takes values in the interval [0, 1]. At the extremes the estimate of \( V_i \) can be 0 and 1. When \( V_i = 0 \), student will retain in university in future with certainty until graduation; when \( V_i = 1 \), student will be dismissed or re-admitted in future. Since we can attach an index \( V_i \) to all students, the question arises which students are considered as vulnerable to attrition in between two extremes. This is particularly important for designing any mitigating interventions so as to reduce the attrition of students. It makes sense to consider students with estimated vulnerability close or equal to unity as “Vulnerable” and those with a vulnerability index close or equal to zero as “non-vulnerable”. But as we move towards center of spectrum, the distinction becomes less obvious and the need for arbitrary cut-off point arises. Among many choices of cut-off points, the most commonly used one is 0.5. Finally, the present study estimated the determinants of student vulnerability to attrition by giving 1 for students with \( V_i \geq 0.5 \) and 0 for students with \( V_i < 0.5 \) using logistic regression model.

\[
\text{Vulnerability} = X'\beta
\]

Since the dependent variable is dichotomous, this model can be estimated using maximum likelihood estimation and the logistic regression can be specified as follow:

\[
L_i = \beta_0 + \beta_1 \text{AGE} + \beta_2 \text{MALE} + \beta_3 \text{HRS} + \beta_4 \text{INCOME} + \beta_5 \text{PLACE} + \beta_6 \text{SECOND} + \beta_7 \text{THIRD} + \beta_8 \text{PROGRAM} + \beta_9 \text{SAT} + \beta_10 \text{COLLEGE} + \upsilon_i
\]

Where \( L_i \), AGE, MALE, HRS, INCOME, PLACE, SECOND, THIRD, PROGRAM, SAT and COLLEGE refer to Logit, age of students, gender of students, daily hours of study, monthly income from family, place of origin (rural and urban), dummy for second year students, dummy for third year students, dummy for program placement (by interest and without interest), general satisfaction of students and dummy for college of students respectively.

The dependent variable \( (L_i) \) is a nominal binary variable which assumes values of 1 for students with probability of greater than or equal to 0.5 and 0 value for students with probability of less than 0.5. Dummy for place assumes 1 for students from urban origin and 0 for students from rural origin. Similarly, dummy for program placement assumes 1 for students who were placed by their interest and 0 for students who were placed without tier interest. Finally, dummy for college assumes 1 for students from college of business and economics and 0 otherwise.

RESULTS AND DISCUSSION

This section presents the various results obtained from both descriptive and econometric analysis. The analysis was based on the primary data obtained from 527 students and secondary data obtained from registrar office.

Descriptive data analysis

As indicated in methodology part, secondary data on cumulative grade point average (CGPA) of all students in Chamo campus were collected from registrar office of college of business and Economics and registrar office of college of Social Science so as to determine appropriate sample size. The main objective of this study was to examine the determinants of students’ vulnerability to attrition in Chamo campus and in this study, the
Table 1. The distribution of cumulative grade point average by batch of students.

<table>
<thead>
<tr>
<th>Cumulative GPA of students</th>
<th>Batch of students</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First year</td>
<td>Second year</td>
</tr>
<tr>
<td>CGPA&lt;=2</td>
<td>41</td>
<td>7</td>
</tr>
<tr>
<td>2&lt;CGPA&lt;=2.49</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td>2.49&lt;CGPA&lt;=3.99</td>
<td>59</td>
<td>38</td>
</tr>
<tr>
<td>CGPA&gt;=3</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>224</td>
<td>140</td>
</tr>
</tbody>
</table>


Table 2. The distribution of cumulative grade point average by sex of students.

<table>
<thead>
<tr>
<th>Cumulative GPA</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>CGPA&lt;=2.00</td>
<td>25</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>2.00&lt;CGPA&lt;=2.49</td>
<td>81</td>
<td>41</td>
<td>67</td>
</tr>
<tr>
<td>2.49&lt;CGPA&lt;=3.99</td>
<td>50</td>
<td>25</td>
<td>107</td>
</tr>
<tr>
<td>CGPA&gt;=3.00</td>
<td>41</td>
<td>21</td>
<td>148</td>
</tr>
<tr>
<td>Total</td>
<td>197</td>
<td>100</td>
<td>350</td>
</tr>
</tbody>
</table>


Researchers defined students with CGPA of less than or equal to 2.49 as low performing student or vulnerable to attrition. As evidenced in Table 1, about 36.75% of the total sample students in Chamo campus have CGPA of less than or equal to 2.49 and therefore, they are vulnerable to attrition. Moreover, about 9.69% of the total sample students in Chamo Campus have CGPA of less than 2.00 and they are first year students. As noted in Table 1, from the total sample students in this study, 34.55% of students have CGPA of greater than or equal to 3.00 while 28.70% of students have CGPA between 2.49 and 3.00. This study also tried to see vulnerability by years of stay in the campus and gender using survey data on cumulative GPA of students.

Table 1 revealed that first year students are more likely to be vulnerable to attrition than second year students and second year students are also more likely to be vulnerable to attrition compared to third year students. From a total sample of students, 224, 140 and 183 students were selected from first year, second year and third year students. The result implies that vulnerability to attrition decreases as years of stay in the campus increases. This study showed that 18.30% of first year students scored less than or equal to 2.00 points out of 4.00 points while 5 and 2.73% of second year and third year students scored less than or equal to 2.00 points respectively. By implication, as experience increases, students’ vulnerability to attrition decreases.

This study also compared the performance of sample students by gender as presented in Table 2. In this study, from a total of 547 sample students, 197 (36%) students were female while 350 (64%) were male students. Data on cumulative GPA of sample students were categorized in to four categories as shown in Table 2. Accordingly, from a total of 197 female students, 25 (13%) of them scored a cumulative GPA of less than or equal to 2.00 whereas from a total of 350 male students, 28 (8%) of them scored a cumulative GPA of less than or equal to 2.00. Similarly, a cumulative GPA of 41 and 19% of female and male students respectively found between 2.00 and 2.50 point. The result revealed that female students are more vulnerable to attrition compared to male students in Chamo Campus. According to student integration model, the basic factors which affect student attrition includes student characteristics and program characteristics, Tinto (1975). According to Hirschy et al. (2011), race, ethnicity, gender, age, parental education level, ability to pay, and domestic partner status can affect student’s attrition. So, colleges/ School leaders should properly manage female student’s tutorials so as to raise their performance and reduce their vulnerability to attrition. Finally, the study also compared the performance of students by college of students and the result was presented in Table 3.

As noted from Table 3, from a total 547 students, 189 students scored a cumulative GPA between 3.00 and
4.00. From a total 210 sample students from college of social science and humanity, 92 (44%) of them scored a cumulative GPA of 3.00 and above whereas from a total 337 sample students from college of business and economics, 97 (29%) of them scored a cumulative GPA of 3.00 and above.

By contrary, from a total sample students from college of social science and humanity, 15 (7%) of them scored a cumulative GPA of less than or equal to 2.00 while from a total sample students from college of business and economics, 38 (11%) of them scored a cumulative GPA of less than or equal to 2.00. Characteristics of a program such as its resources, facilities, structural/organizational arrangements, and its members that can limit or facilitate the development and integration of individuals within the institution or program can affect student’s attrition and attrition is often the result of the interaction between student and program characteristics (Tinto, 1975). That is, student integration into the program, from an academic and social perspective, is often needed to achieve student success (Dodge et al., 2009; Tinto, 1975; Wells, 2003; Wells, 2007 and Pascarella and Terenzini, 1977).

According to Wells (2007) and Dodge et al. (2009), students frequently find that their expectations of what a program will entail do not match up with what they actually experience once in the program and this type of disillusionment has been found to be a contributing factor to student attrition and students that believe that they have made the right program choice tend to have higher levels of motivation which is, in turn, lead to lower attrition rate.

In the study area, most students joined business and Economics College by assuming there is no quantitative courses and when they actually joined the program, they may found a mismatch between their expectation and what is on the ground. Moreover, staff experience is higher in college of social science and humanities compared to business and Economics College. This is because, there is higher staff turnover in college of business and economics due to better job opportunities in other sectors of economy for them. All these, may account for higher students’ attrition at college of business and economics compared to college of social science and humanities.

In addition, from a total 210 sample students from college of social science and humanity, 64 (30%) of them scored a cumulative GPA of less than or equal to 2.49 while from a total 337 sample students from college of business and economics, 137 (41%) of them scored a cumulative GPA of less than or equal to 2.49.

**Logistic regression**

To classify the students in Chamo campus as highly vulnerable, moderately vulnerable and not vulnerable to attrition depending on the predicted probability of being dismissed or re-admitted in the future, two vulnerability thresholds were used following Chaudhuri et al. (2002). These two thresholds are the average vulnerability which is equal to the percentage of students whose CGPA is less than or equal to 2.49 from the total sample students (0.3565) and 0.5. By using these two thresholds, sample students were classified as highly vulnerable if the predicted probability of being dismissed or re-admitted in the future is greater than 0.5, less vulnerable if the predicted probability of being dismissed or re-admitted in the future is between the average vulnerability (0.3565) and 0.5 and not vulnerable if the predicted probability of being dismissed or re-admitted in the future is less than the average vulnerability (0.3565).

Table 4 revealed that from a total 337 sample students of college of business and economics, 142 (42.34%) students were highly vulnerable to attrition while from a total of 210 sample students of college of social science, school of law and school of pedagogical science, only 65 (30.095%) of students were highly vulnerable to attrition. That means, from the total 547 sample of students, 207 students are highly vulnerable to attrition. But, from these highly vulnerable students, 132 (64%) were female students while 75 (36%) were male students. This implies that, female students were more vulnerable to attrition in Chamo Campus compared to their male counterpart. From the total of 207 highly vulnerable students, 132 (64%) were female students while 75 (36%) were male students. This implies that, female students were more vulnerable to attrition in Chamo Campus compared to their male counterpart.
vulnerable students, 119 (57%) of students were from rural areas where as 88 (43%) of students were from urban areas. So, students with rural origin are more vulnerable to attrition than students from urban origin.

Regarding program placement 114 (21%) students responded that they were placed to a program or department without their interest and of these, 46 (40%) students were highly vulnerable to attrition. But, from 433 students who were placed to a program by their interest and161 (37%) of students are highly vulnerable to attrition. Thus, students who were placed to departments without their interest are more vulnerable to attrition as evidenced by this study. From the total of 547 students, 289 (53%) of students are not vulnerable, 51 (9%) students are moderately vulnerable and 207 (38%) of students are highly vulnerable to attrition. Students with rural origin, female students, students who were placed to program without their interest and students from college of business and economics are more vulnerable to attrition in Chamo Campus.

In the first semester of 2009 E. C, from a total of 547 students there were 195 (35.65%) students whose cumulative GPA was less than or equal to 2.49. But, analysis of vulnerability revealed that 207 students are vulnerable to attrition or have high probability of getting cumulative GPA of less than 2.49. This means, 12 (2.2%) students were not vulnerable in the first semester of 2009 E.C, but they are vulnerable to attrition in the second semester of 2009 E. C. Therefore, vulnerability analysis is very important for forward looking policy targeting than mere dependence on the ex-post attrition measure. As the study revealed, the proportion of vulnerable students 207 (38%) is greater than the proportion of currently low performing students 195(35.65%).

Econometric data analysis

To examine the possible determinants of students’ vulnerability to attrition, the vulnerability index is used to categorize students as highly vulnerable and low vulnerable. That means, if the vulnerability to attrition is greater or equal to 0.5, the students are categorized as high vulnerable which takes the value of 1 and 0 if the vulnerability index is less than 0.5 for the students. Then, this dummy variable is regressed on all explanatory variables of the model to determine the relative strength of each variable in affecting vulnerability (the probability of being dismissed or re-admitted) using the logistic estimation. Vulnerability analysis has a paramount importance in identifying not only the currently poor performing students, but also those students who are more likely to be dismissed or re-admitted in the near future. Thus, this study classified students in to highly vulnerable and less vulnerable using thresholds of 0.5 and examined the determinants of vulnerability of students to attrition in Chamo Campus using logistic regression. The dependent variable is a dummy variable which is obtained from the vulnerability level of each student. The dependent variable assumes value of 1 if the students’ level of vulnerability to poverty is greater than or equal to 0.5 and 0 if the students level of vulnerability is less than 0.5. The logistic regression result of the determinants of vulnerability of students to attrition is presented in Table 5 Below. The dummy dependent variable regressed on all age, hours of study per week, monthly income from family, overall satisfaction of students from various services, dummy for sex, dummy program placement, dummy for batch of students and college of students. Accordingly the determinants of students’ vulnerability to attrition measured using logistic regression model and the result is presented in Table 5. The coefficients of Logit model showed that students’ vulnerability to attrition is statistically significantly affected

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-vulnerable (289)</th>
<th>Moderately Vulnerable (51)</th>
<th>Highly Vulnerable (207)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEX</td>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>240</td>
<td>35</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>49</td>
<td>16</td>
<td>132</td>
</tr>
<tr>
<td>PLACE</td>
<td>Urban</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>112</td>
<td>17</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>177</td>
<td>34</td>
<td>119</td>
</tr>
<tr>
<td>PROGRAM</td>
<td>Interest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>232</td>
<td>40</td>
<td>161</td>
</tr>
<tr>
<td></td>
<td>Without Interest</td>
<td>57</td>
<td>11</td>
<td>46</td>
</tr>
<tr>
<td>COLLEGE</td>
<td>CBE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>159</td>
<td>36</td>
<td>142</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>130</td>
<td>15</td>
<td>65</td>
</tr>
</tbody>
</table>

Table 5. Logistic Regression of the determinants of students’ vulnerability to attrition.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Standard Error</th>
<th>Z</th>
<th>Probabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.0401</td>
<td>0.0749</td>
<td>-0.54</td>
<td>0.592</td>
</tr>
<tr>
<td>Sex</td>
<td>-1.0073</td>
<td>0.2341</td>
<td>-4.30</td>
<td>0.000</td>
</tr>
<tr>
<td>Income</td>
<td>-0.0013</td>
<td>0.0006</td>
<td>-2.20</td>
<td>0.028</td>
</tr>
<tr>
<td>Place</td>
<td>-0.2275</td>
<td>0.2245</td>
<td>-1.01</td>
<td>0.311</td>
</tr>
<tr>
<td>Program</td>
<td>-0.2626</td>
<td>0.2701</td>
<td>-0.97</td>
<td>0.331</td>
</tr>
<tr>
<td>Second</td>
<td>-0.1117</td>
<td>0.2690</td>
<td>-0.42</td>
<td>0.678</td>
</tr>
<tr>
<td>Third</td>
<td>-0.2831</td>
<td>0.2984</td>
<td>-0.95</td>
<td>0.343</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>-0.3941</td>
<td>0.1613</td>
<td>-2.44</td>
<td>0.015</td>
</tr>
<tr>
<td>Hours</td>
<td>-0.4187</td>
<td>0.0485</td>
<td>-8.63</td>
<td>0.000</td>
</tr>
<tr>
<td>College</td>
<td>0.8112</td>
<td>0.2409</td>
<td>3.37</td>
<td>0.001</td>
</tr>
<tr>
<td>Constant</td>
<td>1.9763</td>
<td>1.6233</td>
<td>1.22</td>
<td>0.223</td>
</tr>
</tbody>
</table>

Link test

\[ \hat{V} \text{ulnerability} = 0.0095 + 0.9858\hat{y} - 0.0110\hat{y}^2 \]

\[ Z_{\text{value}} = (0.08, 7.93, -0.18) \]

Variance Inflating Factor (VIF) 1.20
Average students’ vulnerability to attrition 0.3565


Table 6. Marginal Effect after Logistic regression of Students’ vulnerability to attrition.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Marginal Effect</th>
<th>Standard Error</th>
<th>Z</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>-0.0081</td>
<td>0.0150</td>
<td>-0.54</td>
<td>0.591</td>
</tr>
<tr>
<td>SEX</td>
<td>-0.2119</td>
<td>0.0503</td>
<td>-4.21</td>
<td>0.000</td>
</tr>
<tr>
<td>INCOME</td>
<td>-0.0003</td>
<td>0.0001</td>
<td>-2.24</td>
<td>0.025</td>
</tr>
<tr>
<td>PLACE</td>
<td>-0.0452</td>
<td>0.0440</td>
<td>-1.03</td>
<td>0.305</td>
</tr>
<tr>
<td>PROGRAM</td>
<td>-0.0544</td>
<td>0.0567</td>
<td>-0.94</td>
<td>0.345</td>
</tr>
<tr>
<td>SECOND</td>
<td>-0.0221</td>
<td>0.0526</td>
<td>-0.42</td>
<td>0.674</td>
</tr>
<tr>
<td>THIRD</td>
<td>-0.0556</td>
<td>0.0573</td>
<td>-0.97</td>
<td>0.331</td>
</tr>
<tr>
<td>SATISFACTION</td>
<td>-0.0792</td>
<td>0.0325</td>
<td>-2.44</td>
<td>0.015</td>
</tr>
<tr>
<td>HOURS</td>
<td>-0.0841</td>
<td>0.0087</td>
<td>-9.64</td>
<td>0.000</td>
</tr>
<tr>
<td>COLLEGE</td>
<td>0.1553</td>
<td>0.0432</td>
<td>3.59</td>
<td>0.000</td>
</tr>
</tbody>
</table>


by gender, income, hours of study, general satisfaction and faculty of study. As indicated in Table 5, sex negatively and statistically significantly affects students’ vulnerability to attrition at 1% level of significance. In other words, female students are more vulnerable to attrition. This study also revealed that second year and third year students are more vulnerable to attrition compared to third year students though statistically insignificant.

Regarding the relationship between students’ satisfaction and vulnerability to attrition, the result from Table 6, revealed that higher students’ satisfaction is associated with lower students’ vulnerability to attrition. So, satisfaction of students from various services in university may positively affect their academic performance. Study by Zoran (2016), Muhammad (2015) and Nara (2014) confirmed that student’s satisfaction with University services affect student performance positively. It is believed that the relationship between students’ vulnerability and monthly income from family is positive because money can buy you all the comforts that you need to concentrate on your studies, Radner et al. (1975), Bennett (2003), Jackson (1978) and Wells (2007). The result of this study revealed that students...
belonging to more affluent family are less vulnerable to attrition as the coefficient of income from family is negative and statistically significant at 1% level of significance. Using data from a sample of 547 students, the results in Table 5 suggest that longer hours of study per week is associated with lower vulnerability of students to attrition.

As shown in Table 6, the probability of being highly vulnerable to attrition of male students is less than that of female students by 21.19%. Hence, female students have more vulnerability to future attrition than male students. According to studies conducted by Mersha (2009), Astin (1993), Prince, (1993), Egenti and Omoruyi (2011) and Eshetu (2002), as the grade level in higher institution increases, the number of female students starts to decline because of lots of factors and consequently, higher education remains an area of learning from which women are less represented. The very few women that are fortunate enough to join higher institutions are characterized by lower academic performance and higher forced withdrawal.

The coefficient of monthly income from family has negative sign and statistically significant at 5% level of significant. In other words, higher monthly income from family reduces vulnerability of students to attrition as presented in Table 6. Though statistically insignificant, students with urban origin were less vulnerable to attrition compared to students with rural origin. The studies conducted by Li et al. (2015), Lim (2015) and Coates and Edwards (2009) found that despite the rapid rise in participation of students from disadvantaged areas in higher education in recent years, their degree completion rates still lag behind those of their fellow students from more privileged or urban areas. More importantly, the overall satisfaction of student from the various services has negative and statistically significant effect on students’ vulnerability to attrition. Studies conducted by Grayson (2004), Bean and Bradley (1986) and Pike (1991) found that there are strong association between students satisfaction from the various services provided in higher institutions and the academic performance of students. That means, most of the study revealed that more satisfied students perform better in their grades.

By implication, higher satisfaction from various services in university increases student retention and reduces students’ vulnerability to attrition. So, raising the standard of services provision may raise students’ satisfaction and thereby, reduce students’ vulnerability to attrition in University.

Regarding the coefficient of hours of study per week, it affects students’ vulnerability to attrition negatively and significantly. This implies that as hours of study per week increases by one hour, student’s vulnerability to attrition decreases by 8.41% as indicated in Table 6. So, students’ effort or commitment or determination has a paramount important in improving their performance and thereby reduce their vulnerability to attrition.

As noted in Table 6, faculty of students has significant effect on students’ vulnerability to attrition. Dummy for college is defined as 1 for students from college of business and economics and 0 other wise. The coefficient of college dummy is positive and statistically significant at 1% level of significant. That means, vulnerability to attrition for students from college of business and economics is higher than the vulnerability of students from college of social science and humanity, school of law and school of pedagogical and behavioral science by 15.53%. In other words, students from college of business and economics are more vulnerable to attrition compared students from other college and schools. This difference in vulnerability may be due to the differences in experiences of staff, staff to student ratio and nature of the disciplines. This result is in line with the studies conducted by Cardak and Vecii (2013) and Marks (2010) which classified the determinants of students vulnerability to attrition at higher institutions in to personal characteristics, prior academic performance and university characteristics (field of study and academic support programs). Finally, the diagnostic test results of the Logit model shows that there is no problem of Multicollinearity as the mean value of variance inflating factor (VIF) is 1.20 which is less than 10. The link test which can be used to check the existence of model miss-specification revealed that there is no problem of model miss-specification as the coefficient of $\hat{y}$ is statistically significant.

CONCLUSION AND RECOMMENDATIONS

Students are the most essential asset in any educational system. The overall economic development of a country depends on academic performances of the students. The students’ performance plays an important role in producing the best quality graduates who will become great leader and manpower for the country thus responsible for country’s economic and social development.

This study aimed at assessing the level and determinants of students’ vulnerability to attrition at Arba Minch University, Southern Ethiopia using survey data from a sample of randomly drawn 547 students. The study found that students’ vulnerability to attrition decreases with an increase in their experience in the Campus. That means, first year students are more likely to be vulnerable to attrition than second year and third year students. With regard to students GPA 25 (13%) of female sample students and 28 (8%) of male sample students scored a cumulative GPA of less than or equal to 2.00. So, female students are more vulnerable to attrition compared to male students in Chamo Campus.

This study also revealed that from a total of 337 sample students from college of business and economics, 142 (42.34%) of students are highly vulnerable to attrition...
while from a total of 210 sample students from college of social science, school of law and school of pedagogical science, only 65 (30.095%) of students are highly vulnerable to attrition. That means, from the total 547 sample of students, 207 students are highly vulnerable to attrition. But, from these highly vulnerable students 132 (64%) are female students while 75 (36%) are male students. This implies that, female students are more vulnerable to attrition in Chamo Campus compared to their male counterpart. As indicated in this paper, students with rural origin are more vulnerable to attrition than students from urban origin. Similarly, students who were placed to departments without their interest are more vulnerable to attrition as evidenced by this study.

In this study, out of 547 sample students, 289 (53%) of them are not vulnerable, 51 (9%) students are moderately vulnerable and 207 (38%) of students are highly vulnerable to attrition. Regarding the determinants of students’ vulnerability to attrition, coefficient of sex is negative and statistically significant at 1% level of significance and this implies that male students were less vulnerable than female students. More importantly, the general satisfaction of student from the various services, hours of study per week, monthly income from family are negatively and statistically significantly affect students’ vulnerability to attrition. Higher hours of study per week will raise students’ confidence and lead to better performance. So, students’ effort or commitment or determination has a paramount important in improving their performance and thereby reduce their vulnerability to attrition. The coefficient of college dummy is positive and statistically significant at 1% level of significant. That means vulnerability to attrition for students from college of business and economics is higher than the vulnerability of students from other college/schools by 15.53%.

Based on key results of the study, the researchers identified some areas for interventions in order to reduce the number of unfinished degrees (attrition) and increase the quality of graduates. The study found that female students are relatively more vulnerable to attrition and therefore, there is a need to provide tutorials classes for female and less performing male students. There is higher staff turn-over in college of business and economics and this leads to lower staff to student ratio and thereby, greater staff work overload. Due to this, course instructor may not have enough time to give tutorial for female and low performing male students. So, it would be better if tutorials for female and low performing students will be given by students with better cumulative GPA and assistant graduates. This study found that those students who were placed to program/ department without their interest were more vulnerable to attrition than students who were placed by their interest. So, college/ school leaders have to give due attention to students’ program placement and reduce the number of students who will be assigned to program without their interest.

According to Central Statistical Authority (2014), about 22% of the total population in Ethiopia is living below poverty line and therefore, it would be common to see students with financial problem in universities. Since this study revealed significant effect of monthly income from family on students’ vulnerability to attrition, colleges/ schools have to devise methods so as to help students with financial problem and thereby, reduce their vulnerability to attrition. Colleges/ schools have to work hard so as to improve staff to student ratio as this definitely affect students’ academic performance. Motivating and cultivating the reading habit of students through availing up to date books, advising, giving routine exercises, allowing them to celebrate reading day at university level and the like have paramount importance to reduce students’ vulnerability to attrition in higher institution. As indicated in this study, students’ level of satisfaction from the various services in university reduces students’ vulnerability to attrition. So, improving the standard of service provisions in higher institution may increase students’ motivation, aspiration, and academic performance and thereby, reduce the number of unfinished degrees/vulnerability to attrition.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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