

Research Article

Understanding Waiting Time from Graduation to First Employment: Survival Analysis-Based Evidence from Ethiopia

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Most students considered that having a university degree is sufficient to be employed. However, obtaining a job after graduation becomes challenging, especially in developing countries. As a result, some graduates have to wait a considerable amount of time to get their first job. We estimated the average waiting time for first employment for 2019 first-degree graduates from Debre Markos University (Burie campus), Ethiopia. The median waiting time for the first employment of graduates was 35 weeks, showing that 50% of graduates managed to secure their first job 35 weeks after graduation. In addition, Cox proportional hazard and log-normal accelerated failure time models were fitted to model waiting time for first employment with various factors. It was found that cumulative grade point average, gender, internship, and age of the graduates were significant factors that affect the waiting time for first employment of graduates. Finally, we documented that though cumulative grade point average is important to pass the first phase of elimination criteria, it is not the only metric that employers consider.

1. Introduction

Students considered university degree a sufficient means of achieving employment [1]. However, the transition from university to employment is more difficult and becomes one of the key problems graduates face after completing their university degrees [2]. The problem is more severe in developing countries. In fact, Ethiopia is experiencing an increase in employment opportunities, but it is difficult to find a job immediately after graduation. Thousands of young graduates remain unemployed [3]. According to the 2011 World Bank database, for example, the general unemployment rate in Ethiopia in 2009 was 20.5% which is five times higher than the rate in China. Graduating as a full-time student means a transition from being out of the labour force to being in the labour force. This creates a temporary imbalance in the labour market and leads to frictional unemployment [4]. Furthermore, the recent economic downturn, mass higher education, and increased access to educational institutions have made the labour market for graduates more competitive. As a result, a degree is no

longer sufficient to guarantee a rewarding career. These show that some graduates have to wait for a considerable amount of time to obtain their first employment after their graduation [5].

The length of time to obtain the first employment for graduates is expected to depend on the general characteristics of graduates as well as on various economic, social, and institutional factors [6]. However, the length of waiting time and possible determinants are not well identified. Although little systematic research has been conducted on this issue, their findings are mixed and inconclusive. Ayaneh et al. [7], for example, conducted a study in Ethiopia and found that the median waiting time for first employment of graduates was 15 months. However, a study conducted by Fenta et al. [8] found that graduates have to wait a little more than five months which is almost similar to the result (4.6 months) of the study conducted by Ama [9] in Botswana. Regarding determinants that contributed to waiting time, Niragire and Nshimyiryo [10] in Rwanda documented that the cumulative grade point average (CGPA) of the graduates plays an insignificant role in their employability. However, a study

conducted by Mehmetaj and Zulfiu [11] documented the opposite. Furthermore, these inconclusive empirical investigations associated with average waiting time, as well as possible determinants, the prevalence of unemployment, and its associated factors in Ethiopia are not well known, and university graduates are unemployed longer. These gaps motivated us to conduct this study to better understand the characteristics of graduates and the underlying factors that influence their employability. More specifically, this study addresses the following questions: What is the average waiting time between graduation and first-time employment? What factors affect the employability of graduates? What are the most used job-getting methods by graduates?

The average waiting time to obtain the first job after graduation was estimated using data from the 2019 graduates' tracer study survey. This study documented that the average waiting time for first employment was 44 weeks. This implies that on average, graduates wait almost 11 months to get their first full-time job. Demographic characteristics such as age and gender of graduates, CGPA, and internship completed during their study were found to be significant factors contributing to waiting time to first employment of graduates. Public advertisement, Internet, and relationships were the most widely used methods of finding a job.

The remainder of the article is organized as follows. Section 2 describes the characteristics of the data used in this study. Section 3 develops the model that we employ. Section 4 presents the major empirical results. Section 5 discusses the results, and Section 6 provides us with the conclusion.

2. Data

The study was conducted on 145 undergraduate students of Debre Markos University (Burie campus) in the 2019 academic year. The study used 2019 graduate tracer survey data, collected by the Burie campus institutional quality assurance office. In the 2019 academic year, 1033 students graduated from 10 undergraduate regular programs at the Burie campus. Unfortunately, one program (computer science program) was excluded from the study due to data inconsistency. This study covers 9 programs and 739 graduates. The data were collected using a questionnaire prepared nationally by the Ethiopian Ministry of Education. After 78 weeks of graduation, graduates were randomly contacted on their phones to report their current employment status and other related factors. Data collectors were trained and assigned to each department to collect the data. In addition, students' baseline information such as their field of study, gender, age, cumulative grade point average (CGPA), parent's education level, region, and other related variables are taken from the file that students are required to fill out upon graduation.

3. The Model

A survival model is an important tool that can play a significant role in the process of generating evidence-based information on survival time [12,13]. Accordingly, a nonparametric analysis, such as the Kaplan-Meier survival

curve method, and semiparametric methods, such as the Cox proportional hazards regression model, were employed. In addition, a parametric method of analysis such as the log-normal model was selected using the Akaike information criterion (AIC). Suppose that T is the time length that graduates must wait to find their first job, which would start at the time of graduation ($T = 0$) and end when the graduate finds the first job (event time, $T = t$). The term "find a job or employment" refers to the "event" of interest and the "waiting time" as "survival" to simplify the definition.

Therefore, the survival function that describes the probability that graduates will be unemployed beyond time " t " is denoted by

$$S(t) = P(T > t), \quad (1)$$

where T is a nonnegative random variable.

And let the hazard function which represents the probability of finding a job at $T=t$, given that he/she has survived (has been unemployed) until time " t ," be denoted by

$$h(t) = \frac{f(t)}{s(t)}, \quad (2)$$

where $f(t)$ is the probability density function.

3.1. Nonparametric Analysis

3.1.1. Kaplan-Meier (KM) Survival Function. Kaplan-Meier (KM) survival function estimator is a nonparametric estimator of the survival function $S(t)$ (unemployment curve for this study). The main advantage of the Kaplan-Meier curve is that it can incorporate censored data. This is particularly crucial for right-censoring, that is, the loss of data from the sample before the final outcome [14]. The Kaplan-Meier estimator of the survival function (or survival probability) $\hat{S}(t) = P(T \geq t)$ is defined as

$$\hat{S}(t) = \prod_{t_i < t} \left[\frac{n_i - r_i}{n_i} \right] = \prod_{t_i < t} \left[1 - \frac{r_i}{n_i} \right], \quad (3)$$

where r_i is the observed number of employments at time t_i and n_i is the number of graduates who are looking for a job at time t_i .

3.2. Semiparametric Methods. Analyses based on nonparametric methods do not account for the effects of covariates on unemployment duration. Semiparametric models, however, make it easier to examine the relationship between covariates and response variables. Hence, semiparametric models were computed to examine the relationship between unemployment time and possible explanatory variables.

3.2.1. Cox Proportional Hazards (PH) Regression Model. Cox first developed the proportional hazards model in 1972 as a way to model the relationship between survival time and potential predictors [15]. PH models also allow one to estimate the effect of covariates on survival time [16]. The

hazard rate (e.g., finding a full-time job in this study) for the i^{th} graduation is given by

$$h(t) = h_0(t)e^{\beta X_i}, \quad (4)$$

where t is the survival (unemployed) time, $h(t)$ is the hazard function; β a is a vector of unknown parameters to be estimated; $h_0(t)$ is the baseline hazard function at time t and shows how the hazard function changes as a function of survival time that is a hazard function when all predictors are equal to zero and X_i is the vector values of $n \times 1$ the explanatory variables.

3.3. Parametric Analysis. In this method, the main idea is to avoid completely specifying the hazard function. Parametric survival models assume a known distribution for survival times. Three of the most commonly used distributions are exponential, Weibull, and lognormal [14].

The exponential regression model: assuming that the distribution of the time is taken to be exponential, the time of survival is called accelerated failure time, which is expressed as

$$T = e^{\beta' X + \varepsilon}. \quad (5)$$

Taking natural logarithm

$$\ln T = \beta' X + \varepsilon, \quad (6)$$

where ε is the error component.

The survival function can be obtained by expressing in terms of time as

$$s(t, X, \beta) = \exp[-te^{\beta X}]. \quad (7)$$

The hazard function of the exponential regression model is

$$h(t, X, \beta) = e^{\beta X}. \quad (8)$$

3.3.1. Model Selection. The likelihood ratio test can be used to measure the goodness-of-fit of a model. However, the likelihood increases with an increase in the number of parameters. Therefore, the Akaike information criterion (AIC) can be used which is defined as

$$AIC = -2L + 2(k + c), \quad (9)$$

where L is the log-likelihood, k is the number of predictors, and c is the number of parameters. That is, $c = 1$ for the exponential regression model and $c = 2$ for Weibull and lognormal regression models. According to the criterion, a model with a small AIC value was considered the best fit for the data.

3.4. Definition and Measurements of Variables

3.4.1. The Dependent Variable. The time for first employment after graduation is the dependent (outcome) variable in this study. The time between graduation and the first employment is measured in weeks.

4. Results

4.1. Descriptive Statistics. The summary statistics obtained from 145 respondents of the 2019 Burie campus graduates show that 77.20% were males. At the time of graduation, the average age of the graduates was 23.77 years. Among the graduates surveyed, 81.40% and 71.00% of them studied their preferred field and at their preferred university, respectively (Table 1). In addition, 25% of the employed graduates are not working in their preferred work region. The results show that 34.48% of the graduates did not complete an internship during their studies. On average, graduates applied to four companies. As can be observed in Table 1, 61.4% of the total cases were experiencing the event (finding a job) within the study period (78 weeks). However, 38.6% of the graduates were looking for a job by the end of the study period. The average educational level of students' fathers and mothers was less than one year.

Figure 2 shows that most of the graduates were from the Amhara Regional State (64.83%) followed by Oromia (12.41%) and Southern Nations and Nationalities Peoples of Ethiopia (SNNPR) (11.72%). Only five percent of the graduates were from the capital city of Ethiopia (Addis Ababa).

Almost 18% of the graduates scored less than or equal to 2.5 CGPA. Only 29% of the graduates scored higher than 3.50 CGPA. About 55.18% of the graduates' CGPA was greater than or equal to 3.01. The remaining 26.90% and 17.93% of the graduates achieved a CGPA of 2.51-3.00 and 2.00-2.50, respectively (Table 4).

Previous studies show that discipline affects employment outcomes, for example [17,18]. Consequently, Figure 1 shows that the management department represents the highest share (80%) of employed graduates. The next were horticulture and accounting and finance, with 61.54% and 61.24% of the graduates employed, respectively.

Among the different approaches to getting a job, public advertisement is the most predominant means for graduates (36.55%). The Internet (6.21%) and relations (4.83%) are the next most widely used methods of getting a job. The third-highest percentage (4.83%) shows that relationships are the other frequently used method of getting a job.

Figure 3 shows that almost one-fourth (24%) of graduates were employed in governmental sectors. However, only 4% of the graduates started their own business.

4.2. Nonparametric Analysis. Figure 4(a) shows that there were very few graduates employed within the first 10 weeks (two and a half months) of graduation. However, from 10 weeks of graduation up to 50 weeks, there is a steep decline in the unemployment probability. It is seen that after 50 weeks of graduation, the probability of being employed decreases at a declining rate. The median time to first employment of graduates was found to be 35 weeks, which is lower than the result found by Ayaneh et al., [7] which was 15 months (almost 60 weeks).

For further information, Kaplan-Meier curves were generated for various covariates. As a result, there are

TABLE 1: Summary of descriptive statistics.

Variable	Obs.	Mean	Std. dev.
Time	145	43.655	29.590
Event	145	0.614	0.489
Censored	145	0.386	0.489
CGPA	145	3.106	0.520
Age	145	23.786	1.546
PRWR	145	0.924	0.668
Gender	145	0.772	0.421
PRWR	145	0.748	0.418
Fathedu	145	0.303	0.461
Mothedu	145	0.221	0.416
Fieldpref	145	0.814	0.391
Univpref	145	0.710	0.455
NCC	145	3.552	2.208
NCW	145	0.738	0.624
Internship	145	0.655	0.477

Note: Event refers to a time at which graduates find their first-time employment, while censored refers to graduates still looking for a job. Detailed descriptions of other variables are provided in Table 2.

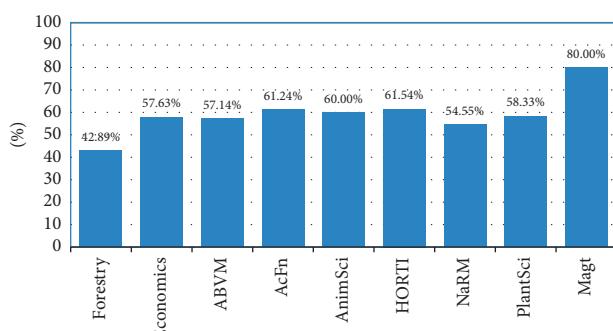


FIGURE 1: Employment status by department. Note: ABVM refers to agribusiness and value chain management; AcFn = accounting and finance; HORTI = horticulture; Plantsci = plant science; Magt = management.

TABLE 2: Summary of definitions and measurements of variables used.

Variable	Description	Measurement
Time	Duration of unemployment period	Weeks
CGPA	Cumulative gross point average	CGPA
Age	Age of graduates	Year
Gender	Gender of graduates	Dummy: 1 if male, 0 if female
PRWR	Preferred work region of graduates	Dummy: 1 if yes, 0 otherwise
HFYFJ	How do you find your first job?	Categorical
Wregion	Working region	Categorical
Department	Department of graduates	Categorical
BornReg	Born region of graduates	Categorical
Fathedu	Educational level of graduates' father	Dummy: 1 if educated, 0 otherwise
Sec	Sector of employed	Categorical
Mothedu	Educational level of graduates' mother	Dummy: 1 if educated, 0 otherwise
Fieldpref	Preference field of study	Dummy: 1 if yes, 0 otherwise
Univpref	University preference	Dummy: 1 if yes, 0 otherwise
NCC	Number of companies contacted	Continuous
PRWR	Preferred work region	Dummy: 1 if yes, 0 otherwise
NCW	Number of companies worked	Continuous
Wregion	Work region of graduates	Categorical
Internship	Internship done	Dummy: 1 if yes, 0 otherwise
Sector	Sector where graduates employed	Categorical

Note: HFYFJ refers to the methods by which graduates find their first job. For a list of methods of finding a job, see Table 3. BornReg and Wregion refer to the region where graduates are born and the region where they are getting employed, respectively. Ethiopia is the Federal Democratic Republic composed of 9 National Regional States and two administrative councils. This study is conducted on graduates from nine departments (for the list of departments, see Figure 1).

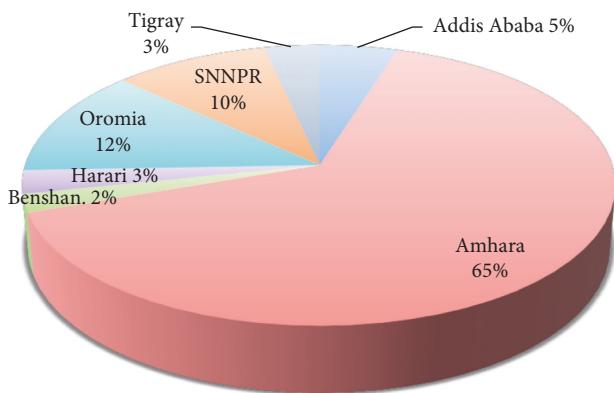


FIGURE 2: Regional distribution of respondents.

TABLE 3: Summary statistics of ways of getting the first-time job.

How did you find your first job?	Frequency	Percentage
Public advertisement	53	36.55
I contact companies directly	3	2.07
Through Internet	9	6.21
Contacted by the company	4	2.76
Third party's recommendation	2	1.38
Relations	7	4.83
I established my own business	5	3.45
Other	6	4.14
No job yet	56	38.62
Total	145	100.00

TABLE 4: Distribution of respondents by CGPA category.

CGPA	Freq.	Percent
2-2.5	26	17.93
2.51-3	39	26.9
3.01-3.5	38	26.21
3.51-4	42	28.97
Total	145	100

significant disparities in the unemployment curves for each of the covariates. Figure 5(a) validates this argument that the unemployment rate for graduates who did internships dropped faster than the rate for graduates who did not do internships during their undergraduate studies. Between the first 10 and 50 weeks following graduation, the unemployment rate curve for students who attended their selected area of study is consistently lower than that of students who did not attend their preferred field of study. However, the difference in survival curves between these groups is essentially nonexistent following 50 weeks of graduation Figure 5(b).

Additionally, both high- and low-CGPA scorers have almost the same employment opportunity for the first 10 weeks of graduation. The survival curve for students with CGPA between 2.00-2.50 and 2.51-3.00 is almost identical. Furthermore, students who have a CGPA between 3.01-3.50 and 3.51-4.00 have almost identical survival curves (see Figure 5(d)). However, the survival curve for students with a CGPA less than for 3.00 is higher than that for students with a CGPA greater than 3.00.

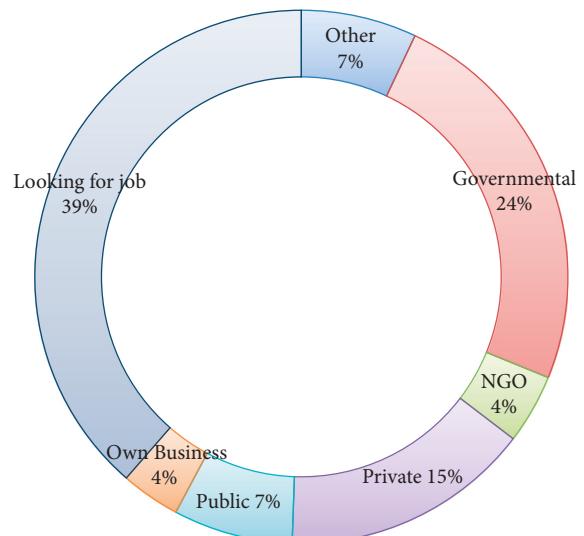


FIGURE 3: Sectorial distribution of employed graduates.

Furthermore, the log-rank test was used to determine whether the difference in survival curves of these explanatory factors is statistically significant. The result shows that the survival function of the graduates for internships and gender was found to be statistically significant (Table 5). In addition, the survival difference between graduates having CGPA up to 3.00 and above 3.00 is significant. However, there is no significant difference in the survival curve of graduates related to their preferred field of study.

4.3. Semiparametric Analysis

4.3.1. Testing the Proportional Hazards Assumption. Cox proportional hazards models assume that the hazard ratio is constant over time [19]. Then, this assumption should be verified before the application of the Cox proportional hazards model. Accordingly, to test the proportionality of hazards among various observations, the Schoenfeld test was performed. Based on the result, eight variables except for work region, sector employed, and preferred work region were considered (Table 6). As a result, the final model was fitted with these eight covariates.

The Cox PH regression result shows that out of eight covariates, five (CGPA, age, gender, number of companies contacted, and internship) were found to be significantly affected by time to the first employment of graduates. However, the preference field of study and parents' educational level were found to have no significant effect at the time of the first employment (Table 7). The estimated Cox PH hazard rates for the CGPA show that the higher CGPA of a graduate, the higher the hazard ratio. In other words, graduates with a higher CGPA have a lower unemployment duration. As can be seen in Table 7, graduates with a high CGPA had a higher probability of experiencing the event (getting a first-time job). The hazard ratio for the age of graduates for this study shows that the higher the age of graduates, the longer the duration of unemployment (less likely to be employed). The waiting time for male graduates

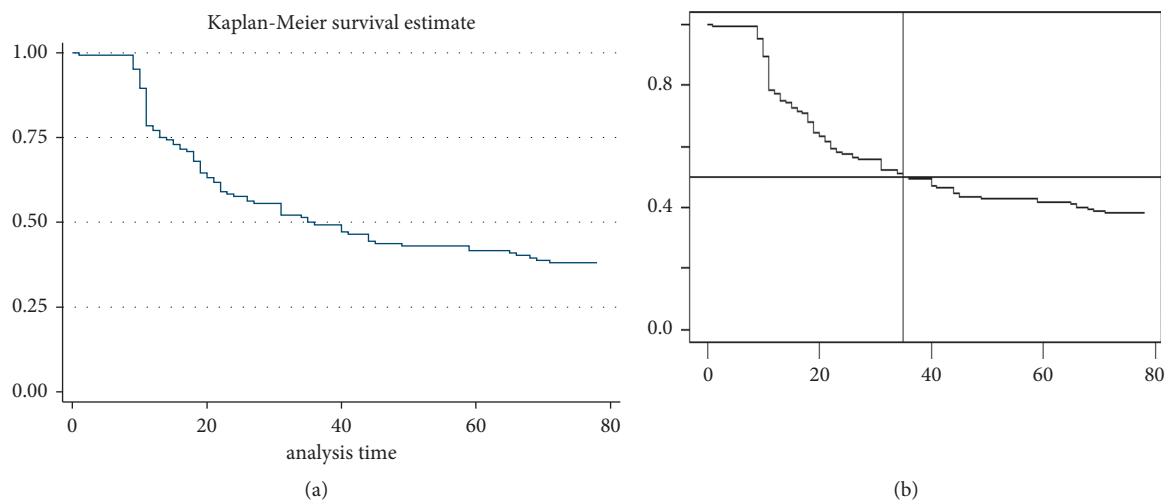


FIGURE 4: (a) KM survival function. (b) KM survival function with a median. Note: the horizontal and vertical straight lines in Figure 4(b) represent the mean and median waiting times for first employment, respectively.

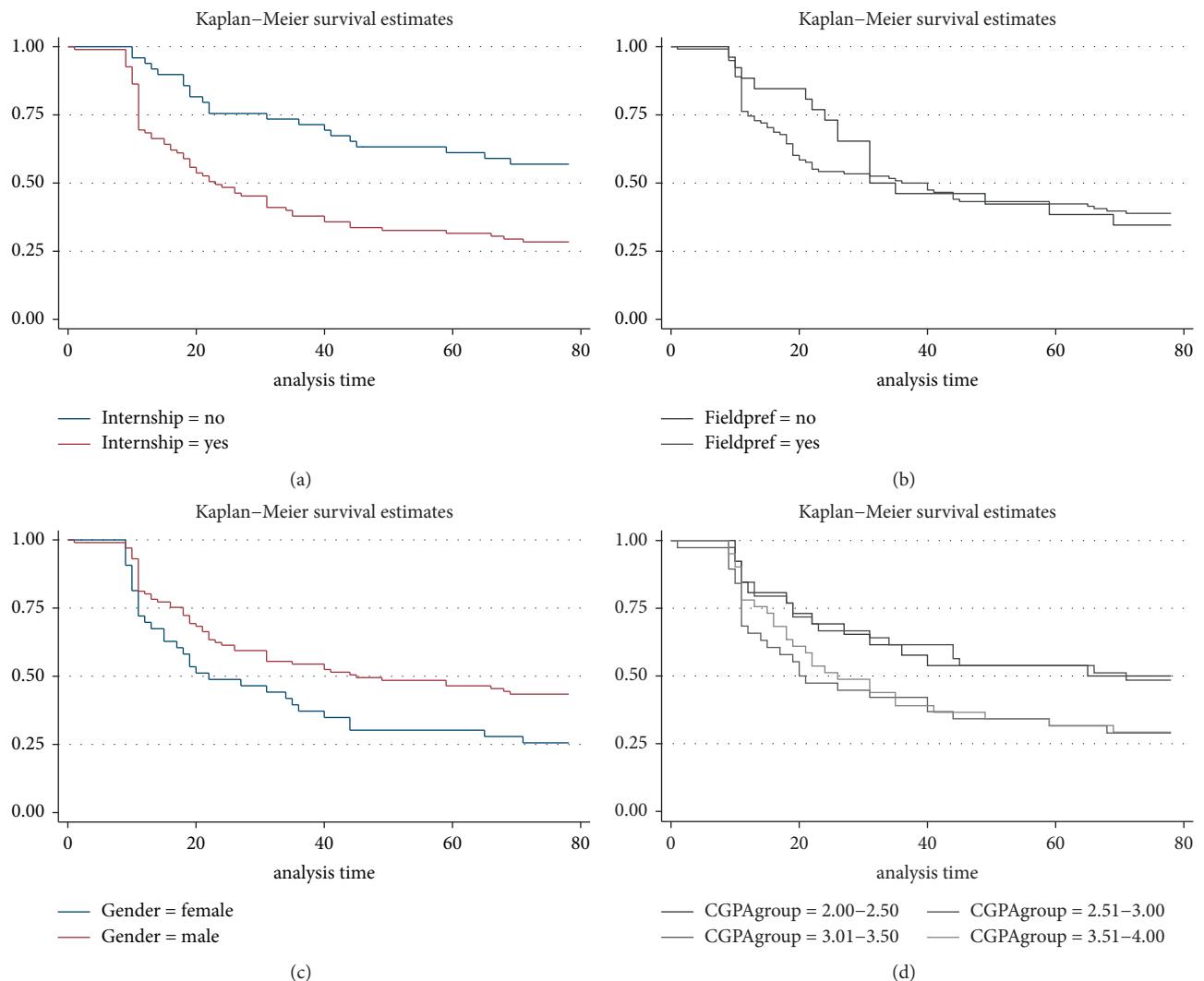


FIGURE 5: (a) Kaplan-Meier curve for internship. (b) Kaplan-Meier curve for field of study. (c) Kaplan-Meier curve for gender. (d) Kaplan-Meier curve for CGPA.

TABLE 5: Log-rank test for equality of survivor functions for various covariates.

Covariates	Chi2	Pr > chi2
Internship	13.07	0.0003***
Preference field of study	0.03	0.8719
Gender	11.74	0.0006***
CGPA-grouped	6.93	0.0741**

Note: ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. CGPA-grouped shows graduates grouped into two based on their CGPA. Graduates with CGPA less than or equal to 3.00 in one group and graduates having CGPA greater than 3.00 in another group.

TABLE 6: Proportional hazard assumption checking results.

Covariates	chi2	P value	PH assumption
Age	0.30	0.5843	Hold
Gender	0.08	0.7838	Hold
CGPA	0.13	0.7164	Hold
Work region	105.94	0.0003	No
Father education	1.30	0.2550	Hold
Mother education	0.01	0.9173	Hold
Sector employed	3.75	0.0124	No
Preference field of study	3.33	0.0529	Hold
Preferred work region	61.81	0.0002	No
Number of companies contacted	0.92	0.3368	Hold
Internship	0.48	0.4892	Hold

was 43.7% $((0.563-1) * 100)$ longer than for female graduates.

4.4. Parametric Analysis. When the PH assumptions are violated, parametric accelerated failure time (AFT) models can be used as an alternative to the PH model [20]. The AFT model does not assume constant hazards as in the PH model. However, it assumes that the effects of the covariate are fixed and multiplicative by the accelerated factor on the time scale of t . The relationship between covariates and the survival time can also be illustrated as a linear relationship between the natural logarithm of survival time and the covariate X , that is,

$$\ln T = \alpha + \beta X + \delta \mu_i, \quad (10)$$

where \ln is the natural logarithm, T is survival time (T), α is the intercept, β is a vector coefficient to be estimated, δ is the scale parameter, and μ_i is the residual or unexplained variation and assumes a specific distribution.

Parametric models such as Weibull, lognormal, log-logistic, and exponential models were fitted. Also, for better comparison of the goodness-of-fit of the models and to identify the best distribution in different AFT models, the Akaike information criterion (AIC) was used, and the best model (Log-normal) was chosen (Table 8). Both AIC and Bayesian information criterion (BIC) show that the lognormal AFT model is the best-fitted model for the data, among the other considered models. Furthermore, the AIC value of the PH model (AIC = 786.0578) approximately doubles the AIC values of each considered AFT model, that is, Weibull AFT model (AIC = 379.9486), exponential AFT model

TABLE 7: Cox PH model estimated hazard rates.

_t	Haz. ratio.	Std. err.	Z	P > z	(95% conf. interval)
CGPA	1.495	0.318	1.890	0.059**	0.985-2.269
Age	0.783	0.063	-3.030	0.002***	0.669-0.917
Gender	0.563	0.145	-2.230	0.026**	0.340-0.932
Fathedu	0.637	0.181	-1.590	0.113	0.365-1.112
Motheedu	0.772	0.254	-0.790	0.431	0.405-1.470
Fieldpref	0.908	0.274	-0.320	0.749	0.503-1.639
NCC	1.117	0.054	2.290	0.022**	1.016-1.229
Internship	3.443	0.930	4.580	0.000***	2.028-5.845

Note: ***, **, and * refer to significance at 1%, 5%, and 10% levels, respectively. No. of subjects = 145, no. of failures = 89, time at risk = 6330, log-likelihood = -385.0289, number of obs. = 145, LR chi2 (8) = 46.85, and Prob > chi2 = 0.0000.

TABLE 8: Comparison of the PH model and the AFT models using AIC criteria.

Model	AIC	BIC
PH model	786.0578	809.8717
Exponential	379.1373	405.9279
Weibull	379.9486	409.7159
Log-normal	367.3917	397.159
Log-logistics	367.9253	397.6927

(AIC = 379.1373), lognormal AFT model (AIC = 367.3917), and log-logistics AFT model (AIC = 367.9253). It means that in this circumstance, the performance of the AFT models is much better than that even from the PH model.

The result in Table 9 shows that CGPA, age, gender, number of companies contacted, and internships performed were associated with the waiting time for the first job. This implies that the same variables were found to be significant in both the PH and AFT models.

The positive coefficient means that the effect of the covariate is to prolong the survival time, while a negative coefficient is to shorten the time to the event. Positive and statistically significant coefficients of age and gender imply an increased survival time or a decrease in failure time. The percentage of change in the waiting time value can be calculated by $(e^\beta - 1) * 100\%$. For, example, male graduates survived 58% ($e^{0.4579292} - 1$) longer than female graduates. Also, the failure time of older graduates was higher than that of younger ones. The negative and statistically significant coefficients of CGPA, the number of companies contacted, and the internship imply that the effect of these covariates decreases the survival time or increases the failure time. For example, the higher the number of companies contacted (applied) reduces the survival rate of graduates by 15% ($e^{0.1409678} - 1$).

Furthermore, for further comparison, the results of the exponential, Weibull, and log-logistic regression models from R software are given in Table 10. Although the results for the three models are similar to lognormal regression results in magnitude, their signs are opposite. In other words, a positive coefficient (hazard rate > 1) indicates that as the independent variable increases, the time to event (the probability of getting hired for the first time for this study)

TABLE 9: Lognormal regression result accelerated failure-time form.

_t	Coef.	Std. err.	z	P > z	(95% conf. interval)
CGPA	-0.407	0.197	-2.07	0.038**	-0.793 -0.022
Age	0.186	0.069	2.70	0.007***	0.051 0.322
Gender	0.458	0.236	1.94	0.052**	-0.005 0.920
Fathedu	0.332	0.255	1.30	0.193	-0.167 0.831
Mothedu	0.357	0.292	1.22	0.222	-0.216 0.929
Fieldpref	0.035	0.279	0.12	0.901	-0.513 0.583
NCC	-0.141	0.050	-2.80	0.005***	-0.239 -0.042
Internship	-1.038	0.221	-4.68	0.000***	-1.473 -0.604
_Cons	1.259	1.709	0.74	0.461	-2.09 4.611
/ln_sig	0.087	0.081	1.07	0.284	-0.072 0.247
Sigma	1.091	0.089			0.930 1.280

Note: ***, **, and * refers significance at 1%, 5%, and 10% levels, respectively. No. of subjects = 145, number of obs = 145, no. of failures = 89, time at risk = 6330, LR chi2(8) = 47.27, log-likelihood = -173.69583, and Prob > chi2 = 0.0000.

TABLE 10: Parametric regression model hazards and coefficients.

Unemployment Duration	Exponential regression		Weibull regression		Log-logistic regression	
	Coefficients	Exp (-coef)	Coefficients	Exp (-coef)	Coefficients	Exp (-coef)
CGPA	-0.4065**	1.5016	-0.3857**	1.4706	-0.4029**	1.4962
Age	0.2762***	0.7587	0.2654***	0.7669	0.2096***	0.8109
Gender	0.562**	0.5701	0.5377**	0.5841	0.478**	0.6200
Fathedu	0.4384	0.6451	0.4254	0.6535	0.4215	0.6561
Mothedu	0.282	0.7543	0.2568	0.7735	0.3265	0.7214
Fieldpref	0.1905	0.8265	0.1747	0.8397	0.0739	0.9288
NCC	-0.1222**	1.1300	-0.1118**	1.1183	-0.1494**	1.1611
Internship	-1.3318***	3.7879	-1.2722***	3.5687	-1.0819***	2.9503
Intercept	-0.4792	1.6148	-0.3532	1.4236	0.6565	0.5187

Note: ***, **, and * refers significance at 1%, 5%, and 10% levels, respectively.

is lower. As a result, the positive coefficient for age indicates that the probability of getting a first job decreases with age. A positive coefficient for gender implies that male graduates had a longer unemployment period than female graduates.

Moreover, a negative coefficient (hazard rate <1) means as the independent variable increases, the time to the event increases (shorter duration for the event or more likely for it to occur). This means that the probability of the event happening (getting the first-time job for this study) is higher. Therefore, as the graduates' applications increase and/or as they complete an internship, the probability of getting their first-time job would increase.

5. Discussion

The result of this study shows that the average waiting time for first-time employment was 44 weeks (Table 1). This implies that on average, graduates wait almost 11 months to get their first full-time job, which is higher than the result of a similar study conducted by Fenta et al. [8] on Bahir Dar University graduates (which is 5.08 months). In terms of region, the majority of the graduates were from the Amhara Regional State (64.83%) followed by Oromia (12.41%) and Southern Nations and Nationalities Peoples of Ethiopia (SNNPR) (11.72%) (Figure 2). The highest percentage of graduates from the Amhara region may be because the

university is located in the Amhara region and students have a habit of choosing universities located in their birth region (ethnic group). In addition, ethnic violence has become a common phenomenon in many public universities in Ethiopia. Many students are also becoming victims of the violence [21]. As a result, we presumed that students would choose to attend universities within their ethnic groups (regions) in order not to be victimized.

Despite the low job market demand for graduates having been identified as a major reason for the low employment of graduates, evidence indicates insufficient information regarding job vacancies had a nonnegligible impact on graduates' employment [11]. This means that there is a link between job search methods and graduates' employment. Job search strategies such as newspaper and public advertisements remain popular methods of looking for a job [22]. Consistent with the finding of a similar study by Fenta et al. [8], the public advertisement was found to be the most predominant means of getting a job by graduates (36.55%) (Table 3). The Internet (6.21%) and relations (4.83%) were the next most widely used methods of getting a job. In this digital world, it is not surprising that the Internet was the second most popular means of finding a job. Good relations and social networks may help graduates to get many people from college, social media, and anywhere which might have more information about job vacancies and they might be employers [23]. Therefore, a good relationship can increase

the chance of employment. Likewise, the third-highest percentage (4.83%) of this study shows that relationship is the most frequently used method of getting a job, which is in harmony with the study conducted by Fenta et al. [8] on the employability of Bahir Dar University graduates.

Furthermore, it is sad to see that a very low proportion (4%) of students were self-employed (Figure 3). Perhaps this is because since graduates are young, they may face many acute challenges, such as a lack of funds and other capital for starting a business [24]. Several studies have argued that the Ethiopian curriculum is largely based on theoretical knowledge and lacks practical training and experience sharing, which does not provide graduates with the necessary skills to launch their own businesses [25]. If so, this could be another reason why only a very few graduates have started their own businesses.

A few graduates found jobs in the first 10 weeks (two and a half months) after graduation (Figure 4(a)). This is probably because the Ethiopian New Year begins two months after students' graduation and employers announce vacancies following the New Year. There is, however, a steep decline in unemployment probability between 10 and 50 weeks of graduation. Nevertheless, after 50 weeks (12.5 months) of graduation, the probability of being employed decreases at a declining rate. On the contrary, Ayaneh et al. [7] found that unemployment survival rates of college graduates declined sharply after 15 months. Here, we argued that nearly after a year of graduation, the graduates were unable to find a job. This is because one year later, more new graduates join the labour market. So, earlier graduates face more competition, and employers are looking for new graduates. Therefore, earlier graduates are less likely to get a job a year later. This is consistent with the study by Jarosch and Pilossoph [26], who argued that employers may think that graduates staying unemployed for a long period make them lose basic skills, which results in substantial expenditure for companies to restore these skills through training and education. Hence, they choose to hire new graduates.

The median time to first employment of graduates was found to be 35 weeks, which is lower than the result found by Ref. [7] which was 15 months (nearly 60 weeks). According to the median waiting time for first employment, 50% of graduates get their first job 35 weeks after graduation. In other words, 50% of the graduates did not secure a job within the first 35 weeks of graduation. Figure 4(b) also shows that more than 35% (38.62%, based on Table 1) of the cases did not experience the event at the end of the study. This means that 38.62% of graduates looking for a job have not been employed 78 weeks after graduation.

The Kaplan-Meier curves drawn for various covariates suggest that there were significant disparities in the unemployment curves for each of the covariates. Ismail [27] argued that internships can improve both social and professional networks, hence increasing one's employment potential. Figure 5(a) validates this argument that the unemployment rate of graduates who completed internships during their undergraduate studies declined faster than that of graduates who did not complete internships. This means

that students who never participated in an internship program during their studies are more likely to be unable to obtain a job than those who did. It may be because employers look for soft skills and competencies which can be acquired through internships and other training in addition to CGPA. In addition, internships can allow students to acquire practical experiences and communication skills which could allow them to manage job interviews that cannot be acquired in classroom settings. The findings of the study by [28–32] support our argument stating that various soft skills such as leadership skills, teamwork skills, communication skills, and solving problems contributed to graduates' integration into work. Between the first 10 and 50 weeks following graduation, the unemployment rate curve for students who attended their selected area of study is consistently lower than that of students who did not attend their preferred field of study. This suggests that graduates who studied their preferred fields were more likely to get jobs than graduates who did not. The reason for this could be that studying an area of interest increases motivation and aspiration, resulting in higher achievement, which increases the probability of getting a job. However, the difference in survival curves between these groups is essentially nonexistent after 50 weeks of graduation (Figure 5(b)).

In addition, both high- and low-CGPA scorers have almost the same employment opportunity for the first 10 weeks of graduation. The survival curve for students with CGPA between 2.00–2.50 and 2.51–3.00 is almost identical. Furthermore, the survival curves of graduates having CGPA between 3.01–3.5 and 3.51–4.00 seem identical (see Figure 5(d)). The survival curve for students with CGPAs less than 3.00, however, is higher than that of students with CGPAs greater than 3.00. This may be because employers in Ethiopia usually advertise for graduates with CGPAs above 3.00. According to Ayaneh et al. [7], this is because the number of applicants is usually much higher than the number of vacancies in Ethiopia. As a result, employer companies use CGPA as an instrument to reduce the number of applicants (high competition); therefore, graduates with a high CGPA have a better chance of being recruited as possible candidates. Moreover, employers believe that graduates with a high CGPA have the skills to perform the given task efficiently and effectively.

Studies show that the age of graduates determines employment outcomes. For example, a study conducted by Wilton [33] shows that mature graduates experience more difficulties in accessing suitable employment than their younger counterparts. The hazard rate for the age of the graduates for this study suggests that the older the graduates, the longer the duration of unemployment (less likely to be employed). Ceteris paribus, as the age of the graduates increased by one year, the survival (the duration of unemployment) of the graduate increased by 21.7% ($(0.783 - 1)^* 100$), which is consistent with the study conducted by Ciucu and Matei [34]. According to Nonyana [35], this is because, given the same work experience, companies prefer to invest in young labour than the old. This is because employers prefer employees who will be there for a long period before retirement, and they believe young employees will be more successful in their careers.

Contrary to the finding of Mehmetaj and Zulfiu [11]; Eyland and Johnson [36]; Lassibille et al. [37]; and Genda and Kurosawa [38], the waiting time for male graduates was 43.7% ((0.563-1)*100) and was higher than that of female graduates. Females had a high probability of being employed compared to their male counterparts. In Ethiopia, women are believed to be the first disadvantaged and marginalized groups in society. Both the federal and regional governments have taken several measures to ensure gender equality. Affirmative action is one of the measures believed to reverse discrimination and the negative effects caused by gender [39]. Then, the lower survival (higher employment) of females found in this study might be due to affirmative action given to females, which has been practiced in the country (see Figure 5(c) also).

6. Conclusions

Most students believe that a college degree is sufficient to be employed. But finding a job immediately after graduation is not easy. The study used nonparametric methods of analysis such as the Kaplan-Meier (KM) survival function and semiparametric methods such as the PH regression model. In addition, due to the violation of the cox PH assumptions in some of the covariates, parametric accelerated failure time (AFT) models such as Weibull, lognormal, logistic, and exponential models were fitted. Using the Akaike information criterion (AIC), the lognormal model was found the best fit for this study. The result of this study shows that graduates have to wait a considerable amount of time to be employed. We documented that CGPA is not the only metric employers consider, as they also look at the soft skills and competencies that can be acquired through internships. In other words, CGPA is not much more important than passing the first phase of elimination criteria. Internships provide graduates with skills that can help them manage job interviews and practical exams for employment, which can give them a competitive advantage over other competitors. The estimated average waiting time for the first employment of graduates suggests that almost half of the graduates are employed within 35 weeks after graduation. While 38.62% of graduates were unemployed within the sample period (78 weeks after graduation). Given the very scarce job opportunities in the country, it is a mystery to see that a very small percentage (4%) of graduates have created and started their businesses. Although students have different reasons for choosing their field of study, the study found that students who studied their preferred field were more likely to be hired. We recommend that universities should respect students' fields of preference as much as possible. Moreover, the result of the study revealed that *ceteris paribus*, graduates who completed internships during their undergraduate education had shorter unemployment durations than those who did not. Therefore, the university, in collaboration with industries and other organizations, should arrange internship programs for graduates in each department.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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