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Article

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IZA Journal of Labor Policy

Provided in Cooperation with:

IZA – Institute of Labor Economics

Suggested Citation: Egessa, Abel; Nyanzi, John Bosco; Muwanga, James (2021) : Determinants of youth unemployment in Uganda: The role of gender, education, residence, and age, IZA Journal of Labor Policy, ISSN 2193-9004, Sciendo, Warsaw, Vol. 11, Iss. 1, pp. 1-29, <https://doi.org/10.2478/izajolp-2021-0008>

This Version is available at:

<https://hdl.handle.net/10419/298769>

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Abel Egessa¹, John Bosco Nnyanzi^{2*} and James Muwanga¹

Determinants of youth unemployment in Uganda: The role of gender, education, residence, and age

Abstract

Youth unemployment in Uganda increased from 12.7% in 2012/13 to 13.3 in 2016/17, despite a decline in the overall national unemployment rate from 11.1% to 9.2%. This poses serious development challenges, particularly to the ongoing efforts to poverty reduction. The main objective of the current study is to examine the extent to which gender, education, residence, and age determine youth unemployment in Uganda. Using recent data from the Uganda National Household Survey 2016/17 collected by the Uganda National Bureau of Statistics, we obtained a sample of 5,912 respondents for the ages between 18 years and 30 years. The main findings based on a binary logistic regression approach, reveal that education, gender, residence, and age are all critical in driving youth unemployment. The Ugandan youth who has some level of education is more likely to be unemployed compared to those with no education. But the youth that attended post-secondary education is associated with the highest unemployment probability followed by those with secondary school education and finally by primary education. While an increase in age appears to increase youth unemployment for females, the married youth have less chances of being unemployed compared to the unmarried youth. Moreover, as the probability of being unemployed reduces for the married youth, being divorced increases that probability. Similarly, the male youth are found more likely to be unemployed than their female counterparts. Additionally, the urban youth increased their chances of unemployment compared to the rural ones. Likewise, males are far more likely to remain in unemployment relative to females, just as living in the northern, eastern, or western region as a youth is less risky in terms of unemployment compared to living in the central region. On the other hand, whereas the education level of the household head is not important for youth unemployment, the marital status and gender of the household head are critical. The indirect effects of education, gender, residence, and age are clearly notable. Implications for policy and research are drawn.

Current version: September 16, 2020
Keywords: youth, unemployment, gender, education, residence, age, binomial logit, Uganda, UNHS 2016/17
JEL codes: C21, D01, J21, J23, J64
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1 Introduction

Youth employment is increasingly becoming a hot topic for the developing world where over one billion of the global population is aged between 15 and 24 (United Nations, 2019). The issue is particularly acute in sub-Saharan Africa where 60% of the population is <25 years. Concerning other countries, Uganda's demographic performance is interestingly unignorable. Currently, with 78% under the age of 30, Uganda has one of the youngest populations in the world. Certainly, the upside is the development potential in terms of youth contribution to economic growth. Unfortunately, the persistent and increasing youth unemployment in the country appears to have weakened this potential. For example, the unemployment rate¹ for the youth aged 18–30 that stood at 4.5% in 2013 and 4.9% in 2015 has since more than doubled to 13.3% in 2016/17 compared to the decline in the national unemployment rate to 9.2% in 2016/17 from 11.1% in 2012/13 (Uganda Bureau of Statistics (UBOS), 2017). The report stresses that almost one-half of the youths (48%) were undereducated for the jobs in the market. Pletscher (2015) has argued that such a trend can undeniably threaten not only the economic and political stability of a country but also could cripple the dream for sustainable development as it frustrates the poverty eradication efforts undertaken by the governments. For Mankiw (2003), the macroeconomic stability of a country gets into disarray once higher unemployment sets in. To be specific, the consequences attributed to the persistent increase in youth unemployment are enormous, particularly in terms of socio-economic, political, and moral forms (Asalfew, 2011). Examples include, inter alia, fostering drug addictions among youths (UN, 2003; Curtain, 2004; Chigunta, 2002; and, Haji, 2007); crime and violence (Okojie, 2003; Haji, 2007; Echebiri, 2005); psycho-social problems on youth (Toit, 2003; Bell and Blanchflower, 2010; Denu et al, 2005); Commercial sex work (Echebiri, 2005; Okojie, 2003; ILO, 2005); and, economic costs such as adverse effects on economic development (Salvador and Killinger, 2008; Denu et al., 2005), as well as higher medical costs due to possibility of contracting deadly diseases out of idleness (UNAIDS, 2004).

In light of the above, it is clear that a persistently increasing youth unemployment status can have adverse repercussions, and is an interplay of diversified factors. Nevertheless, these factors have not been ascertained in Uganda, whereas their knowledge is admittedly critical for efficient youth employability. We contribute to the debate by providing empirical evidence about the extent to which individual and household characteristics affect youth unemployment in Uganda. It is important to note that the government of Uganda has for the last decade come up with several strategic plans and initiatives to tackle the problem of youth unemployment. Examples include inter alia: The School Leavers Industrial Fund in 2010/11 aimed at helping in the training of the graduates to gain skills and to set up small businesses as a means to eradicate poverty; The Youth Venture Fund; The Youth Livelihood Program (YLP) and the consequent Youth Livelihood Fund (YLF); The Women's Entrepreneurship Fund, are notable programs established under the National Youth Policy (NYP), principally designed to support

¹ According to the International Labour Organization (ILO), unemployment occurs when people without jobs have been actively looking for work within the past 4 weeks. The youth unemployment rate is the proportion of the youth labor force that is unemployed. According to UBOS (2016), the unemployment rate is calculated by dividing the total number of youth unemployed (for a country or a specific group of workers) by the corresponding labor force, in this case in the age group 18–30. Here, labor force entails the sum of the total persons employed and unemployed in the group. For our study, a person is considered unemployed if he or she had actively looked for work and was not employed during the last seven days although he or she was available.

young people to find employment by extending grants and other support to small groups of young entrepreneurs to help them start small businesses and thus create employment for other young jobseekers (Ahaibwe and Kasirye, 2015; Makumbi, 2018). Generally, there is in place the presidential initiative for Skilling the youth in the entire country as a means of empowering the youth to acquire employable skills. All these efforts notwithstanding, the problem of high youth unemployment has surprisingly persisted in the country.

Economic theory has offered several explanations for the origin and persistence of unemployment in general, albeit with no consensus to date about their relative merits. Examples of these theories include inter alia the insider–outsider model of wage-setting behavior of firms (see Lindbeck and Snower, 2001; Bentolila et al., 2011); the Job-matching theory (see Jovanovic, 1979); the Efficiency Wage Model (see Shapiro and Stiglitz, 1984; Salop, 1979)); Human Capital Theory (Schultz, 1961; Becker, 1993); the Implicit Contract Theory (see Gordon, 1974; Azariadis, 1975; Burdett and Hool, 1983); and, the job search theory (e.g., Mortensen, 1970; Lippman and McCall, 1976; and, Nickell and Jackman, 1991; Bloemen, 1997). We focus on the latter three given their relevance to the current study.

First, the job-search theories explain the individuals' decisions of whether to participate in the labor market and whether to change or leave jobs. Central here is that unemployment depends on the job offer and job acceptance. When people become unemployed, the expected duration of their unemployment depends on the probability of receiving job offers and accepting them. Three stages, therefore, characterize a typical unemployed person looking for a job (Nickell and Jackman, 1991). In the first step, the person (say N) collects information about job vacancies that come with different pre-assigned wage offers. In the second stage, N decides to respond to the request for vacancies. Finally, N accepts the job offer of any job applied for. The job offer is determined by factors such as education, skills, experience, and the local demand conditions, all of which make a specific person attractive to employers. But also the degree of competition from other job seekers could determine the degree of success in acquiring the job. In the argument of Acero and Almudena (1993), the job market keeps on changing itself as workers change jobs. Some of the factors related to job search include inter alia wage rigidity, the influence of labor unions, and labor legislation.

On the other hand, in the Implicit Contract Theory (Baily, 1974; Gordon, 1974; and, Azariadis, 1975), it is argued that a rational worker will choose an unstable job, equally defined as a job with a higher probability of layoff, if that job offers higher wages than choose a job which offers stable but lower wages, in a situation where unemployment insurance benefits or other forms of social security exist to maximize lifetime earnings. Consequently, unemployment may be created in an unstable labor market if such benefits, viz., the social safety nets for the unemployed, are increased (Azariadis, 1975; Burdett and Hool, 1983). In principle, the underlying cause of unemployment according to the implicit contract theory is the relative risk aversion of employees, where rational jobseekers would prefer immediate high and certain wages over the short-run to low but stable income spread well into the future.

Finally, the Human Capital Theory (Schultz, 1961; Becker, 1993) illustrates that education can play an important role in determining the employment or unemployment rate of persons. According to the theory, education increases not only the productivity and efficiency of people by increasing the level of cognitive stock of economically productive human capability, which is a product of innate abilities and investment in human beings, but also

the chances of employment in the labor market. The less educated or worse, the not educated persons, are, in the human capital framework, viewed as being disadvantaged in the job market where they would be in a position to reap pecuniary and non-pecuniary returns if they were educated. In effect, they miss out too on the opportunities for job mobility, greater output for society, and enhanced earnings for themselves. The protagonists of the theory further contend that those who lack education would miss out on the skills needed to perform complex jobs, and would thus remain caught up in the unemployment trap unless otherwise. The job-matching theory developed later by the likes of Jovanovic (1979) augments the human capital theory by emphasizing that unemployment arises due to a mismatch between educated workers and skilled positions.

On the empirical front, an effort has been made to analyze youth unemployment under the motivation of the development challenges associated with it. From the existing literature, we can identify factors such as race and birthplace differences (see Caliendo et al., 2011; Nganwa et al., 2015; Nordström, 2011; Bhorat, 2007; Mulu, 2012; Msigwa and Kipesha, 2013 *inter alia*), education and the health status of the youth (e.g., Carmeci and Mauro, 2003; Mulu, 2012; and, Msigwa and Kipesha, 2013; Dejene et al., 2016; Salvador and Killinger, 2008; Morris, 2006; Mlatsheni and Rospabe, 2002; Okojie, 2003; Haji, 2007; Anh et al., 2005; Guracello and Rosati, 2007; Diener and Biswas-Diener, 2002; Diener and Scollon, 2003; Asalfew, 2011), in addition to other factors such as marital status, household composition and family (e.g., Verhaeghe et al., 2012; Zhang and Zhao, 2011; Mulu, 2012), migration (e.g., Raphael and Ronconi, 2005; Okojie, 2003; Mlatsheni and Rospabe, 2002; Anh et al., 2005; Sarr, 2000; Nwuke, 2002; Yisak, 2006; Dejene et al., 2016; Asalfew, 2011); sex/gender (e.g., Caliendo et al., 2011; Ejigu, 2011; Halleröd and Westberg, 2006; Mlatsheni and Rospabe, 2002; Asalfew, 2011), age (e.g., Guracello and Rosati, 2007; Denu et al., 2005; Dejene et al., 2016; Ejigu, 2011; Mulu, 2012; Escudero and Mourelo, 2013; Asalfew, 2011), work experience (Guracello and Rosati, 2007; Anh et al., 2005; Hassen, 2005), household income, paternal occupation, and parental divorce (Morris, 2006), job preference of the youth (Okojie, 2003; Haji, 2007; Echebiri, 2005; Adenikinju and Oyeranti, 2004; Denu et al. 2005), poor social networks (Toit, 2003); and, lack of business advisory services (Haji, 2007), as critical in the analysis of youth unemployment.

The most common feature of the aforementioned studies is nevertheless their inconclusivity and mixture of findings. The divergences appear to be explained by, *inter alia*, sample heterogeneity, methodological approaches, and, the nature of data. In the Ugandan context, for example, much of the scholarly work on the topic has indeed been limited to case studies without much national representation (e.g., Makumbi, 2018; Ahaibwe and Mbowe, 2014; Magelahn and Ntambirweki-Karugonjo, 2014; Kamusiime, 2015; Pletscher, 2015), perhaps due to personal choice or data issues. We are therefore reluctant to generalize the findings therefrom to the wider Ugandan situation. Moreover, researcher bias and subjectivity in such case studies of a qualitative nature may be inevitable (Mehra, 2002). On the other hand, for the present study, the availability of a nationally representative dataset, the UNHS data (2016/17), collected by the UBOS facilitates tackling the unemployment issue from a much wider perspective, for policy purposes as well as academic consumption. We focus on Uganda to afford home-grown solutions to the ever-growing challenge of youth unemployment in the country. Methodologically, an empirical approach that carefully addresses the association among selected variables is the

preferred mode of analysis in the current study as opposed to approaches employed by the likes of Pletscher (2015) and Kamusiime (2015).

The main objective of the present study is to analyze the factors that lead to persistent youth unemployment in Uganda. While the focus is specifically put on gender, education, residence, age, and health status of the youth, other individual/demographic and household/socio-economic factors are certainly not ignored. Emphasis on the four factors, however, is grounded in literature. Precisely, education, gender, urban/rural (residence), and age define the labor markets to which groups of youth would be part. Axelrad et al. (2018) reecho this rationale as they argue that youth unemployment stems mainly from the characteristics of the labor market, not from specific attributes of young people. For example, a general prediction of gender discrimination theories is that women's occupational choices are more restricted than men's perhaps due to domestic responsibilities, which results in women confining their job search to a more distinct geographical area and to a narrower range of hours, and thus restricting the range of possible jobs (Manning, 2003; Ollikainen, 2006). This provides a basis for our claim that women have a lower probability of being employed. Equivalently, the gender factor, as a plausible explanation for unemployment further appears common in several studies including inter alia Guracello and Rosati (2007), Denu et al (2005), Ahaibwe and Mbowe (2014), and, Mlatsheni and Rospabe (2002). Here it is observed that female youth across all ages are more likely to be unemployed and are much more likely to be jobless than male youth. In Uganda, overall, the youth (aged 18–30) comprise about 21% of the population (about 8.2 million people), with the majority (56%) being female (UNHS 2016/17). Arguably, factors such as marginalization in business ownership, lack of skill development, inaccessibility to financial resources, and lack of non-agricultural empowerment could be some of the serious catalysts of female youth unemployment (Ministry of Gender, Labour and Social Development, 2006). The study therefore has the gender differential impact on youth unemployment in Uganda, as one of the specific objectives.

On the other hand, the choice of focus on education is likewise informed by the well-established linkages between each of the duo with unemployment (McKee-Ryan et al., 2005; Norstroem et al., 2014; OECD, 2014; Schuring et al., 2013; OECD, 2010; Barham et al., 2009; Thielen et al., 2013). From the human capital theory, it is plausible that the less educated youth are likely not to find jobs unless they engage in education. In fact, the essence of the human capital theory is that education renders people more productive by raising the marginal product of an educated worker relative to one not so educated. In so doing, the chances of an educated person being employed are theoretically higher compared to their less-educated counterparts. However, it is rather possible that the former category could fail to find jobs and hence remains unemployed far longer than the latter, perhaps due to the dynamics of a particular labor market. The exact effect of education, therefore, requires empirical analysis. The Ugandan case offers us an opportunity to understand better the quantitative impact of education on youth unemployment, given the uniqueness of its labor market. Here, unemployment is lower among persons with no education and primary education, and higher among those with secondary education and above. Despite the possibility that the Ugandan education system produces unemployable graduate youths, other socio-economic factors could equally explain the observed paradox (Ssempebwa, 2008).

In light of the above, we focus on four specific objectives. First, we examine the effect of education on youth unemployment. The effects of the residence (rural/urban) and age of the youth are then analyzed as our second and third objectives. The role of gender in youth unemployment is then ascertained in the fourth objective. Additionally, while literature contains significant evidence on the direct economic effects of demographic and socio-economic factors on youth unemployment, we know very little of the likely interactions by educational achievement, residence, age, and gender. The indirect effects of each are therefore assessed in the final objective. This empirical analysis is envisaged to contribute to the existing literature in the field as well as benefiting the evidence-based integrated policy interventions that are relevant for the country. Additionally, realizing Vision 2040 and meeting the Agenda 2030 Sustainable Development Goals (SDGs) that Uganda adopted, particularly Goal 1: “No poverty”, and, Goal 8: “Decent work and economic growth,” but specifically Target 8.6.2 that focusses on youth unemployment, would require research interventions such as the current one to guide policy. A better understanding of the youth unemployment effect of gender, health, and education is highly pertinent to addressing these SDGs, particularly in a country where the national poverty level are observed to have increased from 19.7% in the financial year 2012/13 to 21.4% in 2016/2017 (UBOS, 2014, 2017), implying that the current total number of poor Ugandans who cannot afford three meals a day are now eight million. Therefore, the current study undertakes to uncover the quantitative impact of the drivers of youth unemployment to orchestrate improved policy designs for the benefit of the youth and the country as a whole in the fight against poverty.

Our findings are quite informative. First, they suggest that while health appears insignificant to youth unemployment, education matters albeit with varying degrees depending on one's level of education. For example, the Ugandan youths who attended post-secondary education are found more likely to be unemployed compared to those with no education. However, primary and secondary education does not affect youth unemployment. About gender, however, being male increases the probability of being unemployed compared to being a female. The influential role of health is only observed via the regional or marital status factor of the youth. Additional evidence points to an increase in the likelihood of being unemployed if the youth is residing in urban areas compared to those living in rural areas. But as youth's age increases, we observe a more likelihood of the chances of getting employment. On the other hand, we fail to find sufficient evidence in support of the role of health status in youth unemployment.

The rest of the paper is organized as follows. The next section covers the trends of youth unemployment in Uganda, while section 3 presents the methodology and data analyses. Section 4 captures the results and their discussion, whereas sections 5 and 6, respectively, conclude and present the declarations.

2 Summary of the Trends in the Labor Force in Uganda

It is informative to observe that in the financial year 2012/13, the Labor Force Participation Rate (LFPR) under the category of persons aged between 15 years and 64 years, was 52.7% while the Employment to Population Ratio (EPR) was 47.8%. During the same period, the overall unemployment rate stood at 9.4%; youth unemployment was 12.7%, the urban unemployment rate

8%, the time-related underemployment rate 8.9%, skill-related inadequate employment 5.6%, and the income-related inadequate employment 12.9% (UBOS, 2014). On the other hand, of the total youth unemployed, more female (14.7%) than their male counterparts (11.4%) youth were unemployed. The majority were in the rural areas with 13.5% compared to those in the urban location (12%). The latter records appear to oppose findings by Guracello and Rosati (2007) who illustrated that young people living in cities and towns are much more likely to be unemployed than rural young people. The trend for the regions is equally interesting: The Eastern region had the biggest share (19.7%) followed by the Northern and Kampala regions with 16.5% and 15.8%, respectively. Next came the Peri-urban areas with 12.3%, followed by the Central region (9.4%), the Western region (8.7%), and, last but not the best performer was Karamoja with the lowest unemployment rate of 7.6%. Still notable is that degree holders performed worst with a share of 14.8% followed by those with primary education (14.3%), secondary education (14.1%), no education (7.5%), and, the best performers, the post-primary/secondary specialized training (3.5%).

3 Methodology and Data

3.1 Model and estimation

In the current study, the binary logistic regression model is employed since it is suitable for a dichotomous response (Peng et al., 2002; Stoltzfus, 2011). The model is estimated using the Maximum Likelihood (ML) technique. In a very general sense, the method of ML yields values for the unknown parameters which maximize the probability of obtaining the observed set of data.

Basically, we model the probability p accruing to being unemployed, and a set of covariates $X_1, X_2, X_3, \dots, X_k$. The odds of a youth experiencing unemployment is given by the ratio $p/(1-p)$. The logit transform of p , $\text{logit}(p) = \log(p/(1-p))$ connect p to the linear predictor of the logistic regression model. Mathematically expressed, we get Eq. (3.1):

$$\text{logit}(p) = \log(p/(1-p)) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \dots + \beta_k X_k \quad (1)$$

where X_i are the variables of interest as already explained; p is the predicted probability that the event “unemployed” occurs, coded with 1 and 0 otherwise, $[p(\text{unemployed} = 1)]$; $\log(p)$ or $\log(p/(1-p))$ is the log odds ratio or logit. β_1 are the slope coefficients is interpreted as the rate of change in the “log odds” as X changes. In Eq. (3.1), we estimate the parameter vector $\beta = (\beta_1, \beta_2, \beta_3, \dots, \beta_k)$ of regression coefficients. Note that the measured covariates X_j , where $j=0, 1, \dots, k$ can be numeric or categorical variables.

In binary logistic regression, the odds ratio of the individual coefficient is the exponential of the estimated coefficient β , $[\exp(\beta)]$. In the study, $\exp(\beta)$ is therefore the odds ratio of the odds of experiencing unemployment when a youth moves to a given level of the covariate from the reference level. As Johnson and Wichern (2007) clarify, $\exp(\beta)$ is the estimated multiplicative change in the odds for a unit of increase in the predictors, controlling the effects of others. Illustratively, if $\exp(\beta_3) = 2$, then a one-unit change in X_3 would make the event twice as likely (e.g., 0.67/0.33) to occur. Odds ratios equal to 1 imply that there is an equal probability (i.e., 50/50 chance) for the event (unemployed, in our case) to occur with a small change in the independent variable. Nevertheless, it is important to note that negative coefficients lead to odds ratios less than one: if

for example, $\exp(\beta_2) = 0.67$, then a one-unit change in X_2 leads to the event, (say “unemployed” in our case), being less likely (e.g., 0.40/0.60) to occur. In the case of continuous independent variables, however, odds ratios tend to be close to 1, but this does not suggest that the coefficients are insignificant. It is then important to employ the Wald statistic to test for statistical significance.

Interpretatively, therefore, the coefficient β , coupled with the associated sign, shows the magnitude and direction of the effect in the log-odds for a unit of increase in the predictor variable (Johnson and Wichern, 2007). A positive predictive coefficient ($\beta \geq 1$) means the predicted odds increases as the predictor value increases. In our case, positive values of β_j produce higher odds of youth unemployment. If the youth remains at the same level or in the reference class of a categorical covariate, then the odd ratio evaluates to unity. On the other hand, a negative coefficient ($\beta < 1$) indicates that predicted odds decrease as the predictor value increases. Hence, if the value of the odds ratio $\exp \beta$ is >1 , the chance of unemployment is higher for a member of the group concerning the reference category. Otherwise, an odds ratio of less than 1 would indicate a lower chance of unemployment concerning the reference category. Intuitively, each unit increase in a numeric covariate X_j implies an increase of $1 - \exp(\beta_j)$ in the odds ratio, corresponding to an increase in the probability of observing the event of interest (Niragire & Nshimyiryo, 2017; Peng et al. 2002).

Note that it is possible to compute the more intuitive “marginal effect” of a continuous independent variable on the probability. The marginal effect is

$$\frac{dp}{d\beta} = f(\beta X) \beta \quad (2)$$

where $f(\cdot)$ is the density function of the cumulative probability distribution function $[F(\beta X)$, ranging from 0 to 1]. Since the marginal effects depend on the values of the independent variables, it is often useful to evaluate the marginal effects at the means of the independent variables.

3.2 Data

3.2.1 Data source, variables, and description

The data for this study are obtained from the most recent Uganda National Household Survey collected from June 2016 to June 2017 by UBOS. During the survey, each household was interviewed twice a year, in visits 6 months apart. While in the first stage, 1,750 Enumeration areas (EA) were selected, in the second stage 10 households were randomly selected in each Enumeration area, bringing the total households to 17,320 - a sample size that more than doubled that of 2012/2013 of 6,887 households. Relative to all similar surveys before, the UNHS 2016/17 was thus nationally more representative. As evident in Table 1, a total sample of 5,912 respondents aged between 18 years and 30 years was retrieved from the main dataset of which 10.20% were unemployed during the time of the survey.² It is important to note that the period for which unemployment is defined based on the survey question “Did you look for work or try to start an own business during the last 30 days?”. So, it the last 30 days.

Data was collected on gender/sex (as in Asalfew, 2011 – for Ethiopia); health (as in Hoorn, 2007); and education (as in Bhorat, 2007 - for South Africa); without sidelining

² The use of a range up to 30 years is because in the Ugandan context, a youth in Uganda is a person who is aged 18–30 years (UBOS, 2017). Anyone <18 years is a child and engaging in work at that age is considered child labor in Uganda and is illegal. We therefore prefer the Ugandan contextual definition of the youth to that of the United Nations since we are looking at youth unemployment in Uganda.

Table 1 Summary statistics

Variables	Unemployed youth			
	No	Yes	Total	Percentage of unemployed youth
Region				
Central	1,478	318	1,796	17.71%
Eastern	1,294	91	1,385	6.57%
Northern	1,134	91	1,225	7.43%
Western	1,403	103	1,506	6.84%
Residence				
Rural	2,969	186	3,155	5.90%
Urban	2,340	417	2,757	15.13%
Marital status				
Single	4,217	366	4,583	7.99%
Married	998	192	1,190	16.13%
Divorced	94	45	139	32.37%
Age of youth				
Age of youth	5,309	603	6,012	45.11%
Health status				
No (good health)	2,822	317	3,139	10.10%
Yes (bad health)	2,487	286	2,773	10.31%
Sex				
Female	3,097	361	3,458	10.44%
Male	2,212	242	2,454	9.86%
Education level				
No education	3,583	54	3,637	1.48%
Primary	947	175	1,122	15.60%
Secondary	693	271	964	28.11%
Post-secondary	86	103	189	54.50%
Total	5,309	603	5,912	10.20%

Author's computation using UNHS 2016/17.

other critical variables previously identified in the literature. Specifically, the latter include age (as in Mahlwele, 2012 – for South Africa); residence (as in Mulu, 2012 – for Ethiopia); region (as in Bhorat, 2007 – for South Africa; and, marital status (as in Msigwa and Kipesha, 2013 – for Tanzania). Education is coded “0” for no education, “1” for primary completion, “2” for secondary completion, and “3” for post-secondary completion; sex is a binary variable coded as “0” for females and “1” for male; health is also a binary variable coded “0” for no illness/injuries, and “1” for illness/injuries; residence is binary coded “0” for rural, and “1” for urban; region is coded “0” for central “1” for eastern, “2” for northern “3” for western; marital status is coded as “0” for single “1” for married, “2” for divorced/separated, and “3” for widow/widower; and, age of youth is taken as a continuous variable. The reference category used in the model were respectively No education (ref.), Female (ref.), Good health (No, ref.), Central (ref.), Rural (ref.), and, Single (ref.). We expect each of these variables to influence youth unemployment. A summary of the descriptive characteristics of the dependent variable (unemployment) together with the independent variables, viz., demographic and socio-economic factors, is presented in Table 1.

As observed in Table 1, the proportion of youth unemployment varied from one region to the other. While the highest percentage of unemployed youth was observed in Central (17.71%) followed by Northern (7.43%), the lowest was recorded in Eastern (6.57%) followed by Western (6.84%). Similarly, the proportion of youth unemployment differs by place of residence. Accordingly, a big number of unemployed youth (15.13%) resided in urban and relatively a small number of unemployed youth (5.90%) resided in rural areas. On the other hand, the proportion of youth unemployment varies by marital status. For example, the biggest percentage was observed in divorced youth (32.37%) followed by married ones (16.13%) and then the single youth (7.99%). Moreover, it is evident from the table that the proportion of unemployed youth differs by their age groups: the highest proportion of unemployment is observed in the age group 26–30 years (22.82%) and the lowest proportion in the age group 16–20 years (4.77%). It is interesting to further observe that statistics on health status show that the highest percentage of unemployment is found in youth with bad health (10.31%) whereas the lowest (10.10%) is notable for those in good health. Additionally, the female youth (10.44%) were more exposed to unemployment compared to their male counterparts (9.86%). Finally, we note that the unemployment status of the youth varies by their level of education. The highest percentage of youth unemployment is here observed in the youth with post-secondary education followed by those with secondary education whereas the least percentage is visible in those without education.

A further description of our data can be found in Table 2 exhibiting the correlation matrix. It is clear from the table that none of the correlation values exceeds 80%, pointing possibly to no multicollinearity issues as well as some possible relationship between the independent variables. However, although correlation coefficients measure the covariability of variables, they do not necessarily imply functional relationships between the variables. Therefore, we proceed to the regression analysis. But before we do that, there is a need to carry out diagnostic tests on our model. This follows in subsection 3.2.2.

3.2.2 Diagnostic tests

An econometric requirement before estimating binary logistic regression model is to test for multicollinearity and the goodness of fit of the model. As reported in Garson (2009), multicollinearity in logistic regression is a result of strong inter-correlation among the predictor variables. Several measures can be used in assessing multicollinearity including but not limited to the Variance Inflation Factor (VIF) and Tolerance. The latter is captured by, $1-R^2$ (coefficient of determination). As the value R^2 approaches 0, implying that the inter-correlation is lower, the estimate approaches 1.

On the other hand, VIF is the reciprocal of Tolerance expressed as $1/(1-R^2)$. By rule of thumb, a VIF value equal or >4 (arbitrary but common cutoff criteria) implies that the independent variable exhibits multicollinearity (Hair et al., 2010). VIF measures how much of the variances are inflated, and can be computed either from the simple correlation coefficient or the partial correlation coefficient.

$$VIF = 1/(1-R^2) \text{ for either } Y = f(X) \text{ or } Y = f(X_1, X_2)$$

If $R^2 = 1$, then $VIF = \infty$ implying perfect multicollinearity. Otherwise, if $R^2 = 0$, then $VIF = 1$ that means that there is no multi-collinearity. In essence, as the value of the coefficient of

Table 2 Correlation matrix

	Central	Eastern	Northern	Western	Residence	Single	Married	Divorced	Widow	Age	Health	Gender	No Education	Primary	Secondary	Post Secondary
Central	1.000															
Eastern	-0.338	1.000														
Northern	-0.325	-0.346	1.000													
Western	-0.321	-0.342	-0.328	1.000												
Residence	0.259	-0.115	-0.076	-0.065	1.000											
Single	0.023	-0.003	-0.036	0.017	0.063	1.000										
Married	-0.029	0.012	0.033	-0.016	-0.071	-0.910	1.000									
Divorced	0.018	-0.018	0.002	-0.001	0.021	-0.233	-0.178	1.000								
Widow	-0.010	-0.010	0.026	-0.006	-0.008	-0.059	-0.045	-0.012	1.000							
Age	0.040	-0.036	-0.012	0.009	0.043	-0.572	0.514	0.146	0.045	1.000						
Health	-0.005	-0.073	-0.047	0.126	0.022	0.100	-0.094	-0.016	-0.004	-0.041	1.000					
Gender	-0.028	0.012	0.011	0.004	-0.035	0.238	-0.193	-0.106	-0.038	-0.039	0.082	1.000				
No Education	-0.065	0.040	0.036	-0.013	-0.024	0.491	-0.446	-0.116	-0.025	-0.432	0.044	0.076	1.000			
Primary	-0.107	0.006	0.058	0.042	-0.172	-0.328	0.289	0.097	0.031	0.149	-0.029	-0.066	-0.564	1.000		
Secondary	0.157	-0.038	-0.086	-0.031	0.157	-0.154	0.149	0.019	-0.004	0.216	-0.021	-0.012	-0.388	-0.445	1.000	
Post Secondary	0.080	-0.029	-0.043	-0.006	0.141	-0.026	0.028	-0.004	-0.007	0.192	0.012	0.008	-0.149	-0.171	-0.118	1.000

Author's computation using UNHS 2016/17.

determination (R^2) increases, the higher is the VIF, and thus there are increased chances or indications of multi-collinearity. VIF checks if the variable is not orthogonal to the other variables in the model. If $VIF \leq 10$, i.e., if $1/VIF \geq 0.10$ then there is a problem with the model that needs to be corrected. The study adopts both measures, VIF and Tolerance, to investigate multicollinearity.

On the other hand, besides multicollinearity, the Goodness of Fit of the model needs to be ascertained. Preference is here given to the Hosmer-Lemeshow test since it does not depend on the number of trials per row in the data as the other goodness-of-fit tests (e.g., Deviance test, Pearson test) do. The test, based on the Chi-square test, is thus a more trustworthy indicator of how well the model fits the data when the data have few trials per row. Procedurally, the measure involves testing the null hypotheses H_0 : “the model is a good fit”, against the alternative H_a : “the model is not a good fit”. A significance level <0.05 indicates that the null hypothesis is accepted, otherwise we reject the null and accept the alternative. In other words, if all of the goodness-of-fit tests have p -values higher than the usual significance level of 0.05, then the tests fail to provide evidence that the predicted probabilities deviate from the observed probabilities in a way that the binomial distribution does not predict.

4 Empirical Results and Discussion

4.1 Diagnostic test results – multicollinearity and goodness of fit

In Table 3, we present the results from the VIF used to detect multicollinearity. Clearly, there is no evidence of a strong association among the independent variables sex of the respondents, education level, health, marital status, residence, region, and age of the respondents, since all the values of VIF for the predictors are observed <4 and Tolerance is >0.6 (the majority almost approaching to 1). Therefore, as previously reported in the correlation analysis (Table 2), we confirm that multicollinearity is not a threat in the model.

After testing for multicollinearity, we now confirm whether our model is fit for estimation. From Table 4, which reports the results from Hosmer-Lemeshow goodness of fit statistics,

Table 3 Collinearity Diagnostics among study variables

Variable	VIF	SQRT VIF	Tolerance	R^2
y	1.26	1.12	0.7959	0.2041
Gender	1.17	1.08	0.8579	0.1421
	1.72	1.31	0.5829	0.4171
Health	1.02	1.01	0.9811	0.0189
Marital status	1.82	1.35	0.5499	0.4501
Residence	1.24	1.11	0.8088	0.1912
Region	1.16	1.08	0.8588	0.1412
Age	1.61	1.27	0.6206	0.3794
Age of household head	1.25	1.12	0.8004	0.1996
Education level of household head	1.19	1.09	0.8390	0.161
Marital status and gender of household head	1.08	1.04	0.9239	0.0761
Enumeration area (Dummy)	1.18	1.09	0.8445	0.1555

Note: Mean VIF 1.31.

Author's computation.

VIF, variance inflation factor.

Table 4 Hosmer-Lemeshow goodness of fit test – new

Step	χ^2	Degrees of freedom	Significance Prob > χ^2
1	7.57	8	0.4767

Note: p -value > 0.05.

Author's computation using UNHS 2016/17.

the p -value of 0.4767 is >0.05. Therefore, we conclude that the alternative hypothesis which states that the model is adequate to describe the data is accepted. By implication, we do not reject the null hypothesis, and we conclude that the model is a good fit.

4.2 Determinants of youth unemployment

4.2.1 Education and youth unemployment

It is evident from Table 5 that the education level is significantly important in youth unemployment in Uganda. Specifically, in the current case, the marginal effect at the means for primary of 0.154 tells us that the predicted probability of being unemployed is 0.154 greater for the individual with a primary level of education than for the one who has no education. Also, being a youth who attended secondary education increases the probability of being unemployed by 0.229 compared to youth with no classroom experience. It gets worse for higher education, where the marginal effect at the means for the post-secondary level of education indicates that the predicted probability of being unemployed is 0.411 concerning the youth with “no education.”

By implication, the higher the level of education the more likely one is unemployed. Perhaps this could be explained by several reasons including but not limited to poor quality education, inadequate job-matching skills, job preference, job availability, slow growth of the private sector compared to the number of graduating individuals per annum. Nevertheless, the finding conforms with Nganwa et al (2015) who found that the higher the level of education the more likely one is unemployed.

To further elucidate on the education factor, Table 6, focusing on marginal effects, reports that having attended school as a female in primary, secondary, or post-secondary increases the probability of being unemployed by 0.100, 0.160, and 0.338 respectively at 1% compared to those without education. On the other hand, being a male youth who attended primary, secondary or post-secondary increases more the chances of being unemployed by 0.188, 0.318, and 0.542, respectively. Intuitively, a female youth in the categories of those with certificates in primary, secondary, and post-secondary is more likely to get jobs compared to their male counterparts with similar qualifications. Clearly, the finding suggests that education level increases with the unemployment rate but has stronger adverse effects for the male youths relative to their female counterparts. A previous study by Nganwa et al. (2015) concurs with our documentation.

Also, important to observe in Table 6 is that if we have, say, three female youths with primary, secondary, and post-secondary levels of education, respectively, these are likely to witness their probabilities of unemployment increase by 10%, 16%, and 33.8%, respectively, compared to a youth with no education. Yet, on the other hand, three male youths with the education level of primary, secondary and post-secondary, respectively, are likely to experience

Table 5 Determinants of youth unemployment – logistic regression results

Variables	(1) Coefficient	(2) SE	(3) Odds ratio	(4) SE	(5) Marginal effects	(6) SE
Region: Central (Ref.)						
Eastern	−0.626***	(0.152)	0.535***	(0.081)	−0.045***	(0.011)
Northern	−0.635***	(0.153)	0.530***	(0.081)	−0.046***	(0.011)
Western	−0.657***	(0.146)	0.518***	(0.076)	−0.047***	(0.010)
Residence: Rural (Ref.)						
Urban	0.594***	(0.115)	1.811***	(0.207)	0.041***	(0.008)
Marital status: Single (Ref.)						
Married	−0.506***	(0.169)	0.603***	(0.102)	−0.034***	(0.011)
Divorced	0.603**	(0.241)	1.828**	(0.441)	0.051**	(0.022)
Widow	0.344	(0.870)	1.411	(1.228)	0.028	(0.074)
Age	0.069***	(0.015)	1.072***	(0.016)	0.005***	(0.001)
Health: Good health (No, Ref.)						
Health	0.082	(0.102)	1.085	(0.111)	0.006	(0.007)
Sex						
Female (ref.)						
Male	0.751***	(0.124)	2.118***	(0.263)	0.055***	(0.009)
Education level: No education (Ref.)						
Primary	2.660***	(0.179)	14.300***	(2.558)	0.154***	(0.013)
Secondary	3.164***	(0.175)	23.658***	(4.131)	0.229***	(0.016)
Post-Secondary	4.080***	(0.240)	59.132***	(14.163)	0.411***	(0.042)
Age of household head	−0.007	(0.005)	0.993	(0.005)	−0.000	(0.000)
Education of household head:						
No education (Ref.)						
Primary	0.202	(0.203)	1.224	(0.248)	0.014	(0.013)
Secondary	0.151	(0.222)	1.163	(0.258)	0.010	(0.015)
Post-secondary	−0.153	(0.258)	0.858	(0.221)	−0.009	(0.016)
Marital by headship: Single female head (Ref.)						
Married female head	−0.738**	(0.326)	0.478**	(0.156)	−0.059**	(0.029)
Divorced female head	−0.438	(0.325)	0.646	(0.210)	−0.037	(0.029)
Widow	−0.458	(0.334)	0.632	(0.211)	−0.039	(0.030)
Male head	−0.789***	(0.299)	0.454***	(0.136)	−0.063**	(0.027)
Enumeration area dummy	0.004	(0.003)	1.004	(0.003)	0.000	(0.000)
Observations	5,805		5,805		5,805	

Note: Weighted observations are used; Strata dummies are included in the regressions; Robust SE in parentheses (Clustered); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Source: Author's calculations.

SE, standard errors.

much higher and significant increases in the probabilities of being unemployed by about 18.8%, 31.8%, and 54.2%, respectively, compared to male youth with no education. We take this to mean that male youth are more likely to face unemployment longer than their female counterparts with similar education levels. This may underline the fact that females are more likely to find employment in the informal economy, characterizing the Ugandan economy, than males, as earlier pointed out in ILO (2004).

Table 6 Differential effects in gender

Variables	(1)	(2)	(3)	(4)
	Marginal effects: Female	SE	Marginal effects: Male	SE
Region: Central (Ref.)				
Eastern	-0.029***	(0.009)	-0.021**	(0.009)
Northern	-0.027***	(0.009)	-0.025***	(0.009)
Western	-0.041***	(0.008)	-0.012	(0.010)
Residence: Rural (Ref.)				
Urban	0.024***	(0.006)	0.021***	(0.007)
Marital status: Single (Ref.)				
Married	-0.022***	(0.007)	0.006	(0.012)
Divorced	0.042*	(0.022)	0.034	(0.037)
Widow	0.023	(0.061)		
Age	0.003***	(0.001)	0.001	(0.001)
Health: Good health (No, Ref.)				
Health	0.006	(0.005)	-0.001	(0.005)
Education level: No education (Ref.)				
Primary	0.100***	(0.013)	0.188***	(0.026)
Secondary	0.160***	(0.017)	0.318***	(0.038)
Post-secondary	0.338***	(0.054)	0.542***	(0.084)
Age of head	-0.000	(0.000)	-0.000	(0.000)
Education of household head: No education (Ref.)				
Primary	-0.003	(0.012)	0.013*	(0.007)
Secondary	-0.003	(0.013)	0.010	(0.008)
Post-secondary	-0.020	(0.013)	0.011	(0.011)
Marital by headship: Single female head (Ref.)				
Married female head	-0.058*	(0.033)	0.010	(0.010)
Divorced female head	-0.067**	(0.032)	0.045***	(0.016)
Widow	-0.048	(0.035)	0.027**	(0.012)
Male head	-0.068**	(0.033)	0.020**	(0.009)
Enumeration area (strata dummy)	0.000	(0.000)	0.000	(0.000)
Observations	3,389		2,415	

Note: Weighted observations are used; Strata dummies are included in the regressions; Robust SE in parentheses (Clustered); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Source: Author's calculations. SE, standard errors.

4.2.2 The gender factor

Turning to the next specific objective, Table 5 suggests that being male (compared to being female) increases the probability of being unemployed by about 5.5%. The result of logistic regression shows that sex is an important determinant of youth unemployment in Uganda. The result reveals that being male increases the probability of getting unemployment by 0.055 compared to the female counterparts and it is statistically significant at 1%. The finding is in line with the previous authors Baah-Boateng (2012) who found unemployment to be a bigger labor market challenge for men than women and Isengard (2003) who found that young males in the United Kingdom are at a higher risk of becoming unemployed compared to their female counterparts because of the growth of service sector employment which has offered part-time or flexible jobs for female gender but it is inconsistent with the findings of Dickens and Lang (1995) who found higher unemployment rates among women than men.

The gender factor is explored further in Table 6 which provides evidence that females in households under the headship of a married female decrease the probability of being unemployed (compared to female youth living in a household with an unmarried female head) by 5.8%. This outcome is highly significant at 1% level. On the other hand, being male youth in a household headed by a married female doesn't affect in any significant way one's unemployment status in comparison to being a male living in a household headed by a single female. However, a female youth, living in a household headed by a divorced female head, is likely to witness a reduction in the probability of being unemployed by 6.7% compared to the female youth staying with the unmarried female head of the household. The corresponding reduction in the probability of being unemployed for a similar female youth but living in a household headed by a male is 6.8%, in comparison to a female youth staying in a household headed by an unmarried female. On the other hand, a male youth in a household under the headship of a divorced female is likely to witness an increase in the probability of being unemployed by about 4.5% when compared to one under the household headed by an unmarried female. In the case of male youth staying in a household headed by a male, however, the probability of being unemployed increases by only 2%, under a similar comparison. While a similar male youth living in a household headed by a widow has his probability of being unemployed likely to increase by 2.7% compared to the male youth staying in a household headed by an unmarried female, there is no evidence that a female youth leaving under same circumstances will have her probability of being unemployed affected at any significant level.

It is interesting to note that a female youth who is married would likely have a reduced probability of unemployment by about 0.022, while a female youth who is divorced experiences an increase in her chances of being employed by 0.042 compared to an unmarried female youth, though the significance in levels of the latter outcome is weak (10%) whereas in the former case it is at 1% statistical level. We fail to find evidence for the male youth counterpart in similar marital status. On the other hand, Table 6 demonstrates that a male youth living in a household where the education level of the household head is primary is likely to witness an increase in the chances of being unemployed by 0.013 compared to a male youth living in the household headed by a person who has never received any formal education, though the outcome is weakly significant at 10% statistical level.

Further, gender differential effects can be observed in terms of regions. Table 6 exhibits results that reveal that being a female youth from Eastern, Northern, and Western parts of Uganda (compared to the Central) would reduce the probability of being unemployed by 2.9%, 2.7%, and 4.1%, respectively. On the other hand, being a male from the respective locations would reduce the probability of being unemployed by 2.1%, 2.5%, and 1.2%, respectively, taking the Central region as a reference point. In other words, females are more likely to be employed compared to their male counterparts in the Eastern Northern and Western regions. For the case of males in the Western region, however, data is not committal. Females having a greater probability of getting out of the unemployment net faster than males in these regions could perhaps be attributed to the female readiness to undertake any job available especially if they have been unemployed for long. It is also possible that the nature of the labor markets in these regions compared to the Central region would favor more females than males. For example, according to Bowen et al. (2015), a higher proportion of women than men work in farming in Uganda —76% versus 62%. A full explanation for this scenario is outside the scope

of our study. For now, it suffices to note that findings in line with regional disparities are not unique. For example, Kingdon and Knight (2004) find out that in South Africa, Black workers in all provinces except northern and eastern Cape are significantly less likely to be unemployed than those in Gauteng.

4.2.3 The residence factor

Regarding the residence factor, Table 5 shows that if a youth is from an urban setting, that youth's predicted probability of being unemployed is 0.041 in comparison to a youth in the rural area. The outcome is highly significant at 1% statistical level. The result means that urban youth are likely to be unemployed than rural counterparts, after controlling for region, marital status, age, health, sex, and education of the household member as well as the education, marital status, and sex of the household head. Perhaps it is easier for the youth to be employed in rural areas than in urban areas in Uganda especially in the agriculture sector due to the informal nature of employment in rural areas. In urban areas, youth are more constrained in formal employment requirements such as education, skills, and experience which most youth do not possess. This finding is in line with previous authors (Msigwa and Kipasha, 2013) who found unemployment among the youth to be high in urban areas compared to rural areas, but they also corroborate the argument in Ahaibwe and Mbowa (2014) that urban youth are more likely to be unemployed (12%) than rural youth (3%).

In Table 6, the estimated marginal effects show that residence has a significant effect on youth unemployment in Uganda. The computed result shows that urban female youth increase their chances of unemployment by 0.024 compared to their rural counterparts while male ones increase the probability of being unemployed by 0.021 and this is statistically significant at 1%. The difference between females and males in urban areas is that urban male youth at 1% are likely to be employed than their female counterparts. The reason is likely about the nature of jobs in urban, job preference and availability and, gender disparity which favor the male youth than female ones. This is consistent with the finding of Dickens and Lang (1995) who found the unemployment rate higher in women than men. The result disagrees with the finding of Mulu (2012) who found that a bigger percentage of unemployed women (70.74%) resided in rural areas.

4.2.4 The age factor

The estimated results show that age has a significant effect on youth unemployment in Uganda. Specifically, in Table 5, the relevant marginal effect of 0.005 on age, which is highly significant at the 1% level, demonstrates that age is positively associated with youth unemployment. Intuitively, as the age of the youth increases, the more one is likely to stay in the unemployment net. The result is consistent with the finding by Biagi & Lucifora (2008) who argues that changes in the population age structure are positively related to the unemployment rate of young workers, but have no effect on adults. Perhaps, one possible explanation would be that as years increase without a job, the unemployed youth has less skills and is even likely to fail job interviews due to the possibility of forgetting what he/she learnt earlier and therefore more likely to remain in the unemployment net. It can also be argued that for the youth who continue in school and therefore add extra years to their age, these become more educated and are often biased toward

wage-paying formal jobs that are less supplied in the labor market. This is in line with our earlier finding that as one upgrades from primary to secondary to post-secondary, the possibility of remaining unemployed gets higher. By implication, as one advances in age, the probability of remaining unemployed gets bigger. The positive association between age and unemployment is likely to be the consequence of a “disillusioned worker” effect as it can be argued that the longer an individual is economically inactive, the harder it is to re-enter employment (Vitanen, 2001). For, as the latter author contends, the human capital deteriorates with duration and number of spells of unemployment.

For clarification of the finding in Table 5 on age, Table 6 shows that an increase in the age of a female youth is likely to significantly stimulate the probability of being unemployed by only 0.3% at 1% statistical level. Whereas the effect is significant for females, there is no evidence for the males. By implication, as a female’s age increases the more likely she will drop out of the unemployment net. Perhaps by then, the female is taken over by family responsibilities with less time for paid work, especially given the strong cultural beliefs putting the woman in the kitchen. The finding is however not new as Carlsson and Eriksson (2017) similarly record that older workers and women often have lower employment rates, and the duration of unemployment increases with age.

4.2.5 Interaction effects

Tables 7–10 exhibit results regarding the interaction effects of education, gender, residence, and age respectively, each with the rest of the variables. Several interesting findings deserve attention. For example, in Table 7, the role of the education level of the youth is found to be significantly dependent on marital status and region. Specifically, a primary level educated youth, in comparison to an uneducated one, will have the probability of being unemployed reduce if the youth is married. For a secondary school level youth, however, the probability of being unemployed reduces if the youth is divorced compared to one with no education. The possible intuition is that one struggles to accept any job to survive since one no longer depends on the divorced partner. If a youth falls under the category of post-secondary level and is a widow or married, the probability of being unemployed falls in either case in comparison to one without education. Similarly, being from the Northern region is associated with positive effects of primary education on youth unemployment. This moderating impact is significant at a 5% statistical level.

On the other hand, data shows that in comparison to the youth with no education, the youth with post-secondary education are likely to experience an increase in their unemployment status if they are from the Eastern or Northern regions, though the effect appears much larger for youth in the northern region than for those from the East, albeit weakly significant either way. Perhaps the labor markets in these regions do not attract higher-level skills attained by the youth in the post-secondary category. One could rightly argue that since most of the youth with post-secondary education appear to prefer white-collar jobs, which are not readily available in the rural regions such as the East and Northern regions, most of the youth with such education levels are likely to end up remaining unemployed. By implication, there is little demand for labor with education levels beyond secondary school education in the East and Northern region. It is thus not unimaginable that the differences in the unemployment rates across regions could be because different regions have very different labor markets and

Table 7 Education interactions and youth unemployment

Variables	(1) Coefficient	(2) SE	(3) Odds ratio	(4) SE	(5) Marginal effects	(6) SE
Region: Central (Ref.)						
Eastern	-0.679*	(0.380)	0.507*	(0.193)	-0.053*	(0.029)
Northern	-1.148***	(0.362)	0.317***	(0.115)	-0.081***	(0.025)
Western	-1.453***	(0.408)	0.234***	(0.095)	-0.096***	(0.025)
Residence: Rural (Ref.)						
Urban	0.635*	(0.366)	1.887*	(0.691)	0.042*	(0.024)
Marital status: Single (Ref.)						
Married	1.925***	(0.443)	6.857***	(3.036)	0.130***	(0.033)
Divorced	3.160***	(0.517)	23.567***	(12.193)	0.281***	(0.063)
Widow	4.197***	(1.087)	66.479***	(72.293)	0.450**	(0.184)
Age	0.088***	(0.031)	1.092***	(0.034)	0.006***	(0.002)
Health: Good health (No, Ref.)						
Health	0.098	(0.185)	1.103	(0.204)	0.007	(0.013)
Sex: Female (ref.)						
Male	0.651**	(0.301)	1.918**	(0.578)	0.047**	(0.023)
Education level: No education (Ref.)						
Primary	2.846***	(0.562)	17.214***	(9.681)	0.139***	(0.040)
Secondary	4.063***	(0.872)	58.148***	(50.705)	0.325***	(0.118)
Post-secondary	6.037***	(1.450)	418.458***	(606.877)	0.722***	(0.205)
Age of household head	-0.007	(0.006)	0.993	(0.005)	-0.000	(0.000)
Education of household head:						
No education (Ref.)						
Primary	0.241	(0.239)	1.273	(0.304)	0.016	(0.015)
Secondary	0.204	(0.263)	1.226	(0.323)	0.013	(0.017)
Post-secondary	0.001	(0.297)	1.001	(0.297)	0.000	(0.018)
Marital by headship: Single female head (Ref.)						
Married female head	-0.679	(0.416)	0.507	(0.211)	-0.052	(0.035)
Divorced female head	-0.409	(0.419)	0.664	(0.278)	-0.033	(0.036)
Widow	-0.350	(0.436)	0.705	(0.307)	-0.029	(0.037)
Male head	-0.703*	(0.390)	0.495*	(0.193)	-0.054	(0.034)
Enumeration area dummy	0.005	(0.004)	1.005	(0.004)	0.000	(0.000)
Education interactions						
Primary × Male	0.412	(0.369)	1.510	(0.557)	0.029	(0.028)
Secondary × Male	0.107	(0.364)	1.113	(0.405)	0.007	(0.025)
Post-secondary × Male	-0.333	(0.501)	0.717	(0.359)	-0.020	(0.028)
Primary × Married	-2.113***	(0.487)	0.121***	(0.059)	-0.132***	(0.025)
Secondary × Divorced	-2.465***	(0.469)	0.085***	(0.040)	-0.145***	(0.022)
Post-secondary × Widow	-3.743***	(0.603)	0.024***	(0.014)	-0.176***	(0.020)
Primary × Divorced	-2.239***	(0.668)	0.107***	(0.071)	-0.137***	(0.029)
Post-secondary × Married	-4.427***	(0.998)	0.012***	(0.012)	-0.184***	(0.020)
Education × Health	0.035	(0.225)	1.036	(0.234)	0.002	(0.015)
Primary × Urban	0.234	(0.399)	1.264	(0.504)	0.017	(0.029)
Secondary × Urban	-0.235	(0.400)	0.791	(0.316)	-0.015	(0.025)
Post-secondary × Urban	-0.309	(0.568)	0.734	(0.417)	-0.019	(0.034)
Primary × Eastern	-0.168	(0.482)	0.846	(0.408)	-0.010	(0.028)
Secondary × Northern	-0.042	(0.386)	0.958	(0.370)	-0.003	(0.023)
Post-secondary × Western	0.685	(0.424)	1.983	(0.842)	0.049	(0.032)
Primary × Northern	0.997**	(0.435)	2.710**	(1.180)	0.077**	(0.037)
Post-secondary × Eastern	0.896**	(0.438)	2.449**	(1.072)	0.068*	(0.036)
Post-secondary × Northern	1.441**	(0.658)	4.226**	(2.782)	0.121*	(0.066)
Education × Age	-0.020	(0.020)	0.980	(0.019)	-0.001	(0.001)
Observations	5,805		5,805		5,805	

Note: Weighted observations are used; Strata dummies are included in the regressions; Robust SE in parentheses (Clustered); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Source: Author's calculations. SE, standard errors.

Table 8 Gender interactions and youth unemployment

Variables	(1) Coefficient	(2) SE	(3) Odds ratio	(4) SE	(5) Marginal effects	(6) SE
Region: Central (Ref.)						
Eastern	-0.620***	(0.195)	0.538***	(0.105)	-0.046***	(0.014)
Northern	-0.532***	(0.200)	0.587***	(0.118)	-0.040***	(0.014)
Western	-0.958***	(0.197)	0.384***	(0.076)	-0.065***	(0.013)
Residence: Rural (Ref.)						
Urban	0.606***	(0.152)	1.834***	(0.279)	0.041***	(0.010)
Marital status: Single (Ref.)						
Married	-0.639***	(0.199)	0.528***	(0.105)	-0.042***	(0.013)
Divorced	0.602**	(0.281)	1.825**	(0.513)	0.051**	(0.026)
Widow	0.425	(1.115)	1.529	(1.705)	0.035	(0.098)
Age	0.082***	(0.019)	1.086***	(0.021)	0.006***	(0.001)
Health: Good health (No, Ref.)						
Health	0.140	(0.132)	1.150	(0.152)	0.010	(0.009)
Sex: Female (ref.)						
Male	1.067	(0.664)	2.907	(1.929)	0.080	(0.054)
Education level: No education (Ref.)						
Primary	2.323***	(0.268)	10.207***	(2.740)	0.129***	(0.019)
Secondary	2.800***	(0.264)	16.446***	(4.348)	0.193***	(0.024)
Post-secondary	3.680***	(0.332)	39.652***	(13.161)	0.354***	(0.055)
Age of household head	-0.007	(0.005)	0.993	(0.005)	-0.000	(0.000)
Education of household head: No education (Ref.)						
Primary	0.197	(0.239)	1.218	(0.291)	0.013	(0.015)
Secondary	0.159	(0.265)	1.173	(0.311)	0.011	(0.017)
Post-secondary	-0.157	(0.300)	0.854	(0.257)	-0.010	(0.019)
Marital by headship: Single female head (Ref.)						
Married female head	-0.684*	(0.398)	0.505*	(0.201)	-0.053	(0.034)
Divorced female head	-0.421	(0.403)	0.656	(0.264)	-0.035	(0.035)
Widow	-0.384	(0.414)	0.681	(0.282)	-0.032	(0.036)
Male head	-0.718*	(0.369)	0.488*	(0.180)	-0.056*	(0.033)
Enumeration area dummy	0.004	(0.004)	1.004	(0.004)	0.000	(0.000)
Gender interactions						
Male × Health	-0.173	(0.214)	0.841	(0.180)	-0.011	(0.014)
Male × Primary	0.567	(0.360)	1.762	(0.634)	0.042	(0.029)
Male × Secondary	0.729**	(0.371)	2.072**	(0.770)	0.056*	(0.032)
Male × Post-secondary	0.933*	(0.518)	2.543*	(1.317)	0.075	(0.049)
Male × Married	0.836**	(0.360)	2.307**	(0.830)	0.068**	(0.033)
Male × Divorced	-0.082	(0.721)	0.922	(0.664)	-0.005	(0.047)
Male × Widow	—	—	—	—	—	—
Male × Urban	0.041	(0.235)	1.042	(0.245)	0.003	(0.016)
Male × Eastern	-0.017	(0.321)	0.983	(0.315)	-0.001	(0.021)
Male × Northern	-0.286	(0.310)	0.751	(0.233)	-0.018	(0.018)
Male × Western	0.611**	(0.304)	1.843**	(0.560)	0.047*	(0.025)
Male × Age	-0.047	(0.033)	0.954	(0.031)	-0.003	(0.002)
Observations	5,804		5,804		5,804	

Note: Weighted observations are used; Strata dummies are included in the regressions; Robust SE in parentheses (Clustered); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Source: Author's calculations. SE, standard errors.

Table 9 Residence interactions and youth unemployment

Variables	(1) Coefficient	(2) SE	(3) Odds ratio	(4) SE	(5) Marginal effects	(6) SE
Region: Central (Ref.)						
Eastern	-0.851***	(0.239)	0.427***	(0.102)	-0.062***	(0.017)
Northern	-0.954***	(0.260)	0.385***	(0.100)	-0.068***	(0.017)
Western	-0.761***	(0.226)	0.467***	(0.105)	-0.057***	(0.016)
Residence: Rural (Ref.)						
Urban	-0.304	(0.685)	0.738	(0.505)	-0.021	(0.047)
Marital status: Single (Ref.)						
Married	-0.099	(0.253)	0.906	(0.229)	-0.007	(0.017)
Divorced	1.060***	(0.359)	2.887***	(1.035)	0.091***	(0.035)
Widow	0.818	(1.188)	2.267	(2.692)	0.067	(0.112)
Age	0.033	(0.025)	1.034	(0.026)	0.002	(0.002)
Health: Good health (No, Ref.)						
Health	0.026	(0.172)	1.026	(0.177)	0.002	(0.012)
Sex: Female (ref.)						
Male	1.026***	(0.203)	2.789***	(0.565)	0.076***	(0.016)
Education level: No education (Ref.)						
Primary	2.573***	(0.281)	13.111***	(3.685)	0.137***	(0.021)
Secondary	3.377***	(0.293)	29.278***	(8.584)	0.257***	(0.032)
Post-secondary	4.735***	(0.438)	113.871***	(49.872)	0.540***	(0.079)
Age of household head	-0.007	(0.005)	0.993	(0.005)	-0.000	(0.000)
Education of household head: No education (Ref.)						
Primary	0.211	(0.206)	1.235	(0.254)	0.014	(0.013)
Secondary	0.134	(0.225)	1.143	(0.257)	0.009	(0.015)
Post-secondary	-0.147	(0.260)	0.863	(0.224)	-0.009	(0.016)
Marital by headship: Single female head (Ref.)						
Married female head	-0.689**	(0.328)	0.502**	(0.165)	-0.054*	(0.028)
Divorced female head	-0.372	(0.329)	0.689	(0.227)	-0.031	(0.028)
Widow	-0.375	(0.337)	0.688	(0.232)	-0.031	(0.029)
Male head	-0.696**	(0.302)	0.498**	(0.150)	-0.054**	(0.027)
Enumeration area dummy	0.006*	(0.003)	1.006*	(0.004)	0.000*	(0.000)
Residence interactions						
Urban × Male	-0.410	(0.258)	0.664	(0.172)	-0.026*	(0.015)
Urban × Primary	0.160	(0.362)	1.174	(0.425)	0.011	(0.026)
Urban × Secondary	-0.317	(0.364)	0.728	(0.265)	-0.020	(0.023)
Urban × Post-secondary	-0.893*	(0.515)	0.410*	(0.211)	-0.050**	(0.025)
Urban × Married	-0.650**	(0.291)	0.522**	(0.152)	-0.041**	(0.017)
Urban × Divorced	-0.743	(0.490)	0.475	(0.233)	-0.046*	(0.026)
Urban × Widow	-0.963	(1.730)	0.382	(0.660)	-0.057	(0.078)
Urban × Health	0.082	(0.214)	1.085	(0.233)	0.006	(0.015)
Urban × Eastern	0.387	(0.306)	1.473	(0.451)	0.028	(0.023)
Urban × Northern	0.491	(0.320)	1.634	(0.522)	0.036	(0.025)
Urban × Western	0.174	(0.294)	1.190	(0.349)	0.012	(0.020)
Urban × Age	0.056*	(0.032)	1.057*	(0.033)	0.004*	(0.002)
Observations	5,805		5,805		5,805	

Note: Weighted observations are used; Strata dummies are included in the regressions; Robust SE in parentheses (Clustered); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Source: Author's calculations. SE, standard errors.

Table 10 Age interactions and youth unemployment

Variables	(1) Coefficient	(2) SE	(3) Odds ratio	(4) SE	(5) Marginal effects	(6) SE
Region: Central (Ref.)						
Eastern	-0.197	(0.300)	0.821	(0.246)	-0.012	(0.019)
Northern	0.245	(0.516)	1.278	(0.660)	0.016	(0.034)
Western	0.657	(0.757)	1.929	(1.461)	0.048	(0.056)
Residence: Rural (Ref.)						
Urban	0.434	(0.616)	1.544	(0.950)	0.030	(0.042)
Marital status: Single (Ref.)						
Married	1.387**	(0.555)	4.001**	(2.219)	0.094**	(0.041)
Divorced	4.581***	(1.136)	97.654***	(110.890)	0.554***	(0.180)
Widow	6.515***	(1.933)	675.028***	(1,304.846)	0.815***	(0.162)
Age	0.234***	(0.042)	1.264***	(0.053)	0.016***	(0.003)
Health: Good health (No, Ref.)						
Health	0.218	(0.565)	1.243	(0.702)	0.015	(0.039)
Sex: Female (ref.)						
Male	1.703**	(0.690)	5.492**	(3.787)	0.130**	(0.056)
Education level: No education (Ref.)						
Primary	3.765***	(0.406)	43.185***	(17.524)	0.234***	(0.040)
Secondary	5.656***	(0.804)	286.074***	(230.011)	0.580***	(0.102)
Post-secondary	8.172***	(1.324)	3,541.089***	(4,688.317)	0.904***	(0.054)
Age of household head	-0.007	(0.005)	0.993	(0.005)	-0.000	(0.000)
Education of household head: No education (Ref.)						
Primary	0.237	(0.232)	1.267	(0.294)	0.016	(0.015)
Secondary	0.192	(0.258)	1.211	(0.313)	0.013	(0.017)
Post-secondary	-0.053	(0.292)	0.949	(0.277)	-0.003	(0.018)
Marital by headship: Single female head (Ref.)						
Married female head	-0.608	(0.416)	0.545	(0.226)	-0.048	(0.036)
Divorced female head	-0.333	(0.420)	0.717	(0.301)	-0.028	(0.037)
Widow	-0.393	(0.432)	0.675	(0.291)	-0.032	(0.037)
Male head	-0.703*	(0.390)	0.495*	(0.193)	-0.054	(0.035)
Enumeration area dummy	0.004	(0.004)	1.004	(0.004)	0.000	(0.000)
Age interactions						
Age × Male	-0.041	(0.031)	0.960	(0.030)	-0.003	(0.002)
Age × Education	-0.061***	(0.019)	0.940***	(0.018)	-0.004***	(0.001)
Age × Marriage	-0.082***	(0.023)	0.921***	(0.021)	-0.006***	(0.002)
Age × Urban	0.007	(0.027)	1.007	(0.027)	0.000	(0.002)
Age × Region	-0.019*	(0.011)	0.981*	(0.011)	-0.001*	(0.001)
Age × Health	-0.005	(0.025)	0.995	(0.024)	-0.000	(0.002)
Observations	5,805		5,805		5,805	

Note: Weighted observations are used; Strata dummies are included in the regressions; Robust SE in parentheses (Clustered); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Source: Author's calculations. SE, standard errors.

some have fewer jobs available. This corroborates what is recorded in Merotto (2019) where the author notes that the density of paid (wage) employment increased between 2002 and 2014, but much more in the Kampala, western, and central regions than in the eastern and northern regions.

In Table 8, we provide evidence that the effect of gender on youth unemployment is also indirect via education, marital status, and region. For example, it is observed that compared to the female youth, a male youth in the secondary education category is likely to experience an increase in the probability of being unemployed relative to one with no education. Similarly, a male youth who is married is more likely to witness an increase in the probability of being unemployed compared to an unmarried female. But also, being a male from the Western region increases the likelihood of being unemployed compared to a female youth from the Central region. Furthermore, being a youth from the urban area reduces the probability of being unemployed if one is a male, compared to a youth from a rural residence. Similarly, a youth from the urban residence but with a post-secondary level of education is likely to have a reduced likelihood of being unemployed, just as an urban youth that is married or divorced. However, if the youth is from an urban area in western Uganda, the likelihood of being unemployed increases compared to the rural youth.

4.2.6 Additional findings

From Table 5, we take note of the effects of the demographic factors, viz., marital status and region of the youth as well as the age, education, marital status of the household head, that we included as control variables in our models. For example, while marital status is observed to significantly determine youth unemployment of young females it does not affect male youth in Uganda. The estimated result shows that being a married female youth reduces the probability of being unemployed by 0.034, compared to the unmarried youth, and where the marginal effect at means is highly significant at 1% statistical level. The estimate also shows that in comparison to an unmarried youth, being a divorced female youth increases the probability of being unemployed by 0.051 where the observed coefficient is significant at 5% conventional levels. By implication, married females have more employment opportunities than the divorced ones. This is in agreement with the finding of Verhaeghe et al. (2012) and Zhang and Zhao (2011) who found that married women have a higher LFPR than single women do. Axelrad et al (2018) similarly document that divorced and widowed men are less likely than single men to find a job.

Still notable in Table 5 is the observation that being a youth living under a household headed by a married female significantly reduces the probability of being unemployed compared to the youth living under the household headed by an unmarried female. The associated marginal effect at the means is -0.059 and significant at a 5% statistical level. This is in line with the argument of Neethi (2017) that on average, the married-couple households normally tend to be well-off and with connections or social networks that can assist the unemployed youth get out of the unemployment gap compared to a single female-headed household. On the other hand, an unemployed youth living in a household headed by a male is likely to experience an increase in the probability of being unemployed by 0.063 compared to a youth under an abode headed by an unmarried female. This outcome is significant at a 5% conventional level. Perhaps, this is because the unemployed youth in the household feel more secure under a

male head that could be providing the requirements at home and can afford not to work while they search for a job. The evidence at hand that a female youth living under a household headed by a divorced female or under a male-headed household is likely to have her chances of being unemployed reduced, whereas the opposite appears to be the case for the male youth living in either household, could be an indication that perhaps females are much more favored by either household heads, helping them to get employed faster than males. The explanation for the outcome could however lie elsewhere, and therefore a subject of further study. Nevertheless, relatedly, Moepeng and Tisdell (2008) has previously argued that unemployment is much higher for female heads of household than for male heads.

5 Concluding Remarks

The main objective of the study was to identify and examine the factors which determine youth unemployment in Uganda using UNHS 2016/17. To achieve its objective, the study employed a binomial logistic regression model for analysis. Gender, education, age, and residence are found to play a key direct and indirect role, in addition to the region, and marital status, in youth unemployment in Uganda. The main findings based on a binary logistic regression approach, reveal that education, gender, residence, and age are all critical in driving youth unemployment. The Ugandan youth who has some level of education is more likely to be unemployed compared to one with no education. But the probability of being unemployed varies among the different categories of education, with youth that attended post-secondary education being associated with the highest probability followed by those with secondary school education and finally by primary education. While an increase in age appears to increase youth unemployment, married youth have less chances of being unemployed as compared to unmarried. Moreover, as the probability of being unemployed reduces for the married youth, being divorced increases that probability. Similarly, the male youth are more likely to be unemployed than their female counterparts. Additionally, the urban youth increased their chances of unemployment compared to the rural ones. The study also shows that males are far more likely to remain unemployed relative to females. Finally, living in the northern, eastern, or western region as a youth is less risky in terms of unemployment compared to living in the central region. On the other hand, whereas the education level of the household head is not important for youth unemployment, the marital status and gender of the household head are critical. The indirect effects of education, gender, residence, and age are clearly notable. Data has similarly presented evidence that a female youth living under a household headed by a divorced female or under a male-headed household is likely to have her chances of being unemployed reduced. The opposite however appears to be the case for the male youth living in either household.

In light of these findings, attention should be focused on improving the education that the youth receive especially via designing a youth-employable oriented curriculum. The current curriculum especially in post-secondary education, along with secondary and primary level education, should be improved to match the employment needs of the labor market. In essence, job creation should also be prioritized. The Special Presidential Initiative on skilling the youth program across the country is a venture in the right direction and needs to be extended to all youth categories both within and outside the school to increase their chances

of being employed. Additionally, in the modern era, the rural-urban migration may not be overturned but government programs such as YLF and Operation Wealth Creation should be channeled toward the urban youths without sidelining the rural areas. But also, an adoption of affirmative action measures that are oriented toward females but without sidelining the males would go a long way in improving their employability in the labor market. We advocate for an increase in the availability of initial working capital to engage youth at the early stages of their age to operate their own businesses since it is found that as the youth's age increases, they are more likely to fail and fall into the unemployment net. Also, since the married youth have less chances of being unemployed as compared to the divorced ones, we encourage an extension of the counseling services to the families to reduce the divorce rate. Finally, developing different regions to remove regional disparities need further attention to reap the advantages of reduced probabilities of youth unemployment observed in our data, particularly for the eastern, northern, and western regions, compared to the central region. We propagate for a balanced regional development since a region is a very critical factor of youth unemployment.

In conclusion, it should be pointed out that we limited ourselves to youth unemployment in Uganda. The question regarding youth employability however would be much related to our topic but requires a separate study. Moreover, as the issue appears to be paramount on the policy agenda of many nations, future research could venture into examining the common elements of the challenge for the East African Community, since one of the benefits of integration is the provision of jobs, and the youth cannot be left out of the equation. For an integrated policy framework, therefore, empirical work in this area would yield an evidence-based source of information required to improve the labor market environment in the region. Also, youth unemployment would likely be driven by institutional quality within countries such as corruption. Once data becomes available, this would indeed be another interesting area. Finally, the issue of discrimination appears a plausible explanation to gender disparities in youth unemployment, yet outside the current study scope, and therefore in need of further research.

Declarations

Availability of data and material

Restrictions apply to the availability of the data used under license from the UBOS for this study. Data are available from the authors upon reasonable request and with the permission of UBOS only.

Competing interests

The authors declare that they have no competing interests.

Funding

Not applicable

Authors' contributions

AE initiated the problem, performed some literature review, analyzed and interpreted the data. JBN reorganized the article, performed a thorough review of literature, reanalyzed the data to include interactions, analyzed and discussed the findings, and, came up with the final document for publication. JM reviewed the entire paper. All authors read and approved the final manuscript.

Acknowledgements

The authors acknowledge comments received from the School of Economics, Makerere University that helped shape the final version as it is now. Our acknowledgments also go to anonymous reviewers from the IZA Journal of Labor Policy.

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