EXPLORING YOUTH UNEMPLOYMENT IN MOROCCO: EVIDENCE FROM MICRO-LEVEL DATA

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This paper explores youth unemployment in Morocco using the Labor Force Survey of the 2019 data to estimate a logit model. The paper provides the evidence for the three categories of possible determinants of youth unemployment in Morocco. The first set of determinants are the geographic and sociodemographic characteristics such the sex, age, the marital status and the area of residence. Secondly, the socioeconomic factors such as the young people's family background and the number of workers per household play a decisive role in explaining youth unemployment in Morocco. Thirdly and finally, the results obtained in this study show that (regardless of their diplomas) young graduates are more likely to be unemployed than persons without a diploma. However, the influence a diploma type has on the probability of being unemployed varies according to the diploma type. The results obtained shed a light on the important characteristics of youth unemployment in Morocco and should serve as a guide for future research in more specific knowledge gaps.

Keywords: labor market, youth unemployment, graduate unemployment, qualified labor, logit model

INTRODUCTION

Unemployment in Morocco is a special phenomenon. It disproportionately affects the most important part of the workforce - the youngest, the most qualified, and the most expensive to train and replace. According to the High Commission for Planning (HCP), the unemployment rate in Morocco reached 11.4% in 2022. Furthermore, while the overall unemployment rate is high, the decomposition of unemployment by the age group paints a grimmer picture. In fact, the unemployment rate reached 18.4% for the individuals aged 25 to 34, and 31.7% for those between 15 and 24 years of age. Other discrepancies can be observed between the unemployment of males (9.5%) and females (17.8%), rural unemployment (5.2%) and urban unemployment (15%), and unemployment between graduates (17.7%) and nongraduates (4.1%). These differences could result from multiple factors such as the sex or age-based discrimination, a

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mismatch between graduates' skills and employers' needs, or discrepancies between job opportunities in rural/urban areas. These observed trends could reflect the impact of individual characteristics on unemployment. Because of the ecological fallacy, however, any inference about the causal relationship between these characteristics and the probability of being unemployed should use an appropriate research design.

While youth entrepreneurship can be a solution to youth unemployment, an inadequate business environment, financial constraints, and excessive taxation yet remain barriers to self-employment by the young in developing countries (Bogetić, Đorđević & Ćoćkalo, 2011). Designing policies to reduce youth unemployment is necessary to limit its adverse effects on developing countries' human resource allocation (Njifen, 2015). Doing so requires a deeper understanding of the individual characteristics related to youth unemployment (Tasci & Tansel, 2005).

Much of the previous analysis of youth employment in Morocco used aggregate data. While this may yield valuable insights, it neglects much of the individual characteristics of the young and unemployed. Thus, this paper aims to examine the individual characteristics of young workers and their impact on the probability of being employed. While the analysis carried out in this paper is exploratory, the objective is to shed light on the vulnerabilities of young Moroccan workers to guide future research in more specific knowledge gaps.

Light is particularly shed on the significance of Moroccan young workers' geographic, sociodemographic and socioeconomic, and educational characteristics and how they influence the probability of being employed. A binary logistic model is used in the paper to analyze the micro-level data sourced from the Labor Force Survey of 2019.

The rest of the paper is divided into four sections. The first section discusses the theoretical and empirical literature. The second section describes the data and the empirical methodology. In the third section, the research results are presented, whereas in the final section, conclusions are drawn together with the implications of the research results.

LITERATURE REVIEW

The determinants of unemployment are a highly discussed issue in the literature. However, youth unemployment is a special dimension of the issue that requires a special lens of analysis. The reviewed studies on the psychological impact of youth unemployment by A. Furnham (1985) point out the fact that unemployment causes stress, self-esteem deterioration, and change in young people's expectations for their access to the labor market. Also, the determinants of youth unemployment are multidimensional and include demographic factors, changes in the economic environment, including the labor market, as well as the factors related to education, work experience, and training (Furnham, 1985).

In this section, some theoretical and empirical literature on the determinants of youth unemployment is discussed from the microeconomic perspective of rational economic agents in accordance with the scope of the empirical analysis made.

Youth unemployment: A theoretical overview

A prominent explanation of youth unemployment hinges on the rational choices of workers. Under perfect market conditions, many labor market models consider unemployment as a voluntary decision made by rational individuals refusing to work by determining the optimal combination between work and leisure (Chadi, 2010). In an extension of the seminal critique of perfect rationality in G. J. Stigler (1961), the application of search theory to the labor market indicates the existence of the informational asymmetries that increase the cost of job search and, consequently, reservation wages (Stigler, 1962). Reservation wages are directly affected by a worker's level of education and qualification, i.e. the more skilled the worker, the higher his/her reservation wage. In this context, youth unemployment can be explained by economic agents' rational voluntary choices. In other words, the decision to participate in the labor market is a result of the trade-off

between continuing job seeking and the available job opportunities in the market. Individuals can either accept or refuse the market's real equilibrium wage based on the opportunity cost of each option. Consequently, higher reservation wages make young, educated individuals more inclined to decide to stay unemployed.

Following the same analytical framework, J. R. Harris and M. P. Todaro (1970) divide the labor market into two sectors: the formal sector, offering high wages with very limited job opportunities, and the informal sector, offering unlimited job opportunities with lower wages. Within this framework, the unemployed choose to voluntarily stay unemployed, seeking the opportunity to improve their economic situation rather than taking available low-paying jobs in the informal sector. According to B. Boudarbat (2006), the same logic could be applied to the duality between the public and the private sectors. Accordingly, because of higher reservation wages or discrepancies between jobs in the formal/informal and public/private sectors, young people may voluntarily prefer unemployment to inadequate employment.

While the first group of theoretical explanations focus on young workers' internal decision-making process, another set of theoretical works put a greater emphasis on the external factors explaining youth unemployment. According to these studies, the existence of spatial and skill disparities may play an important role in wage setting and unemployment. For instance, D. Houston (2005) argues that the presence of skills and spatial mismatches often explains imbalances in the distribution of jobs between regions, which would subsequently be the origin of unemployment. J. R. Harris and M. P. Todaro (1970) explain the high urban unemployment rate in developing countries by a large wage gap between jobs in urban versus rural areas, which encourages the migration towards urban areas or international markets. Faced with this situation, young individuals can either make a voluntary decision to remain unemployed, accept overeducation in the local market, or move towards regions with better opportunities for skilled labor. However, various constraints associated with the third option, such as the high monetary costs

of job search and moving out and the inflexibility of the situation of young married women, force young skilled workers either to remain unemployed or to accept overeducation and the underutilization of their skills in local markets (Njifen, 2015). According to these explanations, youth unemployment can be explained by the disproportionate effect of mobility costs on workers at the start of their careers.

The relevance of human capital theory to the labor market analysis has attracted researchers' attention in recent decades (Petrović, 2010). Hence, a lack of investment in human capital remains one of the most discussed determinants of youth employment. According to the proponents of human capital theory (Becker, 1962; Mincer, 1975), discrepancies between education and employers' needs are the important determinants of youth unemployment. For instance, J. Mincer (1975) examined the effects of education on the income derived from employment. According to Mincer, education is considered as an investment in an inventory of "skills" or a formation of "human capital". The acquisition of a stock of knowledge and skills through formal education allows the improvement of workers' productivity that is likely to be put to use in employment. Therefore, pursuing formal education makes workers more productive and more efficient in the labor market. G. S. Becker (1962) argues that a lack of investment in one component or in more components of human capital may reduce youth employability and lead to unemployment. Becker distinguishes between the three components of human capital: general theoretical knowledge industry/company-specific training and the state of health required to mobilize both. However, these components, especially the first two, are not substitutable and failures in the acquisition and maintenance of one component or more components are the origin of unemployment.

In the same vein, L. Mauro and G. Carmeci (2003) argue that young graduates' lack of professional experience is the main determinant of youth unemployment. Young graduates must acquire firm and industry-specific knowledge through on-the-job activities so that educated human capital can become productive, which reduces the productivity of the

untrained. Thus, hiring the practices that place more emphasis on professional experience contributes to the unemployment of educated youth. A vicious cycle is thus created in the segments of employment where having on-the-job training requires employment for young workers looking for their first job (Njifen, 2015). Therefore, according to human capital theory, youth unemployment arises because of the underinvestment of young workers in one component or in more components of human capital.

In conclusion, it is unlikely that youth unemployment is the result of one single factor. Several theoretical explanations can simultaneously be correct. Ultimately, unemployment is a dynamic, complex, and multidimensional economic phenomenon. An empirical examination of the characteristics of youth unemployment is then necessary to draw relevant conclusions.

A review of the empirical literature

A significant body of empirical literature has examined the determinant of youth unemployment from a microeconomic perspective. These studies have confirmed the role played by age, the sex, geography, and education in determining labor market outcomes. The review the empirical literature presented herein starts by examining some examples of international studies before focusing the attention on the Moroccan case.

H. M. Tasci and A. Tansel (2005) analyzed the determinants of the transition of Turkish workers between different states of the labor market. The first phase of the study consists of the calculation of the probabilities of transition between the labor market states. The second phase consists of the estimation of multinomial logistic models in order to investigate the determinants of the transition of men and women between different states of the labor market. The results show that women in urban areas are more likely to be unemployed. Furthermore, single individuals are more likely to be unemployed. Finally, the probability of losing the job decreases for older and more educated individuals.

G. B. N. Njikam, R. Marc and L. Tchoffo (2005) also analyze the characteristics of youth unemployment in Cameroon using two econometric models. The first analyzes the gains of the labor market participation for young people. The second is based on the multinomial logistic model of labor market participation that distinguishes between young people and adults. The authors conclude that having a higher degree does not boost one's chances of finding a job. Young graduates have high reservation wages. Therefore, they try to make their degree worthwhile by seeking secured jobs. The results also confirm the fact that young women are faced with discrimination in terms of the salary and the responsibilities entrusted to them. Later, I. Njifen (2015) use the decomposition techniques of Blinder and Oaxaca to analyze the characteristics of youth unemployment in Cameroon and the gap in this unemployment according to the gender and a diploma. The findings reveal the presence of gender discrimination in hiring, as well as the explanatory role of education and the area of residence in the worsening of youth unemployment.

The youth unemployment issue has always attracted the attention of researchers in Morocco. In particular, M. Bougroum, A. Ibourk and A. Trachen (2002), N. El Aoufi and M. Bensaïd (2005), B. Boudarbat (2006), J. Ait Soudane, S. Sohli and M. Chiadmi (2020), F. Berahou and A. Abdouni (2021), Y. Idhadj and K. Louizi (2021) analyzed the Moroccan labor market so as to study the determinants of the unemployment of a significant part of the labor force in Morocco from a microeconomic perspective. For example, B. Boudarbat (2006) analyzed the evolution of employment and the wage situation in Morocco using the micro-data from the Labor Force Survey of 1998 in order to show that young graduates prefer stable and well-paid work and, therefore, "voluntarily" risk long periods of unemployment. The results show that while job opportunities and wages have improved for unskilled workers, there is still a significant and gradual decrease in returns to education. Furthermore, N. El Aoufi and M. Bensaïd (2005) examined the unemployment of young graduates based on the population census data of 2004. The authors addressed the different components of the labor market, learning outcomes, the education

and training system, and its relevance to the labor market requirements. They suggested that the prevalence of youth unemployment was linked to a multitude of factors, namely, demographic factors, the imbalance between labor supply and demand, the effects of economic policies, and the orientations of the development model adopted in Morocco after independence. Furthermore, J. Schonholzer (2008) explored the factors that affect access to employment among young vocational training graduates in Morocco. Using a simple logistic model, the author concluded that the gender, certain traits of the father, some types of diplomas, specific sectors of the economic activity, and graduation from public institutions significantly improve the probability of accessing a job. Finally, M. Bougroum *et al* (2002) used a multinomial logistic model to analyze the role of certain key characteristics (diploma characteristics, age, the gender, income, the household size and the situation of a young person inside the household) in the determination of young graduates' access paths to the labor market. The authors emphasize the fact that there is no theoretical framework that holistically encapsulates the phenomenon of graduate unemployment which public decision-makers could base their policies on.

More recently, J. Ait Soudane *et al* (2020) analyzed the role of soft skills and both human and social capital in explaining the difficulties encountered by young graduates in gaining access to employment in Morocco. Using a probit model, the authors showed that the study level and field play a determining role in explaining young graduates' employment. The results also show that relational skills are the selection filters most used by employers. In addition, F. Berahou and A. Abdouni (2021) shed light on the career paths of 1621 university graduates of the class 2009 over the first three years after graduation using the optimal matching classification algorithm to determine the different career paths of the individuals and revealed the existence of six distinct career paths. The authors then estimated a multinomial logit model to analyze the impact of the different factors influencing the probability of belonging to a typical career path. The results confirm the existence of the gender discrimination and the influence of the family

characteristics such as the level of parental education. Finally, they show that the impact of the diploma type on access to employment. In particular, the results show that holders of bachelor's degrees are the segment of the sample which is the most vulnerable to unemployment. Also, Y. Idhadj and K. Louizi (2021) explored the time needed to escape unemployment and the factors likely to lengthen it, based on the data collected from 468 graduates sourced from a retrospective study of the young people who had benefited from the integration contracts between 2015 and 2019. The results of the estimates from the Kaplan-Meier survival model show that the higher the education level, the greater the risk of lengthening the duration of unemployment. Finally, they show that a significant part of the variance in the duration of the graduates' unemployment is essentially due to their job search methods.

DATA AND METHODOLOGY

To do empirical research, the literature review was used to formulate the following hypotheses about the determinants of youth unemployment in Morocco:

H1: Women are more likely to be unemployed than men.

H2: In older individuals, there is a lower probability of being unemployed.

H3: Living in an urban area increases the probability of being unemployed.

H4: Being married decreases the probability of being unemployed.

H5: A higher level of education increases the probability of being unemployed.

H6: A higher level of parental education reduces the probability of being unemployed.

H7: Individuals living with a greater number of employed workers in their household are less likely to be unemployed.

To test these hypotheses, a binary logistic regression model is used to predict the probability of being unemployed for a young person.

Econometric methodology

A binary logistic regression model (also known as a binary logit model) is a predictive model that can be used to predict the probability of a certain binary outcome (Wilson & Lorenz, 2015). For an overview of the logit model, see D. W. Hosmer and S. Lemeshow (1991).

The general equation of a logit model can be expressed as follows:

$$Y = \log\left(\frac{p_1}{1-p_1}\right) = \beta_0 + \beta_1 X_1 + ... + \beta_k X_k \qquad (1)$$

where p_1 is the probability of the occurrence of the event Y outcome given a set of explanatory variables X_1 to X_k and their estimated coefficients β_i ($i = 0$ to k). The estimation of the coefficients of the explanatory variables is based on their ability to predict the event so that the predictions of the outcome Y are as close as possible to the observed values. The probability p_1 of the occurrence of an event ($Y = 1$) varies according to the values of the explanatory variables according to the following logistic function:

$$P(Y = 1 \mid X) = \frac{e^{(\beta_0 + \beta_1 X_1 + ... + \beta_k X_k + \varepsilon)}}{1 + e^{(\beta_0 + \beta_1 X_1 + ... + \beta_k X_k + \varepsilon)}} \qquad (2)$$

The logistic model predicts a probability ranging between 0 and 1 for each individual. If this probability is close to 1, the occurrence of the event to be predicted (namely, being unemployed, for the purpose of this study) is more probable, and if this probability is close to 0, the occurrence of the event is unlikely. Logistic regression aims to find a specification (a group of explanatory variables) that improves the predictivity of the model compared to the initial basic model (the model without explanatory variables, often called "step 0").

How well the logit model fits in is determined by the four main statistics: the -2log likelihood statistic (-2LL) that illustrates the difference between the base model (step 0) and the estimated model (with the explanatory variables), the pseudo-R-squared statistics (Cox & Snell, 1989; Nagelkerke, 1991), representing the estimate of the variance explained by the model, and the Pseudo-R2 (McFadden, 1974) used as the estimate of the explained variability of the model.

$$R^2_{\text{McFadden}} = \frac{-2LL_{base} - (-2LL_{model})}{-2LL_{base}} \qquad (3)$$

The fitted model is then interpreted using odds ratios. An odds ratio is the odds of the occurrence of the outcome event $Y = 1$ after one unit change in the predictor divided by the original odds that the event happens. To obtain the odds ratio (OR) in the case of a categorical variable, the reference category must be defined, and ORs will then be defined in opposition to this reference situation. The choice of a reference modality is important for interpretation as it cannot be dissociated from the qualitative analysis of the results. If the variable X has n modalities, (n-1) odds ratios will be calculated as follows:

$$Odds - ratio(ni) = \frac{Odds_{mi}}{Odds_{mr}} \qquad (4)$$

with m_i being the modality i of the variable and m_r being its reference modality.

Data

This study is based on a representative sample sourced from the National Employment Survey (NES) of 2019. NES is an annual survey conducted by the HCP and aims to provide information about the situation and evolution of the labor force in Morocco. Access to the survey's database is very restricted and limited to a controlled environment due to data confidentiality and other privacy concerns. The dataset made available to the authors[1] in its raw state contains 15 variables and more than 142,000 individuals. However, to obtain relevant data for the research question, the dataset was further processed using two filters. First, in order to limit the data to young people, only the individuals between 15 and

29 years of age were selected. Second, the individuals not seeking employment were excluded as we were mainly interested in the determinants of youth unemployment, not in their access to the labor market. The final dataset consists of 25,589 individuals, which represents 18% of the initial dataset.

Model specification

The outcome variable is the labor market states of young people, which is the binary variable that takes 0 if the individual is unemployed, and 1 if the individual is employed. The choice of the explanatory variables is based on intuition and the review of the empirical literature. All the variables and their modalities are summarized in Table 1.

Note: It should be noted that the Moroccan higher education system is in line with the French LMD (Bachelor's-Master's-Doctorate) higher education system. There are some slight differences between the French system and the international system. For instance, it has been possible to obtain a bachelor's degree in Morocco in only three years since the 2003 education reform.

The explanatory variables are classified into three categories. The first category contains the explanatory variables that represent the demographic characteristics of the individual and his/her geographical environment. These variables are the individual's sex, area of residence, marital status, and the age group the individual belongs in. According to hiring discrimination theory, a possible explanation

Table 1 Data description

Variables	Modalities
Labor market states	0: Employed 1: Unemployed
Sex	0: Male 1: Female
Area of residence	0: Rural area 1: Urban area.
Marital status	0: Single 1: Married 2: Others
Age group	0: 15 - 18 years of age 1: 19 - 24 years of age 2: 25 - 29 years of age
The highest degree (1)	0: The individual has no diploma 1: The individual holds a high-school diploma or a lower-level diploma 2: The individual holds a two-year undergraduate degree or a bachelor's degree 3: The individual holds a master's or engineering degree 4: The individual holds a PhD 5: The individual holds a two-year professional diploma
The highest degree obtained by the household head	0: The individual has no diploma 1: The individual holds a high-school diploma or a lower-level diploma 2: The individual holds a two-year undergraduate degree or a bachelor's degree 3: The individual holds a master's or engineering degree 4: The individual holds a PhD 5: The individual holds a two-year professional diploma
The number of employed workers per household	0: No workers 1: One worker 2: Two workers 3: Three workers 4: Four workers, or more

Source: Authors

for young female unemployment could be employers' prejudice against women for irrational reasons. It could also be systemic, historical, or cultural (Aigner & Cain, 1977). In addition, the young people who live in urban areas are less likely to be unemployed compared to those living in rural areas (Harris & Todaro, 1970). Finally, the marital status is also one of the factors that influence the possibility of being unemployed. The fact that a young person is married reduces his/ her chances of being unemployed as newlyweds may find themselves forced to work to support themselves and fulfill their familial obligations (Tasci & Tansel, 2005). Faced with this situation, they are ready to voluntarily accept the jobs that do not correspond to their qualifications. The last variable in this category is the age group the individual belongs in given the fact that older individuals are perceived by employers to have more professional experience. In general, employers prefer recruiting experienced professionals to fresh graduates.

The second category of explanatory variables contains the variables representing the characteristics of the individual's education. The highest diploma obtained by the individual classified by the educational institution type (universities, engineering schools, and professional training institutions) are used as a proxy for this variable. The literature on the impact of higher education on employment is ambiguous. On the one hand, higher education increases workers' skill level and allows them to integrate in a bigger part of the labor market. On the other hand, the higher the worker's education, the lower the job opportunities in the market that meet their reservation wage requirements. In addition, educated workers find themselves to be overqualified in local markets dominated by the jobs that require unskilled labor.

The third category represents a set of socioeconomic factors. These variables allow for the analysis of the individual's familial environment and the impact of the level of education and the financial stability of the household on the chance of being unemployed. The first variable in this group considers parents' education. Educated parents can comparatively offer better financial support for quality education and can also offer their offspring training on job search and networking opportunities. The second variable is a proxy for the financial stability of households.

RESULTS

In this section, the initial model estimation, the specification and validation tests, as well as the final model estimates are presented.

The initial model estimation

Choosing the right logit model given a multitude of the explanatory variables is based on the contribution of each variable to the accuracy of the model's predictions. The modeling process starts with the estimation of the multiple iterations of the initial "step 0" model that only accounts for the constant. The -2LL statistic is computed for each iteration and the iteration that minimizes the -2LL statistic is retained. The consequent steps (i.e. models) are specified using the forward selection method based on the significance of the score statistic. The results of this analysis show that all the explanatory variables have a significant score statistic[2].

The cross-classification analysis of the initial model allows evaluation of the predictive accuracy of the "step 0" model. The analysis shows that the sample contains 19,590 employed and 5,999 unemployed individuals. By classifying all the individuals into those employed (the most frequent event), the "step 0" model correctly classifies 76.6% of the individuals. This value will be used later as the baseline to assess the quality of the model.

The final model selection and validation

As is discussed before, three statistics are used to evaluate the model fit (Table 2). The best model is the one with the highest value of Cox et Shell's and Nagelkerke R-squared and the lowest -2LL statistics. The value obviously rises for each step, and it can be concluded that the final model is the best fit.

Table 2 The model fit statistics

Step	-2LL	Cox et Shell R2	Nagelkerke R2
7	15686.45	0.379	0.571

Source: Authors

Using the McFadden (1974) Pseudo-R-squared statistic, the final model can be said to predict 44% of the variance in the outcome.

Examining the cross-classification tables of each estimated step allows choosing the best step. As is shown before, the "step 0" model correctly classifies 76.6% of the sampled young people. The results[3] of the cross-classification analysis show that the steps 2 to 6 steadily increase the model's accuracy so as to reach 86.5%, which is the highest accuracy. However, the step 7 model is slightly less accurate than the step 6 one (86.4% versus 86.5%, respectively), but the benefit of the added independent variable outweighs the loss of 0.1% of the model accuracy. Finally, to ensure that the model is adjusted well to the data and that it effectively predicts the group which it belongs in, the list of the observations with the standardized residual value greater than 2 is analyzed, simultaneously paying attention to those located within the three standard deviations. A total of 495 of the total of 25,589 young people are found to have the residual values of more than three standard deviations, which represents 2% of the sample.

Results interpretation

Table 3 summarizes the estimation results of the final model. It presents the coefficients associated with each variable, their standard errors, the odds ratios, and the confidence intervals for each odds ratio.

The obtained results confirm all the research hypotheses (H1-H7) set at the beginning of the paper. The analysis of the indicators of the individuals' demographic and sociodemographic characteristics reveals some interesting findings. First, being a woman increases the probability of unemployment. The probability of unemployment for a woman is 1.7 times greater than that of a man. Second,

unemployment in Morocco is an urban phenomenon, that is to say individuals living in rural areas are 37.3% less likely to be unemployed. Third, young single people are more likely to be unemployed. As the results show, being married reduces the probability of being unemployed by 80%. In addition, being widowed or divorced reduces the probability of being unemployed by 71%. Finally, the chance of being unemployed decreases with the individual's year of age. For instance, young people aged 15 to 18 are 3.4 times more likely to be unemployed than those of 25 to 29 years of age. These results are supportive of discrimination theory and show the vulnerability of young single females to unemployment. The greater chance that the married will find employment can be attributed to the effects of familial responsibilities on the reduction of reservation wages.

The results pertaining to the individuals' education and training account for the fact that young graduates are more likely to be unemployed than young people without diplomas. Remarkably, the impact of having a diploma on the probability of being unemployed varies according to the type of the diploma obtained. Compared to the reference category, young people with a high-school degree or a lower-degree diploma stand a 2.2 times as great a chance of being unemployed. However, the chances of individuals holding other types of diplomas are far greater. Notably, the individuals with a two-year undergraduate degree or a bachelor's degree are the most vulnerable segment of educated youth to employment (OR = 7.3). Furthermore, the holders of a master's or engineering degree are better off compared to the holders of a bachelor's degree, but they are still worse off than the young people with a high-school degree. Obtaining a master's or engineering degree significantly increases the probability of being unemployed compared to the reference category (OR = 3.6). In addition, vocational training is still ineffective in reducing unemployment as professional diploma holders are still 4.7 times more likely to be unemployed compared to the reference category, but they are still better off than the holders of the degrees requiring the same number of the years of study (2-3-year undergraduate degrees). Finally, the results reveal that the additional years of education necessary to obtain a PhD degree do

Table 3 The logit regression results

Modalities	β	OR	CI (95%)	
Sex (Ref. = Male)				
Female	0.545*** (-0.046)	1.725	1.576	1.889
Residence (Ref.= Urban)				
Rural	-0.467*** (0.053)	0.627	0.565	0.695
Marital status (Ref. = Single)				
Married	-1.609*** (0.085)	0.2	0.169	0.236
Other	-1.236*** (0.215)	0.29	0.19	0.443
Age group (Ref. = [25-29])				
[15-18]	1.216*** (0.072)	3.372	2.926	3.886
[19-24]	0.749*** (0.046)	2.116	1.934	2.315
The highest degree obtained (Ref. = No diploma)				
A high-school diploma or a lower-level diploma	0.805*** (0.061)	2.236	1.983	2.522
A two-year undergraduate degree or a bachelor's degree	1.989*** (0.09)	7.305	6.126	8.71
A master's or engineering degree	1.287*** (0.139)	3.624	2.762	4.754
PhD	1.529*** (0.467)	4.612	1.845	11.528
A two-year professional diploma	1.541*** (0.083)	4.668	3.968	5.493
The highest degree obtained by the head of the household (Ref. = No diploma)				
A high-school diploma or a lower-level diploma	-0.36*** (0.052)	0.698	0.63	0.773
A two-year undergraduate degree or a bachelor's degree	-0.889*** (0.143)	0.411	0.311	0.544
A master's or engineering degree	-1.099*** (0.209)	0.333	0.221	0.502
PhD	0.155 (0.368)	1.168	0.568	2.402
A two-year professional diploma	-0.651*** (0.123)	0.521	0.41	0.663
The number of employed workers per household (Ref. = Four workers or more)				
No worker	24.969 (897.583)	6.98E+13	0	-
One worker	3.505*** (0.129)	33.281	25.846	42.853
Two workers	1.755*** (0.129)	5.783	4.488	7.451
Three workers	0.752*** (0.14)	2.121	1.614	2.789
Constant	-4.799*** (0.141)	0.008		

Note: *, ** and *** indicate the 10%, 5% and 1% significance levels, respectively.

Source: Authors

not improve the young people's chances of finding a job. The probability of being unemployed for young people with a PhD exceeds that of the young people who have only obtained a master's or engineering degree.

Finally, the results show the influence the socioeconomic factors exert on unemployment. For instance, the risk of becoming unemployed decreases with an increase in the level of the education of the head of the household (in terms of the years of study). Furthermore, the number of active workers in the individual's household influences his/her probability of being unemployed. The results show that the number of active workers in the household considerably reduces the probability of being unemployed as the probability of being unemployed compared to the reference category (4 or more employed workers) ranges from 33.3 times for the young people living in households with only one person employed to 2.1 times for those living in households with three people employed.

CONCLUSION

The characteristics of youth unemployment in Morocco are explored using the micro-level data sourced from the Labor Force Survey of 2019. Based on the literature review, a total of seven hypotheses were set about the determinant of youth unemployment in Morocco. To verify these hypotheses, a logit model was estimated to determine the impact of education and various individual and environmental characteristics on youth unemployment. The results obtained confirm all the research hypotheses (H1-H7) set herein, in particular the sex, age, the area of residence, the marital status, the diploma of the head of the household, and the number of active workers per household, all being the determinants of youth unemployment in Morocco. Among these factors, the sex and age have the most significant influence on the probability of being unemployed. These results can be considered as the evidence of sex- and age-based discrimination and they can be interpreted using the paper by G. S. Becker (1957) who argued

that certain groups were less represented in the labor market because of the recruiters' unwillingness to interact with them as a result of one's personal taste or prejudice, as D. J. Aigner and G. G. Cain (1977) argue. Age-based discrimination could also be interpreted using human capital theory, which implies that younger workers could be less recruited because they had less time to acquire the necessary professional experience. The results support the recent studies by F. Berahou and A. Abdouni (2021) and Y. Idhadj and K. Louizi (2021), but contradict the earlier research done by B. Boudarbat (2006), who found that being a woman did not affect unemployment, suggesting that the female unemployment rate was due to the fact that female workers prioritized their family obligations of labor market participation. This shift could be the result of the changing attitude of women towards employment during the last two decades.

The worker's family background also affects his/her access to the labor market given the fact that better educated parents can offer better professional orientation to their offspring. The number of employed workers in the household could also be correlated with its financial stability and capacity to offset costs associated with job search and mobility, as argued by I. Njifen (2015). These results are in line with the M. Bougroum *et al* (2002) earlier findings. It should be noted that family support, financial or otherwise, is often a factor neglected in the reviewed literature and deserves further analysis in future studies.

In addition, the results show that young graduates (regardless of the diploma they may have) are more likely to be unemployed than young people without diplomas (the reference category). These results are in line with the B. Boudarbat (2006) findings that the level of schooling increases the probability of unemployment, which could be explained by a mismatch between the number of the skilled workers that graduate from higher education institutions and the number of the vacancies that require skilled workers. However, in a fashion similar to J. Ait Soudane *et al* (2020) and F. Berahou and A. Abdouni (2021) findings, the influence of higher education on the probability of being unemployed is shown to vary according to the type of the diploma obtained. These

illustrate the key differences in returns on higher education investment in terms of unemployment. This finding can be explained using human capital theory. The quantitative mismatch between the supply and demand of skilled workers may play the key role in explaining unemployment amongst youth graduates. Furthermore, J. Ait Soudane *et al* (2020) suggest that additional characteristics such as social capital and soft skills are needed to allow graduates to find employment.

Overall, the results obtained in this paper show that youth unemployment can be explained by a multitude of factors. The theories explored in the literature review all play a role in explaining youth unemployment. These results are in line with M. Bougroum *et al* (2002) conclusion that there is no unique theoretical explanation for youth unemployment in Morocco.

The results obtained in this study are not without limitations, either. The scope of the results is mainly limited by the nature of the micro-level data used in this study. For instance, being a cross-sectional dataset, NES does not allow for an analysis of the evolution of non-immutable characteristics over time. In addition, while the logit model provides a great insight into the impact of the worker's characteristics on his/her access to the labor market, on the one hand, it does not answer the question "why", on the other. In other words, the results show young workers' unemployment-relevant characteristics without informing about the reason for such importance.

The analysis made in this paper can be a valuable step point for future research. For instance, it would be interesting to explore the reasons lying behind the observed impact of the types of diplomas on the probability of being unemployed so as to investigate why graduates from some programs are more successful in finding jobs than others. A mixed-methods approach can be valuable in investigating such issues by also gaining an insight into recruiters' perspectives.

ENDNOTES

1 The sample used in this study was obtained as a part of an internship carried out by the first author within the Statistics Department of the HCP.

2 Due to space limitations, these results are not reported, but they are available from the authors upon request.

3 Due to space limitations, these results are not reported, but they are available from the authors upon request.

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