Education and Youth Unemployment in South Africa after COVID-19: Evidence from the General Household Survey (GHS)

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Youth unemployment remains a major challenge in South Africa, and the COVID-19 pandemic has further disrupted education and labour-market transitions. This study investigates how educational attainment influences youth unemployment in the post-COVID period using the nationally representative 2021 General Household Survey. A sample of 3,652 youths was analysed using logit and probit models across three specifications that incorporate education, demographic factors, and household welfare characteristics. The results show that higher education significantly reduces the likelihood of unemployment, with the strongest effects for diploma and degree holders. However, these effects vary across provinces. Youth in Free State, Northwest, and Limpopo experience high unemployment even with higher qualifications, indicating weak regional labour markets. A sensitivity analysis reveals that returns to education are lower in mining-dependent provinces. The study concludes that expanding education alone is insufficient without addressing provincial labour-market constraints.

Keywords: education, youth unemployment, General Household Survey (GHS) data, post COVID-19, South Africa
JEL *Classifications:* J64, I26, J24, R23, J13, O15

Received 2025/11/25 · Revised 2026/03/06 · Accepted 2026/03/30

Published online 2026/06/30 © Author
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Introduction

South Africa has high unemployment, particularly among youth, and the COVID-19 pandemic exacerbated this crisis by disrupting both education and labour markets (Habiyaremye et al. 2022; de Jongh et al.

2024). In the aftermath of the pandemic, the government has expanded several large-scale interventions aimed at supporting young people, including the Presidential Youth Employment Initiative, which has created more than 1.5 million temporary earning and skills-building opportunities, and the renewed National Youth Service, which seeks to provide structured work experience for unemployed youth (Zikhali and Matsiliza 2024). Despite these efforts, youth unemployment remains persistently high, with recent labour force data showing that nearly half of all young people remain jobless, which signifies the failure to attain the sustainable development goal (SDG) 8 of 'attaining full and productive employment and decent work for all' (Mudiriza and de Lannoy 2023, 2). These conditions have intensified debates about whether education is still an effective pathway into employment, particularly for households facing structural and localised labour-market constraints (Mseleku 2024). This context highlights the importance of re-examining the relationship between educational attainment and youth unemployment using detailed household-level data.

Our study investigates the relationship between educational attainment and youth unemployment across South Africa's provinces, utilising logit and probit models to analyse the factors influencing unemployment outcomes. By using household-level survey data collected across nine provinces, we aim to explore how educational qualifications interact with local labour market conditions. In particular, we focus on the intersection of education, regional economic structures, and dominant industry sectors, which provides new insight into how location and sectoral composition influence the returns to education. Theoretically, our study draws on human capital theory which suggests that higher education should lead to better employment opportunities and lower unemployment rates (Becker 1962). However, empirical evidence suggests that the relationship between education/skills and employment is not always straightforward, as contextual factors such as regional economic performance, industry composition, and household-level resources influence the returns to education (Loss et al. 2024; Ebrahim and Pirttilä 2025).

Notably, most previous studies on youth unemployment and education in South Africa have focused on household-level data (Naudé and Serumaga-Zake 2001; Mlatsheni and Rospabé 2002; Lam et al. 2009; Yu 2013; Dagume and Gyekye 2016; Baldry 2016; Mlatsheni and Ranchhod 2017; Mpendulo and Mang'unyi 2018; Habiyaremye et al. 2022; Ntini and Kappo-Abidemi 2025), and yet these studies rely on datasets collected

before COVID-19 or small-scale surveys with limited coverage. Therefore, these datasets cannot capture the post-pandemic labour market realities, including changes in schooling, sectoral shifts in employment, and regional disparities in job opportunities. By using the nationally representative 2021 GHS, our study provides one of the first analyses of youth unemployment in the post-COVID era, allowing for a more accurate assessment of how education influences job prospects in contemporary South Africa.

Our preliminary findings indicate a strong negative association between higher education levels and youth unemployment across most provinces. Youth with post-secondary qualifications are consistently less likely to be unemployed, although the size of this effect varies geographically. Provinces such as Free State, Northwest, and Limpopo show higher youth unemployment rates despite higher education levels, highlighting the importance of local economic conditions and regional structures in shaping labour market outcomes.

Naturally, the results of this study have important implications for policymakers and the South African Department of Education. By clarifying how educational attainment affects youth unemployment at the provincial level, our research informs policies aimed at improving employability, addressing regional disparities, and designing targeted education and workforce development interventions. Moreover, the study provides evidence for assessing the effectiveness of post-pandemic educational and employment initiatives in meeting labour market needs and promoting inclusive economic growth.

The remainder of the paper is structured as follows. The next section presents the literature review of the paper. Section 3 outlines the methodology. Section 4 presents the results and section 5 concludes the study.

Literature Review

Understanding the relationship between education and unemployment has long been central to labour market research, particularly in developing economies where structural constraints shape youth outcomes. The Human Capital Theory of Becker (1962) provides one of the foundational explanations, asserting that investments in education enhance individual productivity and, in turn, improve employment prospects and lifetime earnings. In line with this view, Dagume and Gyekye (2016) show that educational attainment significantly reduces the likelihood of youth unemployment in South Africa, hence reflect-

ing the important role of skills and training in shaping labour market absorption.

However, despite rising educational attainment over the past two decades, South Africa continues to experience some of the highest youth unemployment rates globally. This paradox has led researchers to explore labour market dynamics that go beyond the human capital framework. Labour Queue Theory, initially developed by Thurow (1976), suggests that employers rank job applicants based on educational credentials, often using qualifications as a screening device rather than as a measure of job-relevant competencies. The expansion of higher education has intensified this ranking process, contributing to what some scholars describe as an educational arms race (Büchel and Mertens 2004). In this context, individuals pursue increasingly higher qualifications to maintain competitiveness even when the labour market does not generate sufficient skilled employment opportunities (Markussen et al. 2024).

Signalling Theory provides another perspective by proposing that education functions primarily as an indicator of an individual's trainability and productivity rather than as a direct source of skills (Spence 1973; 2002). However, as more individuals obtain diplomas and degrees, the signalling value becomes diluted. This phenomenon, often referred to as diploma inflation, complicates the relationship between education and employment outcomes (Araki and Kariya 2022). In South Africa, the situation is further complicated by long-standing inequalities. Race, gender and socio-economic background continue to shape hiring processes and access to opportunities (Mseleku 2022a; 2022b).

Notably, a number of empirical studies have examined the effect of education on unemployment in South Africa (see table 1 for a summary). One of the earliest studies was done by Naudé and Serumaga-Zake (2001) using the 1993 SALDRU survey, 1995 StatsSA and their own survey conducted in 1997. The authors find that education significantly improves the likelihood of being employed. Similarly, Mlatsheni and Rospabé (2002) use the 1999 October Household Survey (OHS) and concluded that increased human capital reduces youth unemployment. Also, Lam et al. (2009) use the 1995 to 2005 OHS to show that schooling plays a crucial role in shaping early transitions into the labour force for young people.

Other national studies reinforce these findings. Using labour force surveys from 2008 to 2012, Yu (2013) found that education consistently decreases the probability of unemployment. Conversely, Baldry (2016) identifies demographic and socio-economic characteristics as stronger

predictors of graduate unemployment than academic performance or field of study. Moreover, Mlatsheni and Ranchhod (2017), relying on the National Income Dynamics Survey (NIDS), find that education reduces unemployment, although the quality of schooling plays a major role in determining the extent of this effect.

Some researchers have focused on smaller geographic areas or specific groups and have also reported mixed results. For example, Mpendulo and Mang'unyi (2018) found a positive association between educational attainment and employment in small towns in the Eastern Cape using a cross sectional survey. Ntini and Kappo-Abidemi (2025) found similar results in a rural area of Mpumalanga. In contrast, Habiyaremye et al. (2022) identified no significant relationship between educational achievement and employment for a sample of programme alumni. Time series studies have also produced conflicting results. Falakahla (2018) found no long-run relationship between education and youth unemployment using the autoregressive distributive lag (ARDL) model, while Patel and Choga (2018), using the vector error correction model (VECM), found that education reduces unemployment.

A key observation from this body of literature is that most studies rely on datasets that are now considerably outdated. Many analyses were conducted using early labour force surveys, provincial surveys, or the first waves of the NIDS data. Several other studies used small or localised samples that limit the generalisability of their findings. Most importantly, no study has fully examined the relationship between education and unemployment using nationally representative data from the post-COVID period, despite the major disruptions that the pandemic brought to the labour market.

The present study addresses these gaps by using the 2021 General Household Survey (GHS) collected by Statistics South Africa. This dataset is nationally representative and provides timely insight into youth labour market experiences after the COVID-19 shock. The study is the first to use this specific dataset to examine the relationship between educational attainment and youth unemployment in the post-pandemic environment. By employing logit and probit models, the analysis offers robust and comparative evidence on the determinants of youth unemployment. In doing so, the study contributes new empirical insights into whether education continues to function as an effective pathway into employment in South Africa or whether structural constraints and labour market mismatches have weakened its protective effect.

TABLE 1 Summary of Previous South African Literature

Name	Scope	Methods	Results
Naudé and Serumaga-Zake (2001)	North-west province: 1993 SALDRU survey, 1995 StatsSA, and 1997 own survey	Probit	Education lowers unemployment
Mlatsheni and Rospabé (2002)	South Africa: October household survey (OHS) 1999	Probit	Education improves employment except for secondary education
Lam et al. (2009)	South Africa: October household survey (OHS) 1995, 1999, 2002, 2005	Probit	Grade 10 or 11 insignificant yet grade 12 or higher significant
Yu (2013)	South Africa: 2000 LFS and 2011 QLFS	Probit	Primary, secondary, tertiary have positive effect, with higher levels having stronger effect
Dagume and Gyekye (2016)	Vhembe district Limpopo: 2013 questionnaire (580 youth)	Probit	Insignificant relationship between education and unemployment
Baldry (2016)	South Africa: 1,175 graduates between 2006 and 2012	Probit	Significant positive relationship after 2 or 3 years of graduating but in the 1st year after graduating
Mlatsheni and Ranchhod (2017)	South Africa: NIDS 2008, 2011/12, 2012	OLS	Matric and tertiary increases employment but going to a historically disadvantaged school does not
Mpendulo and Mang'unyi (2018)	Eastern Cape: 120 survey questionnaires	OLS	Education attainment reduces unemployment
Falakahla (2018)	South Africa: 1991–2017	ARDL	No relationship between education and unemployment
Patel and Choga (2018)	South Africa: 2008–2015	VECM	Negative relationship between education and unemployment
Habiyaremye et al. (2022)	South Africa: 324 programme alumni	Probit	Insignificant relationship between education achievement prior to joining skills development programme and employment
Ntini and Kappo-Abidemi (2025)	Mpumalanga: South Africa: 106 participants	Correlation Coefficients	Positive correlation between education qualification level and employment status

Methods

We employ logit and probit models (Aldrich and Nelson 1984) to examine the effect of educational attainment and other socio-economic factors on youth unemployment in South Africa. The dependent variable is binary, taking the value 1 if an individual is unemployed and 0 if employed, which makes nonlinear probability models more appropriate than ordinary least squares. Unlike the linear probability model, logit and probit ensure that predicted probabilities lie between 0 and 1 and account for the nonlinear relationship between the explanatory variables and the probability of unemployment. The logit model allows interpretation in terms of odds ratios, offering clear insights into how explanatory variables influence the likelihood of unemployment, while the probit model provides a robustness check under an alternative distributional assumption. The explanatory variables include education level, province, race, age, gender, type of institution, Internet access, electricity access, and household income.

MODEL SPECIFICATION

Let Y_i represent the employment outcome, where:

$$Y_i = \begin{cases} 1 \textit{ if youth } i \textit{ is unemployed} \\ 0 \textit{ if youth } i \textit{ is employed} \end{cases} \tag{1}$$

and X_i is a vector of explanatory variables capturing educational, demographic, social, and economic characteristics. The general functional form estimated in both logit and probit models is:

$$P(Yi = 1 \mid Xi) = F(X_i'\beta), \tag{2}$$

where $F(.)$ is a cumulative distribution function and β is a vector of estimated coefficients. The overall functional relationship for the latent variable is given by:

$$Y_i^* = X_i' b + e_i$$

with:

$$Y_i = \begin{cases} Y_i^* > 0 \\ Y_i^* £ 0. \end{cases} \tag{3}$$

The study estimates the following three structured specifications:
Model 1: focuses on educational characteristics:

$$Y_i = \beta_0 + \beta_1(\textit{education level}) + \beta_2(\textit{institution type}) + e_i \tag{4}$$

Model 2: adds demographic and regional characteristics:

$$\begin{aligned} Y_i^* = {} & \beta_0 + \beta_1(\textit{education level}) + \beta_2(\textit{institution type}) \\ & + \beta_3(\textit{province}) + \beta_4(\textit{race}) + \beta_5(\textit{age}) + \beta_6(\textit{gender}) \\ & + e_i \end{aligned} \tag{5}$$

Model 3: adds household and welfare factors:

$$\begin{aligned} Y_i^* = {} & \beta_0 + \beta_1(\textit{education level}) + \beta_2(\textit{institution type}) \\ & + \beta_3(\textit{province}) + \beta_4(\textit{race}) + \beta_5(\textit{age}) + \beta_6(\textit{gender}) \\ & + \beta 7(\text{int}\textit{ernet access}) + \beta_8(\textit{electricity access}) \end{aligned} \tag{6}$$

LOGIT MODEL

The logit model uses the logistic cumulative distribution function to translate the probability of unemployment into the odds that an individual is unemployed versus employed. The logistic function is given as:

$$P(Y_i = 1) - \frac{e^{X_i b}}{1 + e^{X_i b}} \tag{7}$$

where the odds of unemployment are expressed as:

$$\frac{P_i}{1 - P_i} \tag{8}$$

The logit transformation, which is the natural logarithm of the odds, is specified as:

$$Logit(P_i) = In\left(\frac{P_i}{1 - P_i}\right) = X_i b \tag{9}$$

The logit is linear in both the explanatory variables and the parameters. As the probability changes from 0 to 1, the logit ranges from $-\infty$ to $+\infty$. A positive coefficient indicates that an increase in the corresponding variable raises the log-odds and therefore the probability of being unemployed, while a negative coefficient indicates the opposite. Logistic

regression also allows for the interpretation of effects through odds ratios, which describe how the likelihood of unemployment changes relative to reference categories.

PROBIT MODEL

The study also estimates a probit model, which assumes that the probability of unemployment follows a standard normal cumulative distribution function. The probit model is expressed as:

$$P(Y_i = 1) = f(X_i' b), \tag{4}$$

where ϕ is the standard normal cumulative distribution function. The probit model is appropriate when the underlying tendency toward unemployment is assumed to follow a normal distribution and serves as an alternative specification to assess the robustness of the logit results.

Data and Results

DATA SOURCE

Our analysis draws on cross-sectional microdata from the 2021 General Household Survey (GHS) collected by Statistics South Africa (Stats SA). The GHS is an annual household survey designed to measure a wide range of living conditions and socio-economic indicators, including education, access to services, household income, and labour market participation (Omotayo et al. 2019). This makes the dataset particularly suitable for examining patterns of youth unemployment and its association with educational attainment across South Africa's diverse population groups and provinces (Jackson and Yu 2023).

The GHS has been conducted annually since 2002 and provides a nationally representative snapshot of households through a multi-stage stratified sampling design. Over time, the survey has undergone refinements in questionnaire structure, sampling methodology and the classification of key labour market indicators, which are documented in Stats SA's metadata and technical reports (Fransman and Yu 2019). The 2021 wave is collected under the post-2015 survey redesign, which standardised several core modules, including education and labour market variables, thereby ensuring comparability with recent waves.

For the purposes of this study, we restrict the sample to individuals aged 15 to 34 years, aligning with South Africa's official definition of youth. The publicly accessible microdata were obtained from the Da-

taFirst repository, which disseminates harmonised versions of Stats SA datasets for research use. The 2021 GHS offers consistent and detailed information on educational attainment, type of educational institution, household characteristics and access to basic services, allowing us to construct the variables required for the econometric analysis with minimal issues of discontinuity or missing information.

The use of the 2021 dataset also ensures that the definition of unemployment corresponds to the most recent official standards applied by Stats SA, which distinguish between labour force participation, active job search behaviour, and availability for work. Furthermore, the harmonised structure of the 2021 GHS facilitates integration with other recent survey waves should future extensions of the analysis be pursued.

DESCRIPTIVE ANALYSIS

Table 2 presents a summary of the demographic, educational and socio-economic characteristics of youth aged 15 to 34 years included in the study. The total sample consists of 1,524 respondents, of whom only 61.55% were employed, while an overwhelming 38.45% reported being unemployed. The extremely high unemployment share in the sample reflects the broader crisis of youth joblessness in South Africa, where young individuals continue to struggle to secure stable employment opportunities in both the formal and informal sectors.

The distribution of education levels reveals that the majority of youth have relatively low levels of formal attainment. Approximately 43.50% have not completed Grade 12, indicating that most young people remain outside the threshold typically required for labour market entry or skills-intensive occupations. A further 40.94% have completed matric, while only very small proportions hold post-school qualifications. Higher national certificates, diplomas and undergraduate degrees account for less than 15% collectively, and postgraduate qualifications are represented by only a handful of respondents. These patterns reflect persistent structural barriers in the education system, where many youths remain unable to access or complete higher education, ultimately contributing to their vulnerability in the labour market.

Provincial representation shows a broad geographic spread across South Africa. Gauteng records the largest share of youth in the sample (26.44%), followed by KwaZulu-Natal (18.57%), Mpumalanga (11.68%), and Limpopo (10.63%). The Eastern Cape accounts for 9.71% of the sample, while the Western Cape represents 8.33%. Smaller provinces such as

the Free State (5.25%), Northwest (4.79%), and Northern Cape (4.59%) make up comparatively smaller shares of the sample. The distribution highlights provincial disparities in access to educational and employment opportunities, which may influence youth labour market outcomes.

Gender distribution is almost perfectly balanced, with males making up 56.36% and females 43.64% of the sample. Age distribution is skewed toward older youth within the sample, with 46.33% aged 30–34 years and 36.35% aged 25–29 years. Youth aged 20–24 represent 15.35%, while only a very small proportion (1.94%) fall within the 15–19 age bracket. This indicates that a large proportion of the sample consists of young individuals who may not yet have completed schooling or fully transitioned into the labour market, which can partly explain the high unemployment levels observed.

With respect to racial composition, the majority of the sample (90.68%) identify as Black African, reflecting the demographic structure of South Africa's youth population and the persistent historical inequalities that shape socio-economic outcomes. Coloured youth represent 5.38% of the sample, followed by White (2.95%) and Indian/Asian youth (0.98%).

The data also provide insight into the type of educational institutions attended. An overwhelming 98.03% of youth reported attending public institutions, while only 1.97% attended private institutions. This reflects the strong reliance on the public education system and suggests limited access to private schooling due to cost, geographic availability or other barriers.

Access to basic services remains uneven. Internet access is particularly limited, with only 4.92% of respondents reporting any form of internet connectivity, while 95.08% have no access. In a context where digital skills and online resources are increasingly critical for education, job searching and participation in the modern economy, this lack of connectivity represents a major constraint for youth. In contrast, access to electricity is relatively widespread, with 93.31% of respondents residing in households that have electricity, although a small share (6.69%) still live in energy-deprived conditions.

EMPIRICAL RESULTS

Table 3 reports the findings from both logit and probit models. The results show a clear and consistent pattern across all three models. In Model 1, which focuses only on education, higher levels of schooling strongly reduce the chances of being unemployed. Matric, higher certificates,

TABLE 2 Descriptive Profile of Youth Respondents (age 15–34) from the 2021 GHS

Categories	Variables	*F*	%
Employed/unemployment	Youth employed	938	61.55
	Youth unemployment	586	38.45
Education level	No schooling/Less than Grade 12 (1)	663	43.50
	Matric (2)	624	40.94
	Higher national certificate (3)	72	4.72
	Diploma (4)	76	4.99
	Undergraduate degree/Higher diploma (5)	72	4.72
	Honours/ Post graduate diploma (6)	12	0.79
	M-Tech and masters (7)	5	0.33
Province	Western Cape (1)	127	8.33
	Eastern Cape (2)	148	9.71
	Northern Cape (3)	70	4.59
	Free State (4)	80	5.25
	KwaZulu-Natal (5)	283	18.57
	Northwest (6)	73	4.79
	Gauteng (7)	403	26.44
	Mpumalanga (8)	178	11.68
	Limpopo (9)	162	10.63
Gender	Male (0)	859	56.36
	Female (1)	665	43.64
Age	15–19 years (1)	30	1.94
	20–24 years (2)	234	15.35
	25–29 years (3)	554	36.35
	30–34 years (4)	706	46.33
Race	Black/African (1)	1,382	90.68
	Coloured (2)	82	5.38
	Indian/Asian (3)	15	0.98
	White (4)	45	2.95
Type of institutions	Public institution (0)	1,494	98.03
	Private institution (1)	30	1.97
Access to internet	Internet access (0)	75	4.92
	No Internet access (1)	1,449	95.08
Access to electricity	Access to electricity (0)	1,442	93.31
	No access to electricity (1)	102	6.69

diplomas, undergraduate degrees, honours/postgraduate diplomas, and M-Tech/Master's qualifications all show large and significant negative effects. These results support human capital theory (Becker 1962) and match earlier South African findings such as Naudé and Serumaga-Zake (2001), Mlatsheni and Rospabé (2002), Yu (2013), and Patel and Choga

(2018). As education increases, the probability of unemployment falls, with the largest gains found at diploma level and above. Type of institution has no clear effect, suggesting employers place more weight on education level than on the institution attended. However, it should be noted that some of the higher education categories, particularly postgraduate qualifications, contain relatively small numbers of observations in the sample. Consequently, the coefficients for these categories should be interpreted cautiously as they may reflect limited observations rather than stable population relationships.

Model 2 adds demographic and regional factors. After including these variables, some education coefficients shrink, especially for matric and higher certificates, showing that demographic and regional disadvantages reduce the value of lower and mid-level qualifications. Diplomas and higher levels remain strongly significant, confirming that higher education is increasingly required to compete in the labour market (Baldry 2016; Mlatsheni and Ranchhod 2017).

Significant regional differences appear. Compared with Western Cape, youth in Free State, North West, Limpopo, and KwaZulu-Natal face higher unemployment risks. These patterns highlight the influence of local labour market conditions and regional economic structures on employment opportunities for young people. Race also emerges as an important factor in the models. The estimates suggest that White youth experience a lower probability of unemployment relative to African youth. However, this result should be interpreted cautiously given the relatively small number of White respondents in the sample compared with African youth, which may affect the stability and generalisability of the estimated coefficients.

Age effects indicate that youth aged 25–29 and 30–34 are less likely to be unemployed than those aged 20–24, reflecting challenges in the school-to-work transition (Lam et al. 2009). Gender, which is often found to be a strong determinant of labour market outcomes in South Africa, is not statistically significant in some of the baseline specifications but becomes significant once additional demographic controls are introduced. This pattern suggests that gender differences in youth unemployment may partly operate through other structural factors captured in the model, including education levels, geographic location, and household conditions. In other words, once these structural factors are accounted for, the independent statistical effect of gender may diminish. This finding should therefore not be interpreted as evidence that gender

TABLE 3 Regression Estimates

Variables	Dependent variable: Youth Unemployment					
	Logit model			Probit model		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Matric	−0.3865726***	−0.4053553***	−0.1937298	−0.23976***	−0.244789***	−0.1446702*
Higher national certificate	−0.0292117	−0.1415683	0.2800325	−0.0198074	−0.0878395	0.1294088
Diploma	−0.7286356***	−0.6623619**	0.0260818	−0.4420903***	−0.4100973**	−0.042444
Undergraduate degree / Higher diploma	−1.331485***	−1.018804***	−0.0178668	−0.8003502***	−0.6088961**	−0.1276194
Honours / Post graduate diploma	−2.097463**	−1.694304	0.0958573	−1.204978**	−0.9894877*	−0.1434709
M-Tech and master's degree	−1.186814	−1.171599	0.1267247	−0.7164788	−0.7505489	−0.1250275
Type of institution	−0.8027986	−1.033834*	2.780762	−0.4714632	−0.6226873**	1.499739**
Eastern Cape		0.4039775	0.2293864		0.2466271	0.1773689
Northern Cape		0.0995741	0.0970511		0.0662839	0.0622568
Free State		0.6366918**	0.5882928*		0.4011081**	0.3679023*
KwaZulu-Natal		0.0020578	0.0913254		0.0105089	0.070944
Northwest		0.1197696	0.0533285		0.0789679	0.0475933
Gauteng		0.5021895**	0.635104**		0.3086419**	0.3977671***
Mpumalanga		1.114286***	1.053054***		0.6829364***	0.6509908***
Limpopo		0.2656923	0.1594755		0.1647191	0.126098
Gender		0.6844261***	0.7541698***		0.4160824***	0.4622077***
20–24 years		−0.7535787	−0.7334617		−0.4651617*	−0.6126235
25–29 years		−1.744193***	−1.797019***		−1.067507***	−1.254445***
30–34 years		−2.115899***	−2.137114***		−1.293967***	−1.463825***
Coloured		−0.0122921	0.456079		−0.0008431	0.231917
Indian/Asian		−1.804269	−1.022699		−0.8837505	−0.466165
White		−2.133025*	−0.75416		−1.157304***	−0.5484977
Internet access			0.8283848			0.5056135
Access to electricity			−0.3223873			−0.1642869
Household income			−0.0001438***			−0.000061***
Constant	−0.19948***	0.8623373*	0.5865591	−0.1251424***	0.5232419*	0.3978796
Pseudo *R2*	0.0217	0.1106	0.1825	0.0217	0.1106	0.1722
Number of observations	1,524	1,524	1,524	1,524	1,524	1,524

NOTE ***, **, * denote 1%, 5%, and 10% significance, respectively.

inequalities are absent in South Africa's labour market, but rather that they may be mediated through broader socio-economic conditions included in the analysis.

Model 3 adds household and welfare factors. The results still show that higher qualifications reduce unemployment even after accounting for household conditions although the magnitude and statistical significance of some education coefficients decline. In particular, the coefficient for matric becomes weaker once additional controls are introduced. This pattern is consistent with recent research suggesting that the labour market value of matric has gradually eroded as the number of matriculants has increased and labour market competition has intensified (de Lannoy 2025). While matric may still provide a basic signal of labour market readiness, it appears increasingly insufficient on its own to secure employment in a highly competitive labour market.

Provincial and racial patterns also hold, showing structural inequalities persist. Internet and electricity access do not have significant effects, possibly because many job seekers rely on shared or public facilities. Household income has a small but significant negative effect, indicating higher income slightly reduces unemployment risk, though the effect is minor.

The increase in pseudo R^2 from Model 1 to Model 3 shows that unemployment is influenced by more than education alone. Structural factors like region, race, and household conditions continue to affect labour market outcomes even for educated youth.

Altogether, these results provide new post-COVID evidence using the 2021 GHS. While past studies using older data sets like NIDS or small local surveys also found that education reduces unemployment, our findings show that only higher education levels (diploma and above) offer strong protection. Lower and mid-level qualifications no longer guarantee better outcomes. At the same time, the relatively small number of respondents in some higher education categories means that the magnitude of these estimated effects should be interpreted cautiously. Overall, these results highlight ongoing qualification inflation and show that education alone cannot overcome deep regional and racial inequalities in South Africa's youth labour market.

SENSITIVITY ANALYSIS

To test the robustness of our main findings, we divide the sample into two groups based on the dominant industry in each province. The first

group includes youth living in provinces where mining is not dominant (Eastern Cape, Western Cape, Gauteng, KwaZulu-Natal, and Free State), while the second group covers youth in provinces where mining is the primary industry (Northwest, Limpopo, Mpumalanga, and Northern Cape). Tables 4 and 5 report the logit and probit model estimates, respectively.

For provinces without mining activities, Model 1 shows a strong negative effect of education on unemployment across all levels. Matric, higher certificates, diplomas, undergraduate degrees, honours/postgraduate diplomas, and M-Tech/Master's degrees all significantly reduce the probability of being unemployed. This effect persists in Model 2 after adding demographic and regional factors, although the magnitude decreases for matric and higher certificates. Model 3 confirms that higher education remains the most important protective factor even after including household and welfare variables. These findings align with the main results and previous South African studies (Naudé and Serumaga-Zake 2001; Mlatsheni and Rospabé 2002; Lam et al. 2009; Yu 2013). Type of institution and gender are not significant, while older youth (25–29 and 30–34 years) are significantly less likely to be unemployed than those aged 20–24. Race remains a strong determinant, with Coloured and White youth having lower unemployment probabilities than African youth. Household income shows a small negative effect, suggesting better financial conditions slightly reduce unemployment risk.

For provinces where mining dominates, the education effect is weaker. Only diplomas and undergraduate degrees remain consistently significant, and the coefficients for matric and higher certificates are no longer significant after adding demographic and household variables. This suggests that in mining-dependent regions, lower and mid-level qualifications provide limited protection from unemployment. This phenomenon can be explained by the structure of mining-dependent economies, which are often characterised by 'Dutch Disease' effects where resource extraction dominates the economy, limiting the growth of diversified service-sector and knowledge-based jobs that typically absorb educated youth (Corden and Neary 1982). Consequently, the local labour market offers fewer opportunities where higher education is rewarded, and many graduates may compete for a narrow set of positions, reducing the returns to lower and mid-level qualifications. Age effects are stronger, particularly for youth aged 30–34, who experience a much lower probability of unemployment than those aged 20–24. Race effects are more

TABLE 4 Sensitivity Analysis (Logit models)

Variables	Dependent variable: Youth Unemployment					
	Province without mining activities			Province with mining activities		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Matric	−0.5070104***	−0.5376197***	−0.2964564*	−0.941228	−0.0467966	0.2764947
Higher national certificate	−0.1345794	−0.1164495	0.4148745	0.2006277	0.1659426	0.5423813
Diploma	−0.1345794**	−0.7592865**	0.0660563	−0.8690877*	−0.6676365	0.0286387
Undergraduate degree/ Higher diploma	−1.182061	−0.7680868**	0.2838035	−1.836868**	−1.785503**	−1.122972
Honours/ Post graduate diploma	−1.709716	−0.968688	0.3068408	0	0	0
M-Tech and master's degree	−1.160037	−1.240013	0.045597			
Type of institution	−0.83918	−0.7762257	2.958053	−0.5499734	−0.8445297	2.494258
Gender		0.6891943***	0.750117***		0.7582361***	0.9650077***
20–24 years		−0.5033876	−0.3611831		−1.429138	−2.337405
25–29 years		−1.563332***	−1.533807**		−2.165521**	−2.894631
30–34 years		−1.911357***	−1.824556***		−2.55126**	−3.3873*
Coloured		−0.7073858*	−0.3307485		0.2266055	0.7936079*
Indian/Asian		−1.876714	−1.364164		0	0
White		−2.155694***	−0.9853729		0	0
Internet access			0.6398712			0
Access to electricity			0.4394199			−1.773235***
Household income			−0.0001152***			−0.000026***
Constant	−0.2262571**	1.045269**	0.7025362	−0.151549	1.695906	3.419874*
Pseudo [EQ]	0.0229	0.1035	0.1687	0.0189	0.0760	0.2130
Number of observations	1,041	1,041	1,041	480	476	471

NOTE ***, **, * denote 1%, 5%, and 10% significance, respectively

TABLE 4 Sensitivity Analysis (Logit models)

Variables	Dependent variable: Youth Unemployment					
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Honours/ Post graduate diploma	−1.709716	−0.968688	0.3068408	0	0	0
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30–34 years		−1.911357***	−1.824556***		−2.55126**	−3.3873*
Coloured		−0.7073858*	−0.3307485		0.2266055	0.7936079*
Indian/Asian		−1.876714	−1.364164		0	0
White		−2.155694***	−0.9853729		0	0
Internet access			0.6398712			0
Access to electricity			0.4394199			−1.773235***
Household income			−0.0001152***			−0.000026***
Constant	−0.2262571**	1.045269**	0.7025362	−0.151549	1.695906	3.419874*
Pseudo [EQ]	0.0229	0.1035	0.1687	0.0189	0.0760	0.2130
Number of observations	1,041	1,041	1,041	480	476	471

NOTE ***, **, * denote 1%, 5%, and 10% significance, respectively

TABLE 5 Sensitivity Analysis (Probit models)

Variables	Dependent variable: Youth Unemployment					
	Province without mining activities			Province with mining activities		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Matric	−0.3127981***	−0.3205948***	−0.1984803**	−0.058856	−0.0314803	0.1463536
Higher national certificate	−0.0870247	−0.0781861	0.2122724	0.1279881	0.095668	0.567129
Diploma	−0.3999785**	−0.4617626**	−0.0944174	−0.5334282**	−0.4210184	−0.0247469
Undergraduate degree/ Higher diploma	−0.7158154***	−0.4913495**	0.01813	−1.076644***	−1.014069**	−0.6764983
Honours/ Post-graduate diploma	−1.003903*	−0.6163004	0.0456155	0	0	0
M-Tech and master's degree	−0.699551	−0.7876834	−0.1433288			
Type of institution	−0.4833268	−0.4616268	1.434163**	−0.3647068	−0.4970925	0.9348778
Gender		0.4157165***	0.4625949***		0.4656172***	0.5955648***
20–24 years		−0.317635	−0.399431		−0.8487333	−1.102549
25–29 years		−0.9610889***	−1.110176***		−1.304055**	−1.429784*
30–34 years		−1.171043***	−1.291557***		−1.541976***	−1.71288**
Coloured		−0.4049596*	−0.2100503		0.140343	0.4591969*
Indian/Asian		−0.9473803*	−0.6406984		0	0
White		−1.156072***	−0.645869		0	0
Internet access			0.4090565			0
Access to electricity			0.2895094*			−1.054324***
Household income			−0.0000503***			−0.0001315***
Constant	−0.1420702**	0.6431777**	0.5010904	−0.0949309	1.015657*	1.652784**
Pseudo *R2*	0.0229	0.1031	0.1610	0.0190	0.0760	0.2057
Number of observations	1,041	1,041	1,041	480	476	471

NOTE ***, **, * denote 1%, 5%, and 10% significance, respectively

muted; White youth have a smaller advantage over African youth, and Coloured youth show only marginal improvements. Interestingly, access to electricity has a significant negative effect on unemployment in Model 3, possibly reflecting infrastructure challenges that affect labour market participation in these provinces. Household income remains a small but significant protective factor.

All in all, the sensitivity analysis confirms that the protective effect of education is context-dependent. In provinces without mining activities, higher education significantly reduces youth unemployment, consistent with the main analysis. In contrast, in mining-dependent provinces, only higher qualifications offer meaningful protection, highlighting structural limitations in these local labour markets. The findings illustrate that regional economic composition, particularly the dominance of extractive industries, can fundamentally constrain the returns to education, emphasising the need to account for sectoral structure when designing policies to improve youth employment outcomes. These results emphasise the importance of considering regional economic structure when evaluating the returns to education and suggest that policy interventions may need to be tailored to the dominant local industry.

Conclusion

Our study set out to examine the relationship between educational attainment and youth unemployment in South Africa using the 2021 General Household Survey (GHS), one of the first nationally representative datasets to capture the post-COVID labour market. Across all estimated models, we find that higher levels of education reduce the likelihood of unemployment, but the strength of this effect varies sharply across provinces. Young people with diplomas, degrees, and postgraduate qualifications face significantly lower unemployment probabilities, yet this benefit is uneven, with much weaker returns in provinces dominated by mining. These results highlight a reality that national discussions often miss: education matters, but where young people live and the structure of their local economy matter just as much.

The sensitivity analysis reinforces this point. In provinces with more diversified economies, post-secondary education consistently protects youth from unemployment. In provinces where mining remains the central industry, the same qualifications offer less security. This suggests that regional labour demand, sectoral concentration, and limited job pathways undermine the returns to education for many young people. In

other words, education reduces unemployment risk, but it cannot offset structural constraints when entire local economies offer few opportunities for new entrants.

Our findings carry important implications for policy. Since the pandemic, South Africa has rolled out several large programmes aimed at rebuilding youth employment, such as the Presidential Youth Employment Initiative, the Basic Education Employment Initiative, the National Pathway Management Network, and the Youth Employment Service. Together, these programmes have created millions of temporary earning and training opportunities. However, our results suggest that the benefits of these initiatives are not evenly distributed. Many placements remain short-term, and most opportunities cluster in provinces with stronger institutional capacity and more diversified labour markets.

Strengthening these programmes therefore requires a more deliberate focus on where educated youth remain unemployed despite their qualifications. Mining-dependent provinces should receive targeted placement pipelines that connect young graduates to alternative industries, including digital services, logistics, renewable energy, public administration, and small-enterprise development. Expanding long-term placements, improving career progression within public employment programmes, and aligning training with the actual hiring patterns of local employers would make these initiatives far more effective.

Lastly, it is important to acknowledge that the 2021 GHS data were collected during a period still heavily affected by COVID-19-related lockdowns and school disruptions. Some of the patterns observed, particularly high unemployment among younger youth, may reflect temporary shocks rather than permanent structural shifts. This limitation opens an important avenue for future research: longitudinal studies or follow-up surveys could examine whether the relationships between education, regional economic conditions, and youth unemployment persist once the effects of the pandemic fully subside, thereby distinguishing short-term pandemic impacts from long-term labour market trends.

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