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# EDUCATION, DIGITAL ACCESS, AND RURAL YOUTH EMPLOYMENT: EVIDENCE FROM MICRODATA IN MAGELANG REGENCY, INDONESIA

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***Abstract:*** *This study examines the determinants of youth employment in Magelang Regency, Indonesia, with a particular focus on the roles of education and digital access. Using microdata from the 2024 National Socio-Economic Survey (SUSENAS) and employing a binary logistic regression model, the analysis covers 560 individuals aged 15–29 years. The findings reveal that age significantly increases the likelihood of employment, suggesting that older youth are more likely to work due to accumulated experience and completed education. Female youth exhibit higher employment odds than males, reflecting the predominance of informal and home-based work among women in rural Magelang. In contrast, higher educational attainment negatively affects employment probability, indicating a mismatch between formal qualifications and the limited local labor demand for skilled workers. Urban residence positively influences employment chances, while marital status slightly reduces them, particularly among married women. Notably, internet access shows a negative and significant relationship with employment, implying that digital connectivity does not necessarily enhance job opportunities without productive and skill-oriented usage.*

***Keywords:*** *youth employment, education, internet access, logistic regression, Magelang Regency*

**Abstrak:** Studi ini meneliti faktor-faktor penentu lapangan kerja pemuda di Kabupaten Magelang, Indonesia, dengan fokus khusus pada peran pendidikan dan akses digital. Menggunakan data mikro dari Survei Sosial Ekonomi Nasional (SUSENAS) 2024 dan menerapkan model regresi logistik biner, analisis mencakup 560 individu berusia 15–29 tahun. Temuan menunjukkan bahwa usia secara signifikan meningkatkan kemungkinan bekerja, menunjukkan bahwa pemuda yang lebih tua lebih mungkin bekerja karena akumulasi pengalaman dan pendidikan yang telah diselesaikan. Pemuda perempuan menunjukkan peluang kerja yang lebih tinggi daripada laki-laki, mencerminkan dominasi pekerjaan informal dan berbasis rumah di kalangan perempuan di pedesaan Magelang. Sebaliknya, pencapaian pendidikan yang lebih tinggi berdampak negatif terhadap probabilitas kerja, menunjukkan ketidaksesuaian antara kualifikasi formal dan permintaan tenaga kerja lokal yang terbatas untuk pekerja terampil. Tempat tinggal di perkotaan berpengaruh positif terhadap peluang kerja, sementara status perkawinan sedikit mengurangi peluang kerja, terutama di kalangan perempuan yang sudah menikah. Yang perlu diperhatikan, akses internet menunjukkan hubungan negatif dan signifikan dengan lapangan kerja, yang menyiratkan bahwa konektivitas digital tidak selalu meningkatkan peluang kerja tanpa penggunaan yang produktif dan berorientasi pada keterampilan.

**Kata Kunci:** lapangan kerja pemuda, pendidikan, akses internet, regresi logistik, Kabupaten Magelang

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## 1. INTRODUCTION

Youth unemployment remains a critical challenge for developing countries, particularly in rural areas where the transition from education to the labor market is often obstructed by a lack of formal opportunities. In Indonesia, although urban areas offer a higher likelihood of formal employment, rural youth remain heavily dependent on subsistence agriculture and the informal sector (Al Ayyubi, Pratomo, & Prasetyia, 2023; Huijsmans, Ambarwati, Vijayabaskar, & Chazali, 2021). This structural mismatch often forces young people to delay employment or accept precarious roles while searching for better career options. Furthermore, the global sectoral composition of youth employment has undergone a structural shift; since 2008, the services sector has overtaken agriculture as the world's largest employer of young people (International Labour Organization (ILO), 2024a). However, in rural Indonesia, this transition is hindered by barriers that prevent youth from entering modern, high-productivity sectors.

While Indonesia is currently reaping its demographic dividend, a paradox persists in rural areas: education levels are rising, yet the availability of formal employment remains stagnant. This disparity is further exacerbated by the 'digital divide,' which leaves rural youth increasingly isolated from the gig economy and the modern labor markets that now dominate the services sector. Data from 2025 indicates that the youth unemployment rate (15–24 years) stands at 16.16%, significantly higher than the national average (Statistics Indonesia (BPS), 2025). This gap reflects a substantial disparity in human capital; average schooling in rural areas is only 7.97 years compared to 10.08 years in urban regions (Statistics Indonesia (BPS), 2024c). Consequently, youth with lower educational backgrounds remain vulnerable to informal employment without social protection, underscoring education as a crucial determinant for decent work (Hudang, Handoyo, & Hariyanto, 2024; Rothenberg et al., 2016).

Beyond education, digital access has emerged as a new key factor shaping youth employment. The internet not only serves as an information medium but also generates new job opportunities through the digital economy, including gig work and remote employment (Herani & Pranandari, 2024). However, the digital divide between urban and rural areas remains evident. In 2023, 91.01% of urban households had internet access, compared to only 81.60% in rural areas (Statistics Indonesia (BPS), 2024b). This gap constrains rural youth's ability to compete in an increasingly digitalized labor market. Furthermore, differences in physical access, digital skills, and patterns of internet use influence socioeconomic outcomes. In the rural Indonesian context, disparities in digital access can limit the extent to which education translates into improved employment opportunities (Sheila & Fahmi, 2024).

Magelang Regency, a predominantly rural area in Central Java, faces similar challenges. The local economy remains dominated by agriculture and traditional trade, with limited employment diversification. Data from BPS Central Java indicate that the open unemployment rate in Magelang Regency stands at around 4.78% (Statistics Indonesia (BPS), 2024a), yet most employed youth are absorbed in low-productivity informal sectors. This condition illustrates how educational limitations and restricted

digital access exacerbate inequality in employment opportunities. Therefore, Magelang serves as a representative case for understanding the dynamics of rural youth employment.

Previous studies on youth employment in Indonesia have predominantly emphasized the role of education as a key determinant of labor market outcomes (Hudang et al., 2024; Rothenberg et al., 2016). However, the empirical findings remain inconclusive, particularly in rural contexts where higher educational attainment does not always translate into better employment opportunities due to structural limitations in local labor markets (Fettach, Benatallah, & Ghogho, 2022; Tamin et al., 2021).

In addition, although digital access has emerged as an important factor in shaping employment opportunities, most existing studies examine education and digitalization separately, rather than analyzing their combined effects on youth employability (Herani & Pranandari, 2024; Jin & Lyu, 2024). This creates a gap in understanding how human capital and digital access interact in influencing labor market outcomes.

Furthermore, the majority of prior studies rely on national or provincial-level data, which may obscure important local variations in labor market structures, especially in rural areas where employment opportunities are highly context-specific (Huijsmans et al., 2021; Sheila & Fahmi, 2024).

Therefore, this study aims to fill these gaps by simultaneously examining the roles of education and digital access in determining youth employment at the district level, using microdata from Magelang Regency. By applying a binary logistic regression approach, this study provides more context-specific and empirically robust evidence on rural youth employment dynamics in Indonesia.

Finally, the significance of this research lies in its policy relevance. The findings can inform both local and national governments in strengthening vocational education, expanding digital infrastructure, and designing youth empowerment programs in rural areas. Hence, this study contributes not only academically but also practically by promoting more inclusive youth employment. Ultimately, such efforts are vital to ensuring that Indonesia's demographic dividend truly serves as a driver of sustainable development.

## 2. LITERATURE REVIEW

### 2.1 Human Capital and Youth Employment

Human capital theory emphasizes that education plays a crucial role in improving individual productivity and employability. Higher educational attainment is generally associated with better access to employment opportunities, particularly in formal sectors (Hajdari & Fetai, 2022). In the Indonesian context, education is considered a key determinant in improving access to decent work, especially for youth transitioning from school to the labor market (Hudang et al., 2024).

However, empirical evidence suggests that the relationship between education and employment is not always straightforward, particularly in rural areas. Several studies highlight the presence of a mismatch between educational outcomes and labor market demand, where the skills acquired through formal education do not align with

available job opportunities (Fettach et al., 2022). In Indonesia, rural labor markets remain dominated by informal and low-productivity sectors, limiting the absorption of highly educated workers (Rothenberg et al., 2016; Tamin et al., 2021). As a result, higher education may increase job aspirations without necessarily improving employment probability, especially in regions with limited economic diversification.

**2.2 Digital Access and Employment Opportunities**

Digital access has become an increasingly important factor influencing labor market outcomes. The internet provides access to information, facilitates job search, and creates new employment opportunities through the digital economy (Herani & Pranandari, 2024). In theory, increased digital connectivity should enhance employability and support labor market participation (Jin & Lyu, 2024).

Nevertheless, the impact of digital access is highly dependent on how technology is utilized. Differences in digital skills and usage patterns can lead to unequal outcomes, even when access is available. In rural areas, limited digital literacy often constrains the effective use of technology for productive purposes (Sheila & Fahmi, 2024). Moreover, excessive or non-productive internet use may reduce employability and increase the likelihood of being disengaged from the labor market (Grigorescu, Alistar, & Lincaru, 2025). Empirical evidence also suggests that digitalization does not always reduce unemployment and may even contribute to labor market vulnerability when not accompanied by adequate skills (Başol, Sevgi, & Yalçın, 2023). Thus, the synergy between formal education and digital inclusion creates a 'double filter' for youth employment; while education provides the foundational human capital, digital access determines the efficiency with which that capital is utilized in the modern labor market.

**2.3 Socio-Demographic Determinants of Youth Employment**

In addition to education and digital access, socio-demographic characteristics significantly influence youth employment outcomes. Age is an important factor, as older youth are more likely to be employed due to greater work experience and completion of education (Quinlan-Davidson et al., 2024). This pattern reflects the transition process from education to the labor market.

Gender differences in employment are also widely observed. While men typically exhibit higher labor force participation rates, in certain contexts women may have higher employment probabilities due to their involvement in informal and home-based economic activities (Lo Bue et al., 2022; Sarker et al., 2024). This is particularly relevant in rural areas where economic activities are often family-based.

Location plays a crucial role in shaping employment opportunities. Urban areas provide more diversified economic activities, better infrastructure, and greater access to formal employment compared to rural areas (Chanieabate et al., 2023; Liu et al., 2024). Conversely, rural areas tend to have limited job opportunities, which constrains employment outcomes.

Marital status also affects labor market participation, especially among women. Marriage may reduce employment probability due to increased household responsibilities and caregiving roles (Meng & Yang, 2023). In Indonesia, marital status

has been identified as a structural factor influencing youth employment, particularly among women who face constraints in balancing domestic and economic roles (Hidayah et al., 2024; Rimkute & Sugiharti, 2023).

## 3. RESEARCH METHODS

This study utilizes microdata from the 2024 National Socio-Economic Survey (SUSENAS) conducted by Statistics Indonesia (BPS). The analysis focuses on 560 individuals aged 15–29 years in Magelang Regency, representing both rural and urban contexts.

The dependent variable is employment status (ES), coded as 1 for employed (formal or informal) and 0 otherwise. The independent variables include age (AGE), gender (GENDER), educational attainment (EDU), residence (URBAN), marital status (MARITAL), and internet access (DIGITAL).

Age is categorized into two groups (15–24 = 0; 25–29 = 1). Gender is coded as 1 for male and 0 for female. Educational attainment is classified into primary, junior secondary, upper secondary, and higher education, and transformed into dummy variables with primary education as the reference category. Residence is coded as 1 for urban and 0 for rural. Marital status is coded as 1 for married and 0 for unmarried. Internet access is coded as 1 if the household has internet access and 0 otherwise.

To examine the determinants of youth employment status in Magelang Regency, this study employs a binary logistic regression model, which is appropriate when the dependent variable is dichotomous. The model estimates the probability that an individual *i* is employed ($Y_i = 1$) as a function of age, gender, educational, location, and marital status, internet access.

The probability function is specified as follows:

$$\Pr(Y = 1) = \frac{\exp(\beta 0+\beta 1AGEi+\beta 2GENDERi+\beta 3EDUi+\beta 4URBANi+\beta 5MARITALi+\beta 6DIGITALi)}{1+\exp(\beta 0+\beta 1AGEi+\beta 2GENDERi+\beta 3EDUi+\beta 4URBANi+\beta 5MARITALi+\beta 6DIGITALi)}$$

Alternatively, the model can be expressed in its logit (log-odds) form as:

$$\text{Log}\left(\frac{\Pr(Yi=1)}{1-\Pr(Yi=1)}\right) = \beta_0+\beta_1 AGE_i+\beta_2 GENDER_i+\beta_3 EDU_i+\beta_4 URBAN_i+\beta_5 MARITAL_i +\beta_6 DIGITAL_i+ \varepsilon_i$$

The model is estimated using maximum likelihood estimation (MLE) with SPSS software. Model evaluation is conducted using several indicators, including the −2 Log Likelihood (−2LL) to assess overall model fit, the Hosmer–Lemeshow test for goodness of fit, the Nagelkerke $R^2$ to measure explanatory power, and the Wald test to evaluate the significance of individual coefficients. Statistical significance is determined at the 5 percent level.

## 4. RESULTS AND DISCUSSION

### 4.1 Result

**Model Fit and Classification Accuracy**

The binary logistic regression model was tested for goodness of fit and predictive power using several diagnostic indicators. The inclusion of the six independent

variables significantly enhanced the model's explanatory power, as shown by the reduction in the –2 Log Likelihood from 378,032.821 to 327,699.232. The Hosmer and Lemeshow test yielded a Chi-square value of 1.424 with a significance level of 0.984 ($p > 0.05$), indicating that the model fits the observed data well and that there is no significant difference between predicted and actual outcomes. Furthermore, the Nagelkerke $R^2$ value of 0.224 suggests that the model explains approximately 22.4% of the variation in the probability of youth employment in Magelang Regency. Finally, the model demonstrated a classification accuracy rate of 68.3%, an improvement from the 53.2% baseline, confirming its capability to distinguish between employed and unemployed individuals effectively.

**Determinant of Youth Employment**

The binary logistic regression results (Table 5) identify several significant predictors of youth employment in Magelang Regency.

**Table 5. Binary Logistic Regression Result**

| | B | S.E. | Wald | df | Sig. |
|---|---|---|---|---|---|
| AGE(1) | 1,599 | ,012 | 16800,634 | 1 | ,000 |
| GENDER(1) | -,977 | ,009 | 11869,505 | 1 | ,000 |
| Elementary (Primary School or below) | | | 3817,320 | 3 | ,000 |
| Lower Secondary (Junior High School / Islamic Junior High School)(1) | -,686 | ,014 | 2364,148 | 1 | ,000 |
| Upper Secondary (Senior High School / Vocational High School / Islamic Senior High School)(2) | -,852 | ,014 | 3718,626 | 1 | ,000 |
| Higher Education (Diploma I and above)(3) | -,573 | ,018 | 1000,662 | 1 | ,000 |
| Location(1) | ,431 | ,009 | 2218,859 | 1 | ,000 |
| MARITAL1) | -,211 | ,012 | 287,460 | 1 | ,000 |
| DIGITAL(1) | -,493 | ,043 | 129,421 | 1 | ,000 |
| Constant | 1,052 | ,045 | 539,251 | 1 | ,000 |

Source : Results of data processing with SPSS 26

Based on Table 5, Binary Logistic Regression Results, the logistic regression equation can be formulated as follows:

$$\text{Log}\left(\frac{\Pr(Yi=1)}{1-\Pr(Yi=1)}\right) = \beta_0+\beta_1 AGE_i+\beta_2 GENDER_i+\beta_3 EDU_i+\beta_4 URBAN_i+\beta_5 MARITAL_i+ \beta_6 DIGITAL_i+ \varepsilon_i$$

$$\text{Log}\left(\frac{\text{Pr(Yi=1)}}{1-\text{Pr(Yi=1)}}\right) = 1{,}052 + 1{,}599(\text{AGE}_i) - 0{,}977\ (\text{GENDER}_i) - 0{,}686(\text{LowerSec}_i) - 0{,}852(\text{UpperSec}_i) - 0{,}573\ (\text{HigherEdu}_i) + 0{,}431\ (\text{URBAN}_i) - 0{,}211(\text{MARITAL}_i) - 0{,}493(\text{DIGITAL}_i)$$

Based on the results of the binary logistic regression analysis, several key findings can be highlighted. The constant value of 1.052 indicates that when all independent variables are equal to zero (i.e., female youth aged 15–24 years, with primary education or below, residing in rural areas, unmarried, and without internet access), the baseline log-odds of being employed is 1.052, corresponding to a probability of approximately 74.1%.

The variable age (AGE) shows a positive and statistically significant coefficient of 1.599, with an odds ratio of Exp(B) = 4.951. This implies that youth aged 25–29 years are about 4.95 times more likely to be employed compared to those aged 15–24 years, holding other factors constant. This result reflects the role of maturity and experience, as older youth tend to have completed their education and possess greater readiness to enter the labor market.

For gender (GENDER), the coefficient is −0.977 with Exp(B) = 0.376, indicating that male youth have 62.4% lower odds of being employed than female youth, ceteris paribus. Although this finding diverges from the general national trend—where males usually exhibit higher labor force participation—it may reflect the local economic structure of Magelang Regency. Female youth are often involved in home-based economic activities, such as microenterprises and family businesses, which are classified as employment in household surveys.

Regarding educational attainment (EDU), all education levels above primary show negative and significant coefficients: Lower Secondary (B = −0.686; Exp(B) = 0.504), Upper Secondary (B = −0.852; Exp(B) = 0.426), and Higher Education (B = −0.573; Exp(B) = 0.564). This suggests that, compared with individuals with primary education or below, those with higher educational attainment have lower odds of being employed, holding other factors constant. This seemingly counterintuitive result may be attributed to a mismatch between education and available jobs, as the local labor market in Magelang is still dominated by informal sectors with limited demand for skilled or tertiary-educated workers.

The location (URBAN) variable has a positive coefficient of 0.431 and an odds ratio of Exp(B) = 1.540, implying that individuals living in urban areas are about 1.54 times more likely to be employed than those residing in rural areas, ceteris paribus. This finding aligns with the general understanding that urban areas offer more diverse and dynamic employment opportunities.

The coefficient for marital status (MARITAL) is −0.211, with Exp(B) = 0.810, indicating that married individuals have 19% lower odds of being employed compared to unmarried individuals. This result may be related to household role allocation, where married individuals—particularly women—may prioritize domestic responsibilities or participate in non-wage informal activities.

Finally, the coefficient for digital access (DIGITAL) is −0.493, with Exp(B)=0.611, meaning that individuals with internet access have approximately 39% lower odds of being employed than those without internet access.

### 4.2 Discussion

**Age (AGE) and Employment Status (ES)**

The positive and large coefficient on AGE (B = 1.599, Exp(B) ≈ 4.95) indicates that older youth (25–29) are substantially more likely to be employed than younger youth (15–24). This pattern is consistent with standard schooling-to-work transition theory: older youth are more likely to have completed education, to possess work experience, facing psychosocial adjustments and to have formed labor market attachments, all of which raise employment probabilities (Quinlan-Davidson et al., 2024) (De Groot et al., 2021). Older youths, such as those aged 25-29, generally have more work experience than those aged 15-24. This experience can provide them with valuable skills and maturity that employers seek. The ability to handle job interviews and competitive employment opportunities is often developed during the latter stages of this age group, as earlier life stages focus more on learning and personal development (Smith et al., 2021). Practically, the coefficient implies that, ceteris paribus, the odds of employment for 25–29-year-olds are roughly five times the odds for 15–24-year-olds in our Magelang sample — a sizable life-cycle effect on employability. This finding aligns with ILO youth statistics, where employment opportunities increase with age until the late twenties when young people complete education and accumulate work experience(International Labour Organization (ILO), 2024b).

**Gender (GENDER) and Employment Status (ES)**

The estimated coefficient for gender is negative and large (B = −0.977, Exp(B)≈0.376), implying that males in the sample have lower odds of being classified as employed than females (holding other factors constant). While this result diverges from many national-level patterns in which young men often display higher labor-force participation, it is plausible in the Magelang context. In many rural settings women participate in home-based microenterprises, family businesses, and informal services that household surveys classify as employment (Sarker et al., 2024); men may be more involved in seasonal agricultural work or temporary migration, which can produce episodic non-employment at survey time. Women in Magelang Regency have a higher level of university education than men (Badan Pusat Statistik Kabupaten Magelang, 2024), as women's education levels increase, women are increasingly moving from precarious forms of work towards more stable employment opportunities (Lo Bue, Le, Santos Silva, & Sen, 2022). According to the Human Capital Brief: Indonesia (World Bank, 2025), the labor force participation rate of adult women reached 57% and has remained relatively stable since 2019. This indicates that women in Indonesia are becoming increasingly active in economic activities, particularly in the informal sector and home-based work that offers flexible working hours. This finding aligns with the result that women in Magelang Regency have a higher likelihood of being employed compared to men. Such contextual variation supports our interpretation that the

negative coefficient here reflects Magelang-specific labor structures rather than model misspecification.

**Educational Attainment (EDU) and Employment Status (ES)**

Unexpectedly, the estimated EDU dummies (relative to primary education) show negative coefficients in the regression (Lower secondary, Upper secondary, Higher education all have B < 0). At first glance this contradicts the human-capital expectation that more education raises employability. However, three mutually reinforcing explanations reconcile the empirical sign with theory and local realities:

1. Labor-Market Mismatch in Rural Areas.

In Magelang, the structure of labor demand remains concentrated in informal and low-skill sectors such as agriculture, retail, and household enterprises. Consequently, higher-educated youth often seek formal or higher-quality employment opportunities that are limited in the local economy, leading to higher observed non-employment rates or prolonged job-search durations. As a result, higher education tends to elevate employment aspirations without ensuring local job absorption, producing lower realized employment probabilities compared to those with primary education who are more willing to accept informal or agricultural work. Education does not always guarantee employment because multiple factors shape the relationship between educational attainment and job opportunities. One of the key explanations lies in the skills mismatch, in which the competencies acquired through formal education do not necessarily align with the evolving requirements of the labor market (Fettach et al., 2022).

2. Job opportunity. Another reason why higher educational qualifications do not necessarily lead to greater employment opportunities is the increasing number of higher education graduates each year, which is not matched by the availability of corresponding job opportunities (Efendi et al., 2022).

3. Internships and work-integrated learning (WIL) also play an important role in enhancing graduates' employability skills. However, relying solely on formal education without practical work experience can limit the opportunities to obtain suitable employment (Adegbite & Hoole, 2024; Di Meglio, Barge-Gil, Moreno, & Camiña, 2021).

**Urban Residence (URBAN) and Employment Status (ES)**

The urban dummy is positive (B = 0.431, Exp(B) ≈ 1.54), indicating that residing in an urban area increases the odds of being employed by roughly 54% compared to living in rural areas. This result is consistent with the extensive literature showing that urban areas provide more diversified employment opportunities, denser labor markets, and better access to services and infrastructure that facilitate job search and job matching (Liu, Zhao, & Tang, 2024). Additionally, urban areas benefit from a more diversified economy that supports a wider range of industries, including finance, technology, manufacturing, and services. This diversity in economic activities generally offers a broad spectrum of employment opportunities, thus increasing the odds of finding employment for residents. Conversely, rural areas often depend on limited sectors such

as agriculture and may not offer the same employment diversity or number. This disparity contributes to the differences in employment rates, with urban residents typically experiencing fewer barriers to employment (Amadu, Seidu, Afitiri, Ahinkorah, & Yaya, 2021).

**Marital Status (MARITAL) and Employment Status (ES)**

The negative but small coefficient for marital status (B = −0.211, Exp(B) ≈ 0.81) indicates that married youth in Magelang are less likely to be employed compared to their unmarried counterparts. This finding is consistent with empirical evidence from various Indonesian studies showing that marriage can reduce labor-force participation, particularly among young women. According to Hidayah and Maryati (Hidayah, Nazer, & Maryati, 2024), marital commitments often increase the probability of unemployment among educated young people because family responsibilities limit mobility and job-seeking flexibility. Similarly, Rimkute and Sugiharti (Rimkute & Sugiharti, 2023) found that married women's employment decisions are strongly affected by household dynamics and the level of technological support in domestic work, meaning that marriage frequently shifts female labor toward unpaid or home-based activities rather than formal employment. Supporting this, Nursyamsiah (Nursyamsiah, Nahar, Arshad, Indris, & Salleh, 2025) noted that marital status remains one of the structural barriers to women's economic participation in Indonesia, as social expectations around caregiving and household duties continue to constrain women's access to paid work. Taken together, these studies reinforce the interpretation that the negative marital-status coefficient in the Magelang sample likely reflects gendered household roles, where young married women are more inclined to withdraw from the labor market or engage in informal, home-based work, thereby reducing the overall employment probability for the married group.

**Internet Access (DIGITAL) and Employment Status (ES)**

In our estimation, the DIGITAL dummy has a negative coefficient (B = −0.493, Exp(B) ≈ 0.611), indicating a lower odds of employment for those reporting household internet access. However, the negative sign should be interpreted cautiously. The negative association between internet access and youth employment found in this study can be explained by how young people utilize digital technology. Internet connectivity alone does not automatically improve employability if its use remains largely non-productive, such as for social media and entertainment purposes rather than for job search or skill development (Hargittai & Hinnant, 2008). Similar evidence has been reported in recent studies, where digitalization and online engagement did not consistently reduce youth unemployment, but in some cases even reinforced labor market vulnerability. For instance, Başol, Sevgi, and Yalçın (Başol et al., 2023) found that digital transformation may increase youth unemployment in contexts where digital skills are unevenly distributed. Similarly, frequent and addictive internet use among young people and not controlled can actually increase the possibility of becoming NEET (Not in Education, Employment or Training) (Grigorescu et al., 2025). In the

Indonesian context, wider internet access across provinces has not necessarily increased employment rates and may even contribute to higher youth unemployment (Illahi, Taufiq, & Wardaya, 2025). These findings suggest that internet access alone is insufficient to improve labor market outcomes unless supported by targeted use and adequate digital literacy.

### 4.3 Implication

#### Theoretical Implications

This study contributes to the literature on youth employment in several ways. First, it provides empirical evidence that challenges the conventional human capital theory, which assumes that higher education always increases employment opportunities. The findings show that in rural labor markets, higher educational attainment may not necessarily improve employment probability due to structural mismatches between skills and available jobs.

Second, this study extends the literature by incorporating digital access into the analysis of youth employment. Unlike previous studies that often treat digitalization as uniformly beneficial, the results demonstrate that internet access alone does not guarantee better labor market outcomes without adequate digital literacy and productive usage.

Third, by utilizing microdata at the district level, this study highlights the importance of local labor market characteristics in shaping employment outcomes. This finding enriches the existing literature, which has largely focused on national-level analysis and overlooked spatial heterogeneity in employment dynamics.

#### Policy Implications

The findings of this study offer several important implications for policymakers. First, improving youth employment in rural areas requires more than expanding access to formal education. Policymakers should strengthen vocational training and align educational outcomes with local labor market needs, particularly in sectors with higher employment absorption.

Second, digital inclusion policies should not focus solely on expanding internet access, but also on enhancing digital skills and promoting productive internet use, such as for job search, entrepreneurship, and online work opportunities.

Third, targeted interventions are needed to address structural barriers faced by specific groups, particularly married women, by providing flexible employment opportunities and support systems that enable them to participate in the labor market.

Finally, local governments should promote rural economic diversification by encouraging the development of non-agricultural sectors, thereby creating more diverse and sustainable employment opportunities for youth.

## 5. CONCLUSION

This study reveals that youth employment in rural Magelang is influenced by various socioeconomic and digital factors. Among these, age shows a strong positive

relationship with employment, confirming that young people aged 25-29 are more likely to be employed due to greater experience and completed education. Gender has a significant effect, with young men showing lower employment opportunities than women, reflecting the local employment structure where women are engaged in informal, home-based work. Conversely, education level negatively impacts employment probability, indicating a mismatch between school outcomes and rural labor demand. This suggests that higher education alone does not guarantee employment in areas dominated by the informal sector. Urban residence increases employment opportunities due to better access to diverse economic activities and infrastructure. Marital status slightly reduces employment opportunities, particularly for young married women who often face dual role constraints. Finally, internet access unexpectedly shows a negative relationship with employment, Internet access alone does not guarantee better employment opportunities for young people, as its benefits depend on productive use and adequate digital literacy.

Overall, these findings confirm that while demographic and locational factors continue to shape youth employability, the benefits of education and digitalization depend on labor market readiness and skills alignment. Policies that integrate vocational training, digital skills development, rural job creation, and gender-responsive interventions are crucial to transforming these factors into sustainable employment opportunities for rural youth..

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