



Income inequality: a recipe for youth unemployment in Africa

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Received: 17 July 2021 / Accepted: 5 December 2022 / Published online: 14 December 2022
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Abstract

Youth unemployment is a problem in Africa such that young people face almost double the unemployment rate as adults. With the booming population on the rise, youth unemployment can turn into a major catastrophe in the continent if not addressed. This study presents empirical evidence on how income inequality accelerates the problem. The study uses panel data from 42 African countries spanning 29 years from 1991 to 2020. The dependent variable is youth unemployment, and the independent variable is income inequality. The control variables are gross domestic product (GDP) per capita, population growth, political stability, foreign direct investment, gross capital formation, and political stability. The study employs the Generalized Method of Moment (GMM) model for estimations. The results imply that income inequality positively impacts African youth unemployment, which varies across different income levels. Therefore, measures must be formulated to combat income inequality, such as increasing productivity among small-scale farmers, robust social protection programs, minimum wages, and better access to financial services for young people on the continent.

Keywords Youth unemployment · Income inequality · Africa · GMM

Introduction

Youth employment is an essential element of a strong base in any country. Having a decent job is vital for young individuals and their future. Still, it also has a domino effect on local societies, governments, and the world altogether (International Labour Organization 2020). Though various factors cause high youth unemployment, income inequality undeniably exaggerates the problem. Numerous jobs, mainly the lucrative ones, are exclusively accessible only

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to young people from wealthy backgrounds. There are various imaginable explanations for this pattern. For beginners, the utmost prestigious educational background is necessary for high positions, and that education is expensive.

Furthermore, attractive jobs usually require entry-level internships with little or no payment. This becomes difficult for graduates with low-income family backgrounds as they do not make enough money to support themselves (Thompson 2012). In countries like Australia, income inequality can incentivize rich people to reinvest more of their wealth in their domestic countries. In contrast, rich Africans stash a large portion of their wealth abroad and cause capital flight. According to the UN Economic Development report, African countries lose an estimated US\$88.6 billion each year, equal to 3.7% of their economic output, in a capital flight, mostly illicit (Fox 2020).

Growing income inequality decreases demand in Africa as it reduces the consumption share of GDP. The reduction of demand causes productive investment to diminish hence unemployment. In unequal-income countries, corrupting democracies, abuse and exploitation of workers, and a weak safety net for the vulnerable or poor are more likely to exist. All these circumstances fuel unemployment in the society. However, the public debate surrounding wealth and income inequality has given more attention to reduced growing slums, social cohesion, labor exploitation, and middle-class household pressure. But one impact has received relatively little attention: youth unemployment. The relationship between income inequality and youth unemployment in Africa is a rich mine for more research. Therefore, the contribution of this paper is to bring together evidence from empirical data that income inequality accelerates youth unemployment in the continent (United Nations 2020).

During the 19th and most of the twentieth centuries, inequality increased dramatically globally, showing widening gaps in GDP per capita between countries as developing countries grew slower compared to the advanced economies. The restoration of worldwide economic collaboration in the middle twentieth century steered a period of growth and development. Afterward, GDP per capita growth rates speeded in developing countries, mainly in Asia, causing income levels convergence across countries (Bourguignon 2015). Many households were elevated out of poverty. Thus, income inequality in the world first calmed and then quickly declined over the last thirty years. However, it should be noted that some regions did not see income convergences with developed countries. For instance, in Sub-Saharan Africa, on average, income growth were slower than in Asia. COVID-19 crisis has likely reversed some gains in the reduction of global inequality. It will likely worsen global inequality because, overall advanced economies can deal with the crisis by having more resources (Ferreira 2021).

While the reduction of global inequality over the last three decades has been significant, inequalities have increased within country, particularly in advanced economies. Within-country inequality has increased in most countries. Over the past thirty years, 90 percent of advanced economies and more than half of the countries have seen an increase in income inequality, with some countries increasing their Gini coefficients beyond two points. Some key reasons behind the surge in

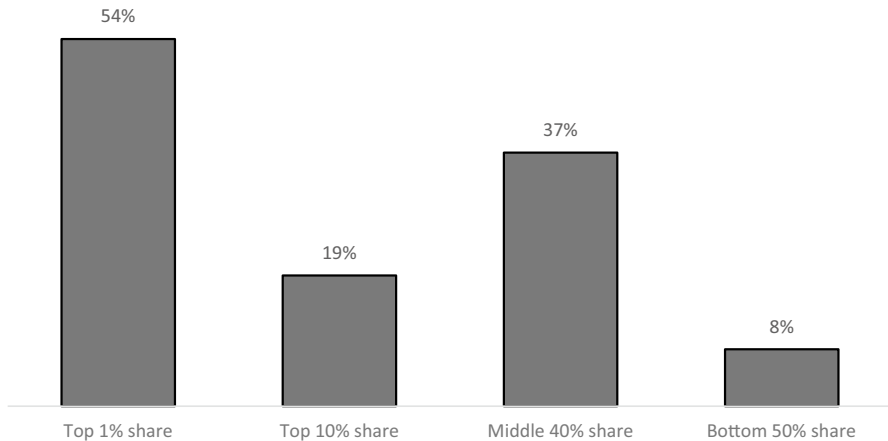


Fig. 1 The percentage share between income earners in Africa for the year 2020. *Source:* Author's calculation

within-country income inequality shown in the literature include globalization, technological progress, commodity price cycles, and national economic policies.

Income inequality in Africa

Despite the remarkable progress recorded in recent years, Africa suffers from widespread uneven income distribution. Income inequalities are predominant in all the sub-regions across the continent. Nevertheless, some countries are inclined to show very high disparities, particularly in middle-income groups such as Namibia and South Africa (Africa Development Bank 2019). Africa does not give a single picture of income inequalities. The highest outstanding increase in income inequality is found in the Central African Republic and South Africa, with Gini coefficients rising from 43 to 56 and 58 to 67, respectively (Africa Development Bank 2019). The most income-unequal countries in Africa are from the Southern part of the continent, with Comoros, Namibia, South Africa, Botswana, Angola, Swaziland, and Lesotho in the top ten. Therefore, these statistics give a disturbing image and show how critical the inclusive growth plan is for the continent (Ayodele Odusola 2017).

Inequalities affect less the north sub-region than the southern sub-region countries and less in eastern sub-region countries than in western ones. The Gini index distribution in Africa shows a split effect along with concentration. Bordering countries that hold cooperative trade patterns have the same income inequalities. These income inequalities are more focused on the west and south than the east and north (World Bank 2021).

Income inequalities are prominent when measured by the income share that goes to the poorest individuals. The richest capture the largest share of income in African countries, thus aggravating income inequalities between the rich and the poor. This income inequality distribution is conveyed by inequalities between urban and

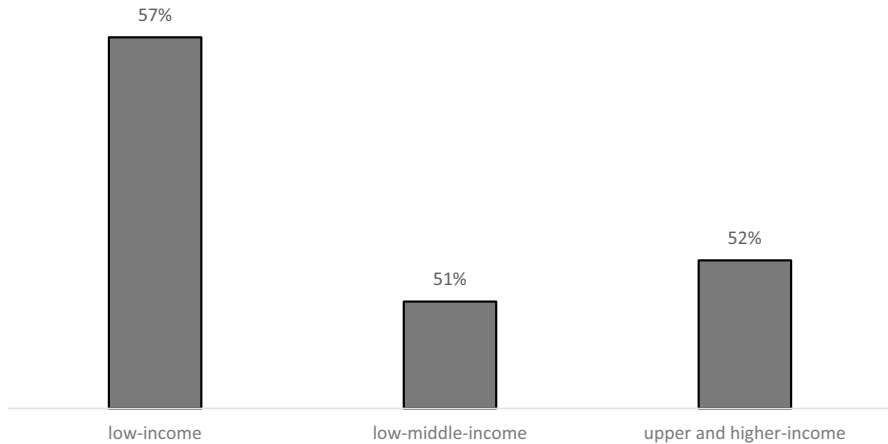


Fig. 2 Percentage of total income owned by the top 1% according to income categories for 2020. *Source:* Author's calculation

rural areas, with the poor being concerted in rural areas (Africa Development Bank 2019). According to Fig. 1, the top 1% owns more than half (54%) of the overall income in the continent, while the bottom 50% own only 8% of the total income share. In Tanzania, for instance, the mean share of the lowest 50% of the population is only 5.2% of total income. In comparison, the mean share of the top 10% is about 51.5%.

Inequality in Africa varies across different income levels. Income inequality is more severe in lower-income countries like Central Africa and DRC Congo (Abebe Shimeles and Tiguene Nabassaga 2017). From Fig. 2, the top 1% own more than the half (57%) share of the total income, followed by upper-middle/higher-income countries, with the top 1% owning 51% share of total income. The lower-middle-income countries have a 51% share of total income held by the top 1%. What leads to such a high-income inequality level in Africa compared with the rest of the world? This matter remains open and poses challenges in addressing the issue due to the limitation of factual data. Another challenge is the diversity and specificity of Africa's political and economic structures, molded by its colonial heritage and history (Fig. 3).

Youth unemployment in Africa

Youths are Africa's most significant asset, which is rapidly increasing. Two hundred million people aged between 15 and 24 will likely double by 2050 to over 830 million (African Development Bank 2017). If correctly harnessed, this growth in the working-age population can increase inclusive economic growth and productivity across the continent. There are nearly 420 million youth aged between 15 and 35 years in Africa, but one-third of them are discouraged and unemployed, and the other third are vulnerably employed. Only one in six young people is in wage employment. Youth people face almost double the unemployment rate as

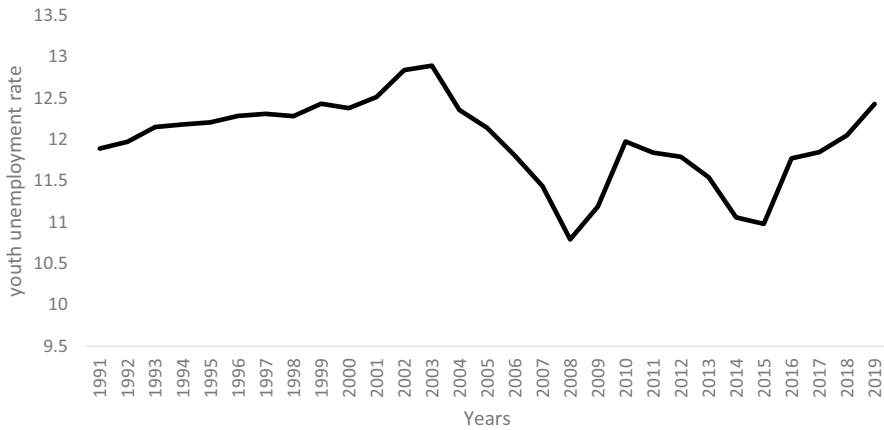


Fig. 3 Trend of youth unemployment in Africa (1991–2019). *Source:* Author's calculation

adults, substantially varying by country. According to the World Bank, youths are responsible for 60% of Africa's unemployment. In North Africa, the youth unemployment rate is 25%. However, the problem is severe in other regions, such as Botswana, Senegal, the Republic of the Congo, and South Africa, among others (Ighobor 2017).

According to the African Development Bank, youth unemployment is twice as high as adults in many African countries. Only 3.1 million jobs are created, whereas 10 to 12 million youth enter the workforce each year, leaving vast numbers of unemployed youth. The costs of youth unemployment in Africa are severe: unemployment influences migration out of Africa, accelerates poorer living conditions, and encourages social unrest in the continent. In particular, youth unemployment is a failure to take advantage of the continent's most significant asset for economic growth: its enormous and increasing population of young talented people. The informal sector employs most of Africa's youth, presenting its problems. The absence of salary jobs drives young people into the informal sector, accounting for nearly 80% of total employment in some countries. Young people and women are more likely to engage in the informal sector than other groups (Ighobor 2017).

Youth unemployment in Africa varies according to the income level of the country and the region it belongs to. From Source: Author's calculation Fig. 4, youth unemployment is severe in the lower-income countries (30% youth unemployment rate) compared to lower-middle (20% youth unemployment rate) and upper-middle/higher-income countries (8.6% youth unemployment rate). Regional-wise, youth unemployment is severe in Southern African countries such as South Africa and Namibia, with a 42.8% of youth unemployment rate. According to regions, East African countries have the lowest unemployment rate for youth, with an 11% of the youth unemployment rate (see Source: Author's calculation Fig. 5).

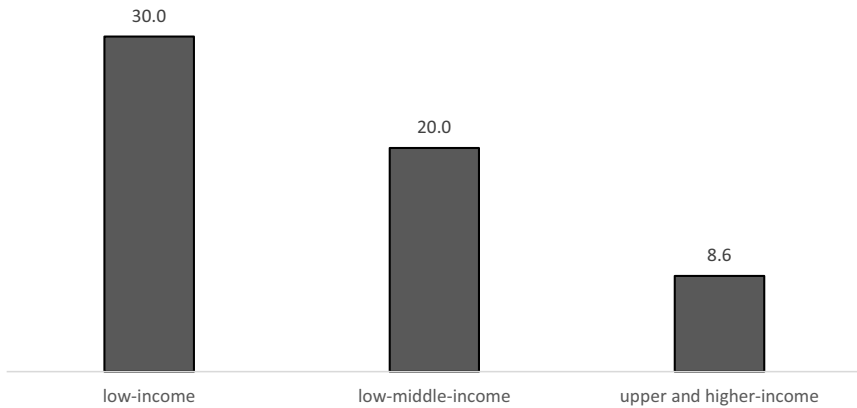


Fig. 4 Youth unemployment rate according to income categories in 2020. *Source:* Author's calculation

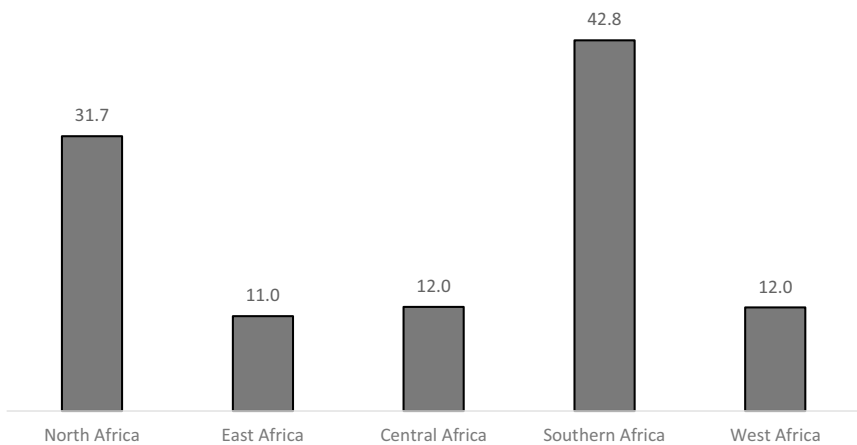


Fig. 5 The youth unemployment rate in each sub-region in 2020. *Source:* Author's calculation

Theoretical and empirical review

This study adopts the "political economy" approach, suggesting that inequality is detrimental to growth through different channels such as rent-seeking activities, social instability, and hence youth unemployment. The rent-seeking models highlight that inequalities encourage the disadvantaged population to become involved in rent-seeking activities such as corruption and government subsidies. These take away wealth from the economy and damage productivity and growth (Dabla-Norris 2005). The political economy approach highlights the relevance of the negative implications for growth brought about by the social and political

instability, in turn, brought about by inequality. It points out that inequality can lead to social unrest. This shortens the duration of the governments in power, which, to maximize their "inter-temporal utility," reduces the time horizon of their economic plans like boosting investment to increase youth employment. More precisely, governments become more inclined to prioritize the current consumption over investment reducing the long-term youth employment (Fernando Delbianco 2014). Galor and Zeira (1993) focused on credit market imperfections. They pointed out that inequality reduces investments in human capital and assuming that credit constraints are binding, higher inequality reduces growth.

The following literatures explore the impact of income inequality on youth unemployment in Africa, which is a problem of the study. Prof. Mthuli Ncube and Anyanwu (2012) examine the impact of income inequality on unemployment across the Middle East and North Africa (MENA) countries. The study found that a one percent increase in income inequality will cause an increase in the unemployment rate by 0.78 percentage points. Yuming Sheng (2011) explored the relationship between income inequality and persisting high unemployment by empirically studying the US economy from 1941 to 2010. Using wage share in personal income (aggregate) as a measure of income inequality, he found a robust trade-off between the wage share in personal income and the unemployment rate. It means that income inequality and the unemployment rate are positively correlated. The results abide with another study by Mercedes Monfort, Javier Ordóñez, and Hector Sala (2018) that examines the convergence patterns of unemployment and income inequality. They found that there is no trade-off between inequality and unemployment to be exploited for economic policy and that the redistributive capacity of governments reduces unemployment. David Castells-Quintana and Vicente Royuela (2012) analyzed the relationship between unemployment and income inequality. The study found that income inequality harms growth hence unemployment among countries with a high level of urbanization and in countries with low levels of urbanization in which there is high and persistent unemployment. Barro (2000) and Ehrhart (2009) provide theoretical and empirical reviews on the several transmission channels through which inequality can affect long-run growth and unemployment. Barro suggested that higher inequality inclines to slow down growth in developing countries and boost growth in richer countries. The Kuznets curve, where inequality increases and later decreases in the economic development process, arises as a clear empirical constancy (Fig. 6).

Ehrhart suggested that there are numerous channels through which inequality might be damaging to growth, specifically three economic explanations (the approach of endogenous fertility, the channel of the capital market imperfections, the argument relating to the domestic market size) and two politico-economic opinions (the method of endogenous fiscal policy and the political instability channel).

William Baah-Boateng (2016) empirically assessed Africa's leading causes of youth unemployment. He found that poor economic growth and population growth intensified African youth unemployment. The study also found that youth unemployment rates vary across gender and geographical location. This study includes population as a control variable that increases youth unemployment.

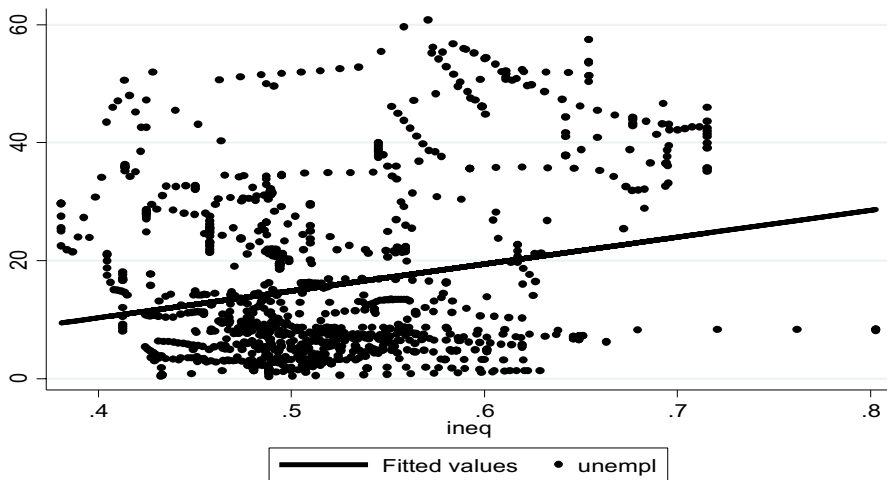


Fig. 6 Fitted regression line between youth unemployment and income inequality (1991–2020). *Source:* Author's calculation

Specifically in Ghana, William Baah-Boateng (2013) again presented the evidence that education and gender, and reservation wage increase unemployment. In Nigeria, the study by Patrick S. O. Uddin and Osemengbe Uddin (2019) examines the causes and effects of youth unemployment. The study found that youth unemployment in Nigeria is caused by population growth, corruption, education, and rural to urban migration. In Tanzania, Robert Msigwa and Erasmus Fabian Kipasha (2013) examine the determinants of youth unemployment in Tanzania. The study found that geographical location, gender, marital status, education, and skills are significant factors in explaining the difference in youth employment status in Tanzania. Anyanwu (2016) presents the features of youth employment in Africa and its determinants. The study found that economic growth, domestic investment, government consumption, inflation, and political stability influence African youth unemployment. Also found that the impact differs across sub-regions.

Mohamed Saney Dalmar, Ali Yassin Sheikh Ali, and Ali Abdulkadir Ali (2017) investigated the determining factors of unemployment in Somalia. The study found that external debt and population growth have a positive a significant impact on unemployment. In contrast, GDP growth, gross capital formation, and the exchange rate negatively and significantly influence unemployment in Somalia. Aiza Shabbir, Shazia kousar, Muhammad Zubair Alam (2020) aimed to analyze the short and long-run relationship between unemployment and macroeconomic variables in South Asian countries. They found that unemployment is negatively influenced by internet users, governance, fixed broadband subscriptions, mobile cellular subscriptions, and human capital. However, population growth and financial activity have a significant and positive relationship with the unemployment rate.

Gaber H. Abugamea (2018) analyzed the factors influencing Palestinian unemployment. The study found that inflation, GDP, external trade, and labor force are primary factors for unemployment in Palestine. Whereas GDP harms the

unemployment labor force, inflation has a positive influence on unemployment significantly. The study by J D Urrutia, R L Tampis, and JB E Atienza (2017) aimed to frame a mathematical model for estimating and forecasting the unemployment rate in the Philippines. The results imply that population and the labor force rate significantly affected the unemployment rate, GDP growth, population, and GNI had a granger-causal relationship with the unemployment rate.

Athia Yumna, M. Fajar Rakhmadi, M. Firman Hidayat, Sarah E. Gultom, and Asep Suryahadi (2015) analyzed the impact of inequality on unemployment in Indonesia empirically. They found that income inequality harms growth while unemployment is severely affected by education inequality. The study also found a U-shaped relationship between inequality and unemployment. This relationship means that initially, inequality may not affect unemployment, but in the long run the impact is realized. The results abide with another study by Lin et al. (2009), who found that income inequality favors high-income countries but harms economic growth in low-income ones. The same result is attained by Shin (2012) from a theoretical standpoint. Herzer and Vollmer (2012) examined the long-run impact of income inequality on long-run growth. They found a negative effect of inequality on growth.

Similarly, Abida and Sghaier (2012) discuss the income inequality-growth relationship in Northern Africa (Algeria, Tunisia, Egypt, and Morocco). They found a negative relationship between income inequality and growth. But different results are found by José Javier Caloca Martínez (2020), who studied the relationship between income inequality and growth. The results found a positive relationship between income inequality and economic growth among low-income countries. Rohan Joshi (2017) analyzed the impact of income inequality and economic growth in Indian states. He also found that income inequality had a strong positive and significant influence on economic growth. There is a trade-off between the two macroeconomic variables. This result contradicts other studies and priori grounds. Lucas Chancel, Denis Cogneau, Amory Gethin, and Alix Myczkowski (2019) investigate that income inequality in Africa compared to other regions or countries from 1990 to 2007. The study found a very high-income inequality in Africa which equals India and Latin America. Central and Southern Africa are particularly unequal.

Fernando Delbianco (2014) explored the connection between income inequality and the economic growth of 20 the Caribbean and Latin American countries. He found that inequality is damaging to economic growth. However, higher inequality inspires economic growth for richer countries, and the relationship becomes positive.

Dr. Thieß Petersen and Dr. Ulrich Schoof (2015) argued that, on the one hand, income inequality has growth-harming effects, for example, declines in demand, social tensions, and political unrest, which lead to an increase in youth unemployment. But on the other hand, income inequality has growth-promoting effects such as investment incentives and more substantial performance incentives. Nevertheless, we should point out that despite a vast empirical literature on the link between inequality and growth, most of the studies reviewed in this section did not focus specifically on the income inequality-youth unemployment relationship

in Africa. Studies on how income inequality affects youth unemployment in the continent are limited, with little evidence capturing the sample from recent years.

Data, model, and methodology

The study uses panel data from 42 African countries spanning 29 years from 1991 to 2020. The data are from secondary sources. Youth unemployment, GDP per capita, population growth, political stability, foreign direct investment, and gross capital formation (a proxy for domestic investment) data are from World Bank Indicators. The income inequality data are from the World Inequality Database (WID). Data on political stability are from World Governance Indicators (WGI). The datasets generated during and analyzed during the current study are available from the corresponding author on reasonable request. The choices of variables are supported by the following kinds of literature Abida and Sghaier (2012), David Castells-Quintana and Vicente Royuela (2012), Aiza Shabbir, Shazia kousar, Muhammad Zubair Alam (2020), Rohan Joshi (2017), William Baah-Boateng (2016), Mohamed Saney Dalmar, Ali Yassin Sheikh Ali, and Ali Abdulkadir Ali (2017), Anyanwu (2016), Dr. Thieß Petersen and Dr. Ulrich Schoof (2015), Prof. Mthuli Ncube and John C. Anyanwu (2012), Gaber H. Abugamea (2018). All variables are shown in Table 1:

The study formulates a dynamic econometric model for the regression analysis, consisting of coefficients and an error term. Therefore, the dynamic econometric model (autoregressive) is specified as follows:

$$\ln Y_{it} = \phi \ln Y_{it-1} + \gamma Z'_{it} + \beta X'_{it} + d_t + \varepsilon_{it}$$

where y_{it} represents the dependent variable (youth unemployment), Z'_{it} represents control variables, X'_{it} represents an explanatory variable, d_t represents the year dummy variable, and ε_{it} means the error term. Lastly, ϕ , β , and γ , represent the unknown parameters to be estimated. i and t represent country and time (year), respectively.

The study employs the Generalized Method of Moments (GMM) for estimation. Arellano and Bover (1995) and Blundell and Bond (1998) developed assumptions under which the study can use the GMM estimator to remove the problem of weak instruments (Bond 1991; Bover 1995).

Other models (such as pooled OLS, random and fixed effect) are weak when the lagged variables are correlated with the error term even if the study assumes that the disturbances are not to-correlated (Babajide Wintoki 2012). To reduce this problem, the study will employ the Arellano-Bond/Blundell-Bond estimator, which addresses the problem of omitted variable bias, endogeneity, and unit root effects in the choice of the instruments (Bond 1991; Bond 1998).

First, the study differentiates the variables to remove any major bias that may arise in the time-variant variable heterogeneity. Then these first differences are used as instrument variables in an equation with level variables (Roodman 2009).

Table 1 Variable name, definition, and source and expectation

Variable	Definition	Source	Priori expectations
unemplo	Youth unemployment rate (% of total labor force ages 15–24)	World Bank (WDI)	+
ineq	Income inequality (top 10% share)	World Inequality Database	–
gdp	GDP per capita growth (annual %)	World Bank (WDI)	+
Pop	Population growth (annual %)	World Bank (WDI)	–
Politins	Political stability and absence of violence—estimate of governance (ranges from approximately –2.5 (weak) to 2.5 (strong) governance performance)	World Governance Indicators (WGI)	–
Fdi	Foreign direct investment (% of GDP)	World Bank (WDI)	–
Gcf	Gross capital formation (% of GDP)	World Bank (WDI)	–

Table 2 Regression results between youth unemployment and income inequality

Model	(diff.gmm)	(diff.gmm)	(diff.gmm)	(diff.gmm)	(diff.gmm)	(diff.gmm)
Variables	lnunempl	lnunempl	lnunempl	lnunempl	lnunempl	lnunempl
L.lnunempl	0.396** (0.192)	0.456** (0.185)	0.455** (0.186)	0.451** (0.186)	0.437** (0.187)	0.433** (0.188)
lnineq	0.771* (0.400)	0.752* (0.385)	0.752* (0.384)	0.742* (0.383)	0.749* (0.386)	0.762* (0.393)
lngdp		-0.0144** (0.00716)	-0.0145** (0.00728)	-0.0139* (0.00720)	-0.0140* (0.00714)	-0.0137* (0.00704)
pop			-0.00111 (0.00457)	-0.00167 (0.00451)	-0.00149 (0.00462)	-0.00153 (0.00463)
politi				-0.0219** (0.00935)	-0.0226** (0.00944)	-0.0236** (0.00919)
fdi					-0.00259* (0.00154)	-0.00262* (0.00154)
lngcf						0.00508 (0.00499)
<i>Diagnostic tests</i>						
Hansen test ^a	0.214	0.211	0.174	0.253	0.301	0.309
AR (1)	0.217	0.178	0.178	0.183	0.190	0.192
AR (2) ^b	0.178	0.171	0.170	0.175	0.181	0.182
Observations	840	840	840	840	840	840
Number of id	42	42	42	42	42	42

Robust standard errors in parentheses

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

^aTo test if the model is correctly specified, the Hansen test is performed. The result shows that the p -value is above 10% in all columns which means the study fails to reject the null hypothesis that the model is correctly specified

^bAutocorrelation test results have the p -value above 10% in all columns the study fail to reject the null hypothesis that there is no autocorrelation

The difference GMM corrects endogeneity by transforming all regressors by differencing. And therefore, the model is changed as follows:

$$\ln \Delta Y_{it} = \phi \ln \Delta Y_{it-1} + \gamma \Delta Z'_{it} + \beta \Delta X'_{it} + d_t + \varepsilon_{it}$$

Results and discussions

Table 2 represents regression results between youth unemployment and income inequality. In the first column (simple regression), the results suggest that income inequality positively and significantly impacts African youth unemployment. The positive coefficient implies that a one percent increase in income inequality increases African youth unemployment by 0.77 percent. The results correspond with the priori hypothesis of the study and other studies (Barro 2000; Mercedes Monfort 2018; Sheng 2011; Castells-Quintana 2011; Athia Yumna 2015; Anyanwu 2012).

After including GDP per capita as a control variable in the second column, the results also imply that income inequality positively and significantly impacts African youth unemployment. The positive coefficient suggests that a one percent increase in income inequality increases African youth unemployment by 0.75 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature.¹ The GDP per capita as a control variable is statistically significant, implying that it affects youth unemployment in Africa. The negative coefficient means that a one percent increase in GDP per capita decreases African youth unemployment by 0.01 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature (Anyanwu 2013; William Baah-Boateng 2016).

After including population growth as another control variable in the third column, the results still imply that income inequality positively and significantly impacts youth unemployment in Africa. The positive coefficient means that a one percent increase in income inequality increases youth unemployment in Africa by 0.75 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature. The GDP per capita as a control variable is still statistically significant, implying that it affects youth unemployment in Africa. The negative coefficient means that a one percent increase in GDP per capita decreases African youth unemployment by 0.01 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature. The population growth as a control variable is statistically insignificant, implying that it does not affect African youth unemployment. This result does not abide by the hypothesis and other empirical literature (William Baah-Boateng 2016; Uddin 2013).

In the fourth column, after adding political stability as another control variable, the results still imply that income inequality positively and significantly impacts youth unemployment in Africa. The positive coefficient means that a one percent increase in income inequality increases youth unemployment in Africa by 0.74 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature. The GDP per capita as a control variable is still statistically significant, implying that it affects youth unemployment in Africa. The negative coefficient means that a one percent increase in GDP per capita decreases youth unemployment in Africa by 0.01 percent when other factors remain constant.

¹ Barro (2000), Mercedes Monfort (2018), Sheng (2011), Castells-Quintana (2011), Athia Yumna (2015) and Anyanwu (2012).

This result abides with the hypothesis and other empirical literature. Political stability as a control variable is statistically significant, implying that it does affect youth unemployment in Africa. The negative coefficient means that the stronger the political stability the lower the youth unemployment. This result follows the hypothesis and other empirical literature (Anyanwu 2013).

In the fifth column, after adding foreign direct investment as another control variable, the results still imply that income inequality positively and significantly impacts youth unemployment in Africa. The positive coefficient means that a one percent increase in income inequality increases youth unemployment in Africa by 0.74 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature. The GDP per capita as a control variable is still statistically significant, implying that it affects youth unemployment in Africa. The negative coefficient means that a one percent increase in GDP per capita decreases youth unemployment in Africa by 0.01 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature. Political stability as a control variable is still statistically significant, implying that it does affect youth unemployment in Africa. The negative coefficient means that a one percent increase in political stability decreases youth unemployment by 2 percent. This result does abide with the hypothesis and other empirical literature (Anyanwu 2013). Foreign direct investment as the added control variable is statistically significant, implying that it does affect youth unemployment in Africa. The negative coefficient means that a one percent increase in foreign direct investment inflow decreases youth unemployment by 2 percent.

In the last column, after adding gross capital formation as another control variable, the results still imply that income inequality positively and significantly impacts youth unemployment in Africa. The positive coefficient means that a one percent increase in income inequality increases youth unemployment in Africa by 0.76 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature. Gross capital formation as a control variable is statistically insignificant, implying that it does not affect youth unemployment in Africa. This result does not abide by the hypothesis and other empirical literature (Mohamed Saney Dalmar 2017).

Table 3 represents regression results between youth unemployment and income inequality based on the income categories. The first column suggests that income inequality positively and significantly impacts youth unemployment in Africa's lower-income countries like Burundi and Congo. The positive coefficient implies that a one percent increase in income inequality increases African youth unemployment by 0.78 percent when other factors remain constant. The results correspond with the priori hypothesis of the study and other studies (Barro 2000; Mercedes Monfort 2018; Sheng 2011; Castells-Quintana 2011; Athia Yumna 2015). All other control variables are statistically insignificant.

The results of the second column with lower-middle-income countries such as Kenya imply that income inequality has no significant impact on African youth unemployment. Foreign direct investment is statistically significant affecting youth unemployment in lower-middle-income countries. Its negative coefficient implies that a one percent increase in foreign direct investment inflow decreases youth

Table 3 Regression results between youth unemployment and income inequality according to income categories

Income category	(Lower)	(Lower–middle)	(Upper middle and higher)
Variables	lnunempl	lnunempl	lnunempl
L.lnunempl	0.704*** (0.0948)	0.348*** (0.103)	0.609*** (0.189)
lnineq	0.871*** (0.287)	0.711 (0.718)	0.722* (0.346)
lngdp	-0.0110 (0.00918)	-0.00280 (0.00592)	-0.0210 (0.0147)
pop	0.00406 (0.0251)	-0.0257 (0.0301)	-0.00164 (0.0178)
politi	-0.0151 (0.0159)	-0.0589 (0.0458)	-0.0192 (0.0337)
fdi	-0.000588 (0.00196)	-0.00436* (0.00261)	-0.00255 (0.00332)
lncaf	0.00237 (0.00744)	-0.0130*** (0.00494)	0.0107 (0.0129)
<i>Diagnostic tests</i>			
Hansen test ^a	0.431	0.171	0.997
AR (1)	0.001	0.100	0.130
AR (2) ^b	0.788	0.132	0.133
Observations	348	116	376
Number of id	16	6	20

Standard errors in parentheses

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

^aTo test if the model is correctly specified, the Hansen test is performed. The result shows that the p -value is above 10% in all columns which means the study fails to reject the null hypothesis that the model is correctly specified

^bAutocorrelation test results have the p -value above 10% in all columns the study fail to reject the null hypothesis that there is no autocorrelation

Table 4 Correlation matrix

	lnunempl	lnineq	Pop	lngdp	politi	fdi	lncaf
lnunempl	1						
lnineq	0.0928**	1					
pop	-0.562***	-0.126***	1				
lngdp	-0.189***	-0.0139	0.126***	1			
politi	0.194***	0.323***	-0.204***	0.0231	1		
fdi	-0.00834	0.0882**	0.0785*	0.121***	0.0150	1	
lncaf	0.106**	-0.0895**	-0.0148	0.0525	0.0959**	0.101**	1

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

unemployment by 0.4 percent. Gross capital formation is statistically significant affecting youth unemployment in lower-middle-income countries. The negative coefficient implies that a one percent increase in gross capital formation decreases youth unemployment by 1 percent. This result does abide by the hypothesis and other empirical literature.

In the third column, the results imply that income inequality positively and significantly impacts youth unemployment in upper-middle and higher-income countries. The positive coefficient suggests that a one percent increase in income inequality increases African youth unemployment by 0.72 percent when other factors remain constant. This result abides with the hypothesis and other empirical literature. All other control variables are statistically insignificant.

Table 4 presents the model's correlation matrix showing the relationship between variables. The results suggest that income inequality has a positive and statistically significant association with African youth unemployment. Other variables which are also positive and statistically significant with youth unemployment in Africa are political stability and gross capital formation. Economic growth, population, and foreign direct investment have a negative and statistically significant relationship with African youth unemployment.

Conclusion

Therefore, the study has provided empirical evidence that income inequality accelerates the youth unemployment problem in Africa. With financial status being the critical factor for employment, youths from poorer families are becoming increasingly discouraged. This situation can be the prime factor for social unrest. Unless young people have genuine prospects of improving their economic and social status, the gap between rich and poor will continue to expand, making a vicious cycle that is hard to escape. Thus, having a solid middle class and the right policies might decrease income inequalities. In this reverence, donor interventions and good government policies will reduce income inequalities and African youth unemployment levels.

Whatever the specific circumstances and history of a country, the following measures can reduce income inequalities across the region: reversing urban favoritism in economics and services, growing productivity among small-scale farmers, guaranteeing women's economic opportunities and access to land, encouraging labor-intensive industries, enhancing capacities to prevent the wealthy from evading taxes, presenting robust social protection programs, setting minimum wages and better financial services access to young people in the continent.

Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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