Child Indicators Research
https://doi.org/10.1007/s12187-025-10235-9

Unveiling the Economic Determinants of Child Labour in Africa: A Comprehensive Study of 37 Countries

Himashi Muthugala[1] · **Tharaka Magammana**[1] · **Amanda Bandara**[1] · **Ayodhya Perera**[1] · **Ruwan Jayathilaka**[2]

Accepted: 28 February 2025

Abstract
This study investigates the impact of unemployment, household income and expenditure, globalisation, and foreign direct investment (FDI) on child labour across 37 African countries from 2010 to 2021, employing panel and multiple linear regression models. The findings reveal diverse impacts: rising unemployment significantly increased child labour in countries like Ethiopia and Niger, while in Cameroon and Kenya, it had a negative effect. Globalisation's influence varied, strongly reducing child labour in Ghana but exacerbating it in Burundi. Household income and expenditure generally reduced child labour, particularly in Ethiopia and Zambia. The effect of FDI was also mixed, decreasing child labour in Madagascar but increasing it in countries with weaker governance. These insights underscore the necessity for tailored, country-specific policies that consider local economic conditions and governance quality. Future efforts to combat child labour must focus on developing sustainable solutions that address these complex dynamics.

Keywords Child Labour · Africa · Household Expenditure · Household Income · Globalisation · FDI · Unemployment

1 Introduction

Child labour remains a persistent global issue, with far-reaching adverse effects on children's education, health, and overall well-being (Parker, 1997). As defined by the International Labour Organization (ILO), child labour refers to work that interferes with a child's education and development or poses a risk to their health (ILO, 2023a). Numerous studies have highlighted the long-term consequences of child labour, including stunted physical growth, cognitive impairments, and increased vulnerability to psychological distress (Ibrahim et al., 2019).

Extended author information available on the last page of the article

Published online: 10 March 2025

The ILO has been at the forefront of efforts to combat child labour, defining a "child" as any person under the age of 18, as outlined in the Worst Forms of Child Labour Convention No. 182 (ILO, 1999). Additionally, the Minimum Age for Work Convention No. 138 (1973) sets the general minimum age for employment at 15 years, with provisions for light work starting at 13 and the minimum age for hazardous work at 18 years or 16 under strict conditions (ILO, 2018). However, many countries, particularly in low-income regions and those within the African continent, struggle to fully implement these regulations.

1.1 Child Labour in Africa

According to the Global Estimates of child labour from the ILO, an overwhelming 72.1 million African children are currently engaged in some form of labour, representing roughly one-fifth of the continent's child population. This prevalence is more than twice that of any other continent globally, underscoring the severity of the issue in Africa (ILO, 2020). Economic pressures often force African children to work from a young age (Agbu, 2009), exacerbated by socio-economic factors, including those examined in this study (Basu, 1999).

The issue of child labour in Africa is worsened by a combination of socio-economic challenges, including household poverty, high unemployment rates, and inadequate access to basic needs. These factors often push families to rely on their children's labour as a source of income or subsistence, making child labour a survival strategy in many African households. This not only deprives children of their right to education and development but also perpetuates the cycle of poverty and inequality across generations.

Despite extensive research on child labour, the socio-economic drivers behind its persistence in African countries remain underexplored. Previous studies have often focused on economic growth, education, or demographics as primary factors contributing to child labour (Ingutia et al., 2020; Lee et al., 2021). Variables such as globalisation (GLB), household income and expenditure (HIE), unemployment (UNE), and foreign direct investment (FDI) have not been thoroughly examined in relation to child labour across the continent. Thus, Africa is used as the main study area for this research.

Considering the aforementioned factors, the main aim of this study is to investigate the impact of four key socio-economic factors, HIE, UNE, GLB, and FDI on child labour across the African continent. Using data from 37 countries spanning from 2010 to 2021, the present research aims to address the following question: What is the impact of household income and expenditure, unemployment, globalisation, and FDI on child labour in Africa? To explore this question, the study tests the following hypotheses:

Hypothesis 1 Household income and expenditure have a significant impact on child labour in Africa, with effects that can vary both positive and negative directions.

Hypothesis 2 Unemployment has a significant impact on child labour, demonstrating both positive and negative effects depending on the context.

Hypothesis 3 Globalisation has a significant impact on child labour, based influenced by a country's level of economic development and global integration.

Hypothesis 4 Foreign direct investment significantly impacts child labour, influenced by the sectors and regulatory environments in which investments occur.

By examining these hypotheses, the study seeks to provide a comprehensive analysis of the aforementioned socio-economic determinants of child labour, offering valuable insights for policymakers and stakeholders working to address this pervasive issue. While child labour remains a pressing global concern in Africa, understanding its multifaceted attributes alongside the impacts of GLB, HIE, UNE, and FDI is crucial. Several studies have explored these dynamics, offering both converging and diverging perspectives. Figure 1 illustrates the distribution of literature across years exploring the relationship between each variable and child labour.

Focusing on the impact of UNE on child labour in the African context, existing literature presents a complex narrative, with studies showing both negative and positive impacts of UNE on child labour. Moreover, some past studies suggest that while child labour may provide short-term financial benefits in the long run, it could have negative impacts through lower wages and continued poverty, thereby reinforcing the cycle of UNE and child labour (Emerson & Souza, 2002).

In earlier studies on child labour, researchers argue that economic hardship, particularly UNE, drives families to rely on child labour for survival (Anker, 2000; Fallon & Tzannatos, 1998) Although these studies provide new insights, most rely heavily on theoretical framework without offering practical solutions for specific regions. In contrast, later research provides empirical evidence from Ghana, linking low household income and UNE to hazardous child labour in rural areas, but still remains narrow in regional scope (Blunch & Verner, 2001). Collectively, these studies emphasise

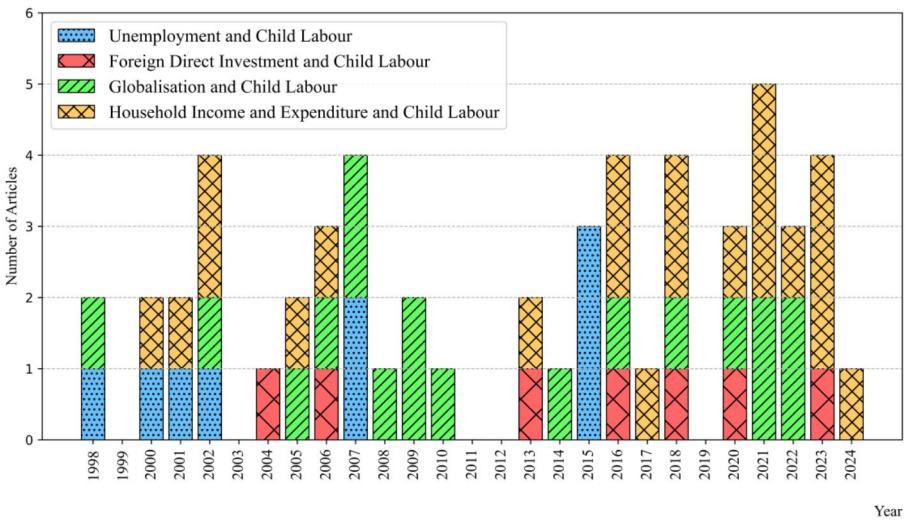

Fig. 1 Relationship between the variables. Source: Based on authors' illustrations

the complex relationship between UNE and child labour while also limiting the application of their findings across diverse contexts.

Studies from 2007 onwards emphasise the long-term consequences of child labour on future employment opportunities and highlight the role of UNE in driving child labour. Researchers argue that early entry into the labour market limits the educational and human capital growth of children, leading to higher UNE and underemployment in adulthood (Roggero et al., 2007). A study from the same year shows that when a father experiences UNE, children are often pushed into the workforce to compensate for lost income; however, the focus on urban settings and male household heads limits the broader applicability of these finding (Duryea et al., 2007). Further studies highlight how mismatches between educational outcomes and labour market demands, particularly in Ethiopia, are often exacerbated by high youth unemployment, suggesting that aligning education with market needs could reduce entry into informal employment, such as child labour (Araya, 2015). Bandara et al. (2015) highlight that in Tanzania, income shocks caused by UNE increase child labour, with boys working more and girls dropping out of school. However, the rural focus constrains the generalisability of the study. Additionally, it is argued that child labour is a household response to UNE shocks in the absence of social safety nets, which brings a new perspective to the discussion (Fabre & Pallage, 2015). However, the long-term consequences for children and the feasibility of implementing such policies in developing countries are often overlooked.

Recent studies continue to highlight the significant role of socio-economic factors, particularly UNE in prevailing child labour. For instance, Mehari (2020) finds that child labour in Ethiopia is heavily influenced by the employment status and literacy of household heads. However, the study's lack of policy recommendations limits its practical utility. Extending this analysis, another study shows that in Cameroon children are more likely to engage in labour when household heads are facing UNE suggesting that improving adult employment and education could lower child labour rates (Bikoue, 2021). However, this study overlooks the influence of broader government policies or international labour regulations. Similarly, Elamin (2023) reveals that paternal unemployment in Sudan significantly increases the likelihood of school dropouts, leading to more children entering the workforce. Additionally, a recent study focusing on Nigeria (Sule Magaji, 2024) highlights that high UNE forces families to rely on child labour compromising their welfare. Although the localised focus of these studies offers valuable insights, it limits their broader applicability. Collectively, these recent works reinforce earlier findings while also underscoring gaps in addressing systemic factors and policy interventions to combat child labour.

Discussions on the impact of HIE on child labour reveal a complex and multifaceted relationship, with studies presenting both positive and negative effects. An early comprehensive analysis by Anker (2000) points out how low HIE pushes families to involve children in labour to meet the basic needs of the household while offering valuable insights into the financial pressures driving child labour in Africa. However, its lack of focus on immediate policy interventions limits its practical application. Similarly, another study that focuses on Ghana finds that rising HIE tends to decrease child labour especially when income supports education and reduces vulnerability within the household (Blunch & Verner, 2001). Nonetheless, their focus on economic

factors may overlook social and cultural influences. Extending these findings, other studies again emphasise this impact while showing how poverty perpetuates child labour across generations in Africa (Admassie, 2002; Emerson & Souza, 2002). However, Admassie (2002) introduces an unexpected positive link between HIE and child labour, complicating earlier assumptions.

Beegle et al. (2006) add a new dimension to the HIE-child labour discussion by highlighting that income shocks and limited credit access drive families to rely on child labour as a coping mechanism, expanding the analysis beyond HIE alone. However, this study downplays immediate solutions such as cash transfers or educational incentives, which could provide short-term relief in reducing child labour. Together, these earlier studies reflect the complexity of addressing child labour through income-related policies, suggesting that broader structural and cultural considerations are necessary for effective intervention. Webbink et al. (2013) show that both household and contextual factors such as low education levels and unskilled labour significantly influence the negative impact of HIE on child labour. Their work underscores the complexity of this relationship, as it varies across different regions and social contexts. A study on Sierra Leone highlights that while child labour is a negative response to poverty it can also be a means for children to finance their education when HIE levels increase (Maconachie & Hilson, 2016). This finding demonstrates the dual impact of HIE on child labour in Africa. Similarly, Edmonds (2016) finds that lower HIE correlates with higher child labour rates, but when income rises, families become less dependent on child labour, emphasising economic growth as a key factor in reducing child labour. However, the study's limits in providing immediate actionable insights are notable. Dammert et al. (2017) examine the role of public policies, such as cash transfer programmes, in reducing child labour by improving HIE. While the study identifies research gaps, it lacks real strategies for addressing them. Further complicating the narrative, studies show that in wealthier households, child labour displays a downward trend while in others, high income leads to increased child labour due to family businesses (Ali, 2018). This finding challenges the assumption that higher HIE universally reduces child labour, highlighting the need for targeted policies that account for varying household dynamics.

Extending earlier findings on the negative impact of HIE Hamenoo et al. (2018) reveal that low HIE significantly increases child labour as children work to support their families focusing on Pokuase, Accra. This study employs Bronfenbrenner's ecological systems theory to explore the multifaceted drivers of child labour, offering a more in-depth understanding of how structural factors exacerbate the issue. Economic distress, such as situations caused by drought, can compel families to increase their reliance on child labour for survival (Kebede et al., 2021). This finding suggests that interventions should align with climate resilience strategies. However, the use of survey data in this study raises concerns about recall bias.

Widening the discussion on the multifaceted impacts of HIE, studies show that while higher HIE generally reduces child labour, it may paradoxically increase in situations where families invest in local production (Basu and Dimova 2022). This research employs a multidimensional approach to analyse the cocoa value chain in Côte d'Ivoire and Ghana. In rural Ethiopia, studies find a negative correlation where increased HIE reduces the likelihood of child labour while examining individual,

household, and community-level factors (Abiye & Hailu, 2021). However, the limited geographic focus and reliance on cross-sectional data constrain the generalisability of the study's findings. A recent study in Mozambique highlights how limited access to adult labour leads to low HIE rates, which in turn increases dependence on child labour (Fumagalli & Martin, 2023). Nevertheless, the focus on Nampula province limits broader applicability, while the programme's mixed effects on schooling underscore the complexity of addressing child labour. In a more recent study, Musa and Magaji (2023) underscore the significant negative relationship between HIE and child labour, aligning with previous research that identifies economic factors as primary determinants. Despite this recurring inverse relationship, some studies have also highlighted the dual impacts of HIE on child labour over time, suggesting that higher HIE may not always reduce child labour and calling for more nuanced policy responses.

FDI plays a complex role in influencing child labour, with both positive and negative impacts evident in the literature. Despite extensive global research on FDI's broader economic effects, recent studies specifically addressing FDI's impact on child labour in Africa remain limited, highlighting the need for focused research to understand how weak labour protections and economic vulnerability shape these outcomes. One early study on sub-Saharan Africa highlights that while multinational enterprises tend to avoid investing in countries with high levels of child labour nations with a comparative advantage in labour intensive goods often attract FDI by relying on child labour (Busse & Braun, 2004). Another study presents similar findings while arguing that child labour can deter FDI by harming economic development and reducing the availability of skilled workers (Braun, 2006). This is particularly pertinent for African nations with high child labour rates, suggesting that efforts to reduce child labour could improve human capital and attract more FDI. Building on these findings, (Hilliard, 2010) observes that while FDI can reduce child labour in some instances, it can also contribute to its increase in industries that are highly dependent on cheap labour. The study stresses the need for strong monitoring and regulatory frameworks to ensure that FDI supports child welfare in Africa. However, its broad conclusions may overlook significant local variations. Further research reveals the sector-specific impacts of FDI. For example, studies in Kenya and Mali show that FDI in the mining sector exacerbates child labour, while FDI in agriculture in Côte d'Ivoire and Ghana is also linked to higher rates of child labour (Doytch et al., 2014). Although these insights are valuable, they may not be applicable to the entire African region. Conversely, a study in sub-Saharan Africa finds that FDI inflows have an insignificant effect on child labour, attributing this to the region's low FDI levels (Che & Sundjo, 2018). Despite employing rigorous panel data analysis, this study may overlook the nuanced country-specific effects of FDI. A more comprehensive study across 44 African countries shows that increases in income per capita, which occur due to FDI, significantly reduce child labour rates (Burhan et al., 2016). While the study offers insightful recommendations for policymakers, it also narrows its key focus and limits its broader regional applicability.

Adding a new perspective to the existing discussion, Kechagia and Metaxas (2020) find that while FDI is positively associated with child labour among boys, it negatively affects girls. Although this study is pioneering in exploring the gendered

impacts of FDI, its methodological limitations may obscure the complex realities of child labour. In a subsequent study, the same authors suggest that while FDI can raise income, it may also increase demand for cheap labour, which leads to more child labour through a substitution effect (Kechagia & Metaxas, 2023). Their research identifies a unidirectional causal relationship where FDI inflows contribute to child labour but not vice versa, highlighting the persistent challenge of child labour in the African region despite global declines.

Old studies argue that while GLB can push children into labour, especially in export industries, it is also sometimes necessary for family survival (White, 1996). This view criticises the blanket elimination of child labour without considering local economic conditions and advocates for policies that balance these factors. In another study Cigno et al. (2002) find that while trade openness may reduce child labour by raising incomes and fostering growth, in areas with weak labour regulations, foreign investments tend to increase child labour. While these studies depend on broad indicators, they oversimplify the complex relationship between GLB and child labour, neglecting local dynamics. Neumayer and de Soysa (2005) suggest that increased trade openness can reduce child labour; however, their broad focus on developing countries without addressing specific regions limits the relevance to African contexts. Similarly, EV Edmonds and Pavcnik (2006) highlight that while higher levels of trade are associated with lower child labour, the control for income reveals no direct relationship between trade and child labour, indicating that income effects rather than trade are at play. However, the study fails to examine how particular sectors may still affect child labour despite this broader trend. Further studies indicate that trade openness typically reduces child labour while also showing that in regions with weaker labour regulations, GLB leads to high child labour rates (Kis-Katos, 2007). However, this study oversimplifies the relationship by focusing on general indicators.

Other studies emphasise the mixed impacts of GLB on child labour. Dinopoulos and Zhao (2007) claim that trade policies promoting the modern sector and FDI reduce child labour by encouraging skilled adult employment. However, this analysis overlooks factors such as household poverty and lack of education. Similarly, other studies argue that GLB exacerbates child labour by increasing the vulnerability of poor families who use child labour as a survival strategy (Wickramasekara, 2008). This study, however, lacks detailed case analyses and numerical data to confirm its claims. Davies and Voy (2009) find a negative correlation between GLB and child labour while attributing this reduction to income gains rather than GLB directly, highlighting the study's limited exploration of broader GLB processes. Another study claims GLB is the primary cause of child labour, arguing that global competition leads companies to seek cheap labour among impoverished populations (Panjabi 2009). However, the study's lack of specific country analyses weakens its ability to offer deeper insights into localised dynamics.

Recent studies further highlight the complex and context-dependent relationship between GLB and child labour. Ozcan and Hakan (2010) observed a U-shaped relationship between income, trade openness and child labour, where child labour initially decreases as income rises, but then increases at higher income levels due to economic pressures. Another study, which emphasises the varying impacts of GLB on child labour, shows that this outcome changes significantly based on country-spe-

cific conditions (Che & Sundjo, 2018). Studies also argue that trade liberalisation can reduce child labour by stimulating economic growth and household income, while emphasising the dependence on strong policies (Tariq & Ab-Rahim, 2020). However, the study does not explore in detail how these policies could address this negative impact. Samuel Okunade (2021) discusses how GLB increases economic pressure on families in sectors such as cocoa farming, where the demand for cheap labour is high. While the study advocates for stronger preventive measures, it also lacks an evaluation of existing policies. Offering a critical view of GLB's role in increasing child labour, a study shows that in the Democratic Republic of Congo (DRC), particularly in cobalt mining, child labour is driven by global demand (Sovacool, 2021). This analysis highlights the challenges of addressing child labour without tackling the underlying socio-economic issues. The study from Hindawi (2022) again identifies both positive and negative effects of GLB on child labour, arguing that while social globalisation may advance human rights, economic globalisation can increase, child labour in regions with weak governance. Focusing on Gahana Gatsinzi and Hilson (2022) also show that GLB has a dual effect on child labour, with global demand for labour commodifying children. Although the study provides valuable insights into societal dynamics, its limited focus on Ghana restricts broader application. In conclusion, while GLB has the potential to reduce child labour through economic growth, its overall impact remains mixed and dependent on local conditions, policies, and regulatory frameworks.

Almost all the studies discussed above, focusing on Africa, either analyse the impact of each variable in isolation or add other controlling factors. Thus, there is a significant gap in the literature regarding the discussion of socio-economic factors collectively in one study. Consequently, the current study aims to investigate the impact of HIE, UNE, FDI, and GLB on child labour in African countries from 2010 to 2021. This study's significance to the existing literature stands out in four key areas.

Firstly, this research fills a notable gap in the literature by simultaneously examining the influence of HIE, UNE, GLB, and FDI on child labour within the African context. While extensive research has explored child labour, very few studies have analysed these specific economic and social factors. To the best of the authors' knowledge, no previous literature has comprehensively assessed the impact of all these factors on child labour with a holistic view, particularly through a country-wise analysis across 37 individual African countries.

Secondly, by concentrating on the African region, where child labour rates are among the highest globally, the study provides insights into the unique economic and socio-political dynamics that influence child labour in this context. This focus offers valuable, region-specific knowledge that is directly applicable to policymakers and stakeholders working to address child labour issues in African countries, which has not been comprehensively addressed before.

Thirdly, by utilising data from 2010 to 2021, this study captures trends and changes over a decade, with 2021 representing the most recent available data. This longitudinal perspective is essential for understanding the long-term effects of HIE, GLB, UNE, and FDI on child labour, enabling the identification of patterns and trends that

might be missed in shorter-term analyses. This approach adds a novel dimension to the existing literature.

Finally, the study offers variable-specific and overarching policy implications to address child labour in Africa providing evidence-based recommendations for targeted interventions. These findings are crucial for guiding African countries toward effective strategies to combat child labour and improve child welfare. Additionally, the study's insights have global relevance, as similar strategies could be applied in other regions facing child labour challenges. By filling a significant gap in the literature, this research offers a comprehensive analysis of how socio-economic factors impact child labour across Africa, using a decade of data and providing both regional and global policy guidance.

The remainder of this paper is organised as follows: the next section outlines the methodology followed by a discussion of the results. Finally, the paper concludes with policy implications, future research suggestions, limitations, and a conclusion.

2 Data and Methodology

This research employed a secondary data analysis approach, utilising a panel dataset that encompasses 37 African countries over a 12-year period from 2010 to 2021. The analysis includes a total of 444 observations for the main panel regression analysis, while the country-wise multiple linear regression (MLR) analysis comprises 12 observations for each country. The selection of this timeframe was primarily driven by the availability of data for the chosen variables. Although the aim was to include all African nations, limitations in child labour data for certain countries necessitated their exclusion from the dataset. Data were collected under the following variables: child labour, GLB, UNE, FDI, and HIE. Detailed information on the sources and variables is provided in Table 1, and the data file used for the analysis is presented in the S1 Appendix.

Data processing and analysis for the initial discussion involved several steps. First using child labour data, line charts were created to depict global and country specific child labour trends. These charts visually represent fluctuations in child labour within each region and individual African nation over the study period. Next, STATA software was employed to generate descriptive statistics for each variable across all countries. Boxplots were subsequently created to display the distribution of data, identifying outliers and comparing different groups (Tukey, 1972; Velleman & Hoaglin, 2012). Finally, thematic maps with bar charts were generated for two distinct periods encompassing all research variables to facilitate a visual comparison of variations across African countries.

The research design, illustrated in Fig. 2, outlines a series of systematic steps for the main analysis, which were crucial in addressing the study's central question: how socio-economic factors influence child labour in African countries.

Before performing the main regression analysis, unit root tests were employed to ensure the stationarity of the variables, a critical assumption for accurate time-series and panel data analysis (Im et al., 2003; Levin et al., 2002). Stationary data are necessary to avoid misleading results due to trends or seasonality. Furthermore,

Table 1 Data sources and variables

Variable	Definition	Measure	Data Source
Child Labour	Refers to work that deprives children (individuals under 18) of their childhood, undermines their potential and dignity, and poses risks to their physical and/or mental development.	Percentage of 5–14 aged population children	U.S. DEPARTMENT OF LABOUR Findings on the Worst Forms of child labour | U.S. Department of Labour (dol.gov)
Globalisation (GLB)	Refers to a process that connects national boundaries, integrates national economies, cultures, technologies and governance and produces complex relations of mutual interdependence.	KOH GLB Index	KOF Swiss Economic Institute KOF GLB Index – KOF Swiss Economic Institute | ETH Zurich
Unemployment (UNE)	Refers to individuals without work, seeking work in a recent past period, and currently available for work, including people who have lost their jobs or who have voluntarily left work.	Percentage of Total Labour Force	Our World in Data UNE rate, 2021 (ourworldindata.org)
Foreign Direct Investments (FDI)	Refers to cross-border investments which a resident from one country holds significant authority of at least 10% ownership over a business in another country. It includes equity capital, reinvested earnings, and other financial flows.	Percentage of GDP	World Bank Foreign direct investment, net inflows (% of GDP) | Data (worldbank.org)
Household Income/Expenditure (HIE)	Refers to the market value of all final goods and services, including durable products, purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings.	Percentage of GDP	World Bank Households and NPISHs final consumption expenditure (% of GDP) | Data (worldbank.org)

Source: Compiled by authors

authors conducted recursive CUSUM plots to examine model stability, which helped detect structural changes within the regression model over time (Brown et al., 1975). Multicollinearity was assessed using the Variance Inflation Factor (VIF), a standard method for detecting the degree to which independent variables are correlated to ensure the results are unbiased (Gujarati & Porter, 2009). Robust standard errors were applied in both the panel regression and MLR models to address any potential heteroskedasticity. Ensuring both stationarity and model stability, along with addressing multicollinearity, reinforces the credibility and reliability of the study's results (Granger & Newbold, 1974).

2.1 Panel Regression Model Analysis

To answer the research question of how GLB, HIE, UNE, and FDI affect child labour, the authors employed panel regression models. The use of panel data is well-established in prior literature as an effective approach for studying the socio-economic determinants of child labour (Edmonds & Pavcnik, 2006; Neumayer & de Soysa, 2005). Panel regression models allow for accounting for both cross-sectional (coun-

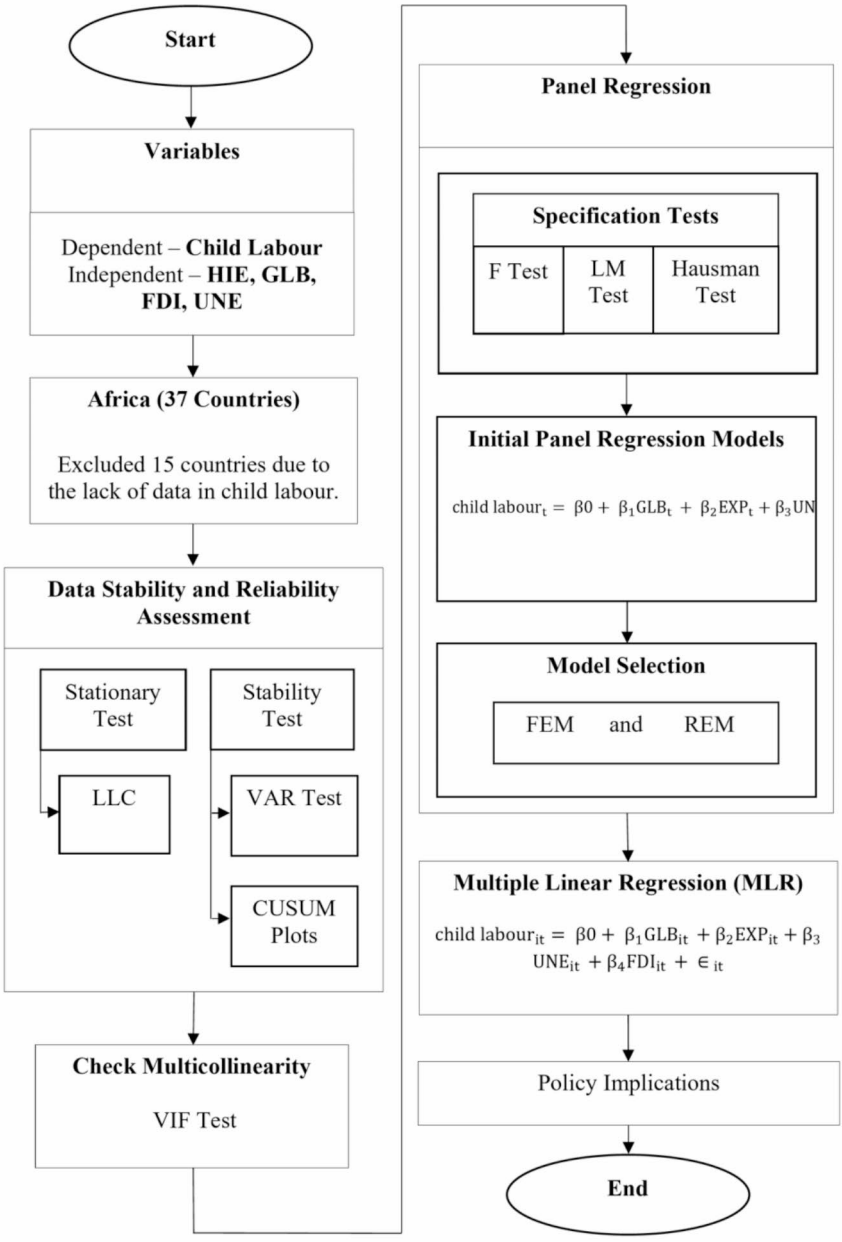

Fig. 2 Methodological research design

try-specific) and temporal (yearly) variations (Kumar, 2024), making them particularly suitable for the present study's multi-country, multi-year dataset.

The study employed Pooled Ordinary Least Squares (POLS), Fixed Effects (FE), and Random Effects (RE) models to stabilise the estimates and control for unobserved heterogeneity across countries. The FE model was specifically used to account for time-invariant characteristics unique to each country, which are important given the diverse economic and social structures across African nations. The Random Effects model, on the other hand, allowed us to capture both within-country and between-country variations, providing a comprehensive understanding of the dependencies between variables. This dual approach ensures that the analysis captures the complexity of child labour dynamics in African countries (Borenstein et al., 2010; Lancelot et al., 1995; Van Niekerk et al., 2023).

To further ensure the accuracy of the chosen methodology, specification tests were conducted to select the most appropriate model. The F-test and Lagrange Multiplier (LM) test were used to assess the suitability of the Pooled Ordinary Least Squares model (Bradfield et al., 2023; Breusch & Pagan, 1979). The Hausman test was then employed to choose between the Fixed Effects and Random Effects models (Hausman & Taylor, 1981; van der Zee et al., 2022), ensuring the correct model specification for panel data analysis. These diagnostic tests were crucial in selecting the most reliable model for addressing the research question.

2.2 Country-Specific Multiple Linear Regression (MLR) Analysis

To complement the regional analysis and address country-specific variations, the study also employed Multiple Linear Regression (MLR) analyses for each country. This method provided insights into the unique conditions prevailing in individual African countries, which are often overlooked in aggregate models. Conducting MLR at the country level allowed us to detect more localised relationships between child labour and its determinants, thus offering targeted policy recommendations. This approach ensures that the research addresses both regional trends and country-specific dynamics, which is essential for a comprehensive understanding of child labour in Africa (Gujarati & Porter, 2009).

In discussing the modifications made to the previous models that employed panel regression analysis, as cited by (Hsiao, 2022), the present research has gone further by incorporating additional stationarity and stability tests. These tests assess the structural stability and stationarity of the variables and the overall model before beginning the panel analysis. Additionally, to look beyond the results of region-specific panel regression, the authors employ MLR for country-specific analysis, allowing readers to capture unique variations and dynamics within individual African countries. This two-pronged approach adds depth to the analysis, as it allows the study to move beyond regional panel data trends and account for country-specific variations, offering a more tailored set of findings and policy recommendations. These modifications were vital to improving upon previous models while ensuring that the results are not only statistically valid but also contextually relevant to the African region.

By utilising Eq. (1), the study provides an in-depth understanding of the impact of GLB, HIE, UNE, and FDI on child labour through a single-country analysis using the MLR model.

$$\mathrm{CL_{it}} = \beta\, 0 + \beta_{\,1}\mathrm{GLB_{it}} + \beta_{\,2}\mathrm{EXP_{it}} + \beta_{\,3}\mathrm{UNE_{it}} + \beta_{\,4}\mathrm{FDI_{it}} + \in_{\mathrm{it}} \quad (1)$$

where, CL indicates child labour, i denotes the country and t shows the year considered. represents the standard error.

In the meantime, to gain an overall understanding of the impact of GLB, HIE, UNE, and FDI on child labour in the African region, the study then used the following Eq. (2) to conduct a panel regression analysis.

$$\mathrm{CL_t} = \beta\, 0 + \beta_{\,1}\mathrm{GLB_t} + \beta_{\,2}\mathrm{EXP_t} + \beta_{\,3}\mathrm{UNE_t} + \beta_{\,4}\mathrm{FDI_t} + \in_{\mathrm{t}} \quad (2)$$

where CL indicates child labour, t indicates the year taken into consideration. ε_t represents the standard error.

3 Results and Discussion

The current study examines the impact of HIE, UNE, FDI, and GLB on child labour in African countries. child labour is defined as work that deprives children of their childhood, potential, and dignity, and harming their physical and mental development (ILO, 2023a).

This study measures child labour as the percentage of children aged 5–14 involved in labour activities. Labour activities are defined as economic activities that involve any productive work. This includes both market production, which refers to activities performed for economic gain and certain types of non-market production, such as producing goods or services for personal or family use (DOL, 2021a).

GLB is measured using the KOF Globalisation Index, an assessment method that measures the economic, social, and political dimensions of GLB. HIE is calculated based on the final consumption expenditure of households and NPISHs as a percentage of GDP, which also captures household income levels as income directly influences the consumption patterns. FDI represents the percentage of GDP, indicating the level of investment flows into the country.

UNE is measured as the share of the labour force that is without work but is available for and actively seeking employment. It is expressed as a percentage of the total labour force, which includes all individuals aged 16 and older who are classified as either employed or unemployed.

The results present the summaries and findings using the panel regression approach. The discussion is based on the analysis results and is supported by the existing limited literature.

To illustrate how child labour acts and varies worldwide, Fig. 3 depicts the trends in child labour percentages globally and across different regions from 2010 to 2021. Throughout the observed period, Africa consistently displayed the highest rates of child labour, significantly surpassing other regions. The global trend shows a grad-

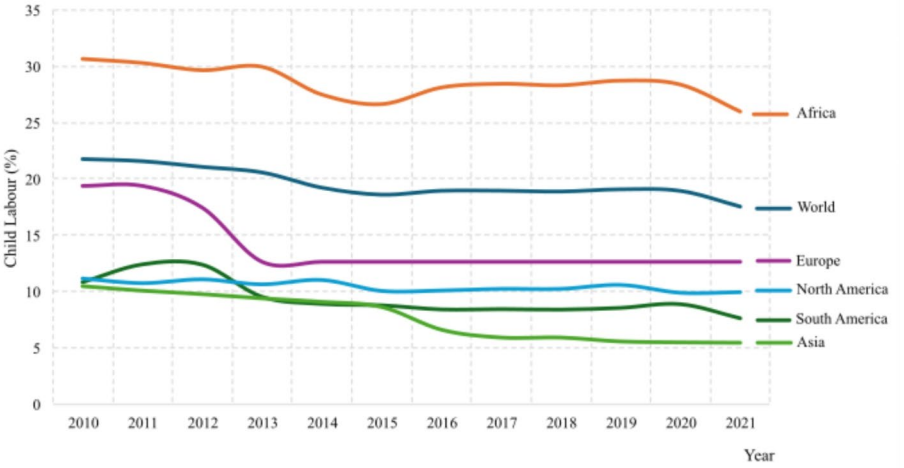

Fig. 3 Child Labour continent wise (2010–2021). Source: Authors' illustrations based on (DOL, 2021b)

ual decline in child labour rates; however, Africa remains the region with the most pronounced child labour issues. Notably, South America and Asia show a steady decrease in child labour rates while remaining at the lower end of the chart. It is noteworthy that Europe exhibited a much higher child labour rate in the early years, which then reduced around 2013 and maintained a steady rate for the rest of the period, along with other continents. Due to the unavailability of child labour data in most European countries, this chart only reflects the averages of a few countries. Thus, this decline in child labour can be directly attributed to the decrease observed in those specific countries.

The persistently high rates in Africa may be attributed to several socio-economic factors, including high poverty levels, limited access to education, and insufficient enforcement of child labour laws. Despite global efforts to reduce child labour, these figures underscore the need for targeted interventions in Africa to address the underlying causes of child labour in the region.

Figure 4A focuses on the twelve countries with the highest child labour trends over the period. Mali stands out with the highest level of child labour among them. This peak is likely linked to the 2013–2014 crisis, which caused a surge in child labour, particularly in mining and agriculture. Although rates dropped in the following years, the chart reflects a sharp increase again during 2018–2019, likely due to renewed conflict (Nderi, 2021). Nigeria shows an upward trend in child labour between 2018 and 2021, likely due to the conflict in the Northeast and the economic impact of COVID-19. Past studies also mentions that child labour is a part of the socio-cultural tradition in Nigeria (Larai & Mahmoud, 2022). In Cameroon, child labour rates increased significantly between 2013 and 2016, likely due to the Boko Haram insurgency which displaced many children and disrupted their education (UNICEF, 2016). Similarly, Lesotho recorded an increase from 2010, greatly influenced by poverty and the HIV/AIDS epidemic. The downward trend shown after 2016 could be credited to international interventions that helped reduce rates (DOL, 2018). The persistently high

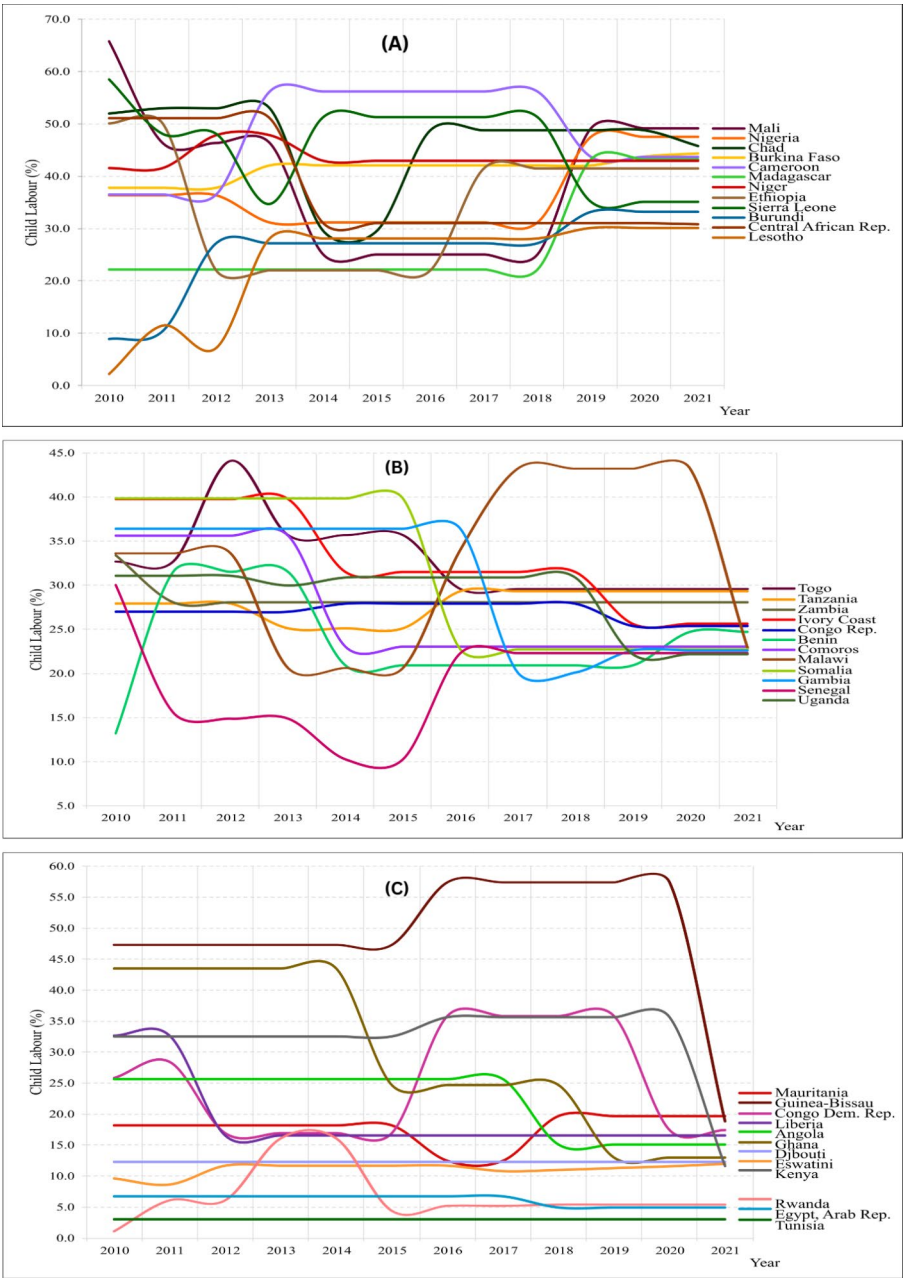

Fig. 4 Child labour trends country wise. Source: Authors illustrations based on DOL (2021b)

rate of child labour in Burkina Faso could be associated with greater participation in the agricultural sector, particularly in rural areas (ILO, 2023b). The higher trends in Ethiopia and Niger might be attributed to drought situations, which displaced families and forced children into labour. Madagascar's child labour grew steadily from 2018 to 2021, largely due to the high demand for vanilla, coupled with weak labour standards (Waxman, 2021; World Bank, 2023b).

Moving to Fig. 4B there is notable variation across these countries. On one hand, countries such as Togo, Tanzania, Zambia, and Ivory Coast demonstrate continually high rates of child labour, steadily surpassing 35–45%. This could be attributed to the dominance of the agricultural sector in these countries, where children work on family farms or plantations (DOL, 2023). On the other hand, countries such as Benin and Malawi show relatively lower and more stable trends in child labour. In the case of Malawi, the fall in child labour between 2010 and 2015 could be associated with improved policy interventions and enhanced access to education (ECLT, 2019). The rise in child labour in Senegal after 2013 is largely due to child exploitation, as many children were sent away to beg on the streets of Dakar (Jean-Matthew, 2014).

According to Fig. 4C, the child labour rate decreased likely after the Ebola outbreak, aided by recovery funds donated by other countries (Fall, 2019). Furthermore, there is notable change in Mauritania, which showed one of the highest rates before it drastically declined in 2021. Guinea-Bissau exhibits extreme fluctuations in child labour trends, with a significant decrease observed in 2020, attributed to economic growth and improved access to education and health resources (Cordeiro, 2021). Meanwhile, there are relatively lower levels of child labour rates in countries like Rwanda, Egypt, and Tunisia. Countries such as Angola, the Democratic Republic of Congo and Ghana experienced notable drops in child labour rates between 2016 and 2017, which can be attributed to a combination of improved socio-economic conditions and effective policy measures (Hamenoo et al., 2018; UNICEF, 2021).

3.1 Descriptive Statistics Summary

To better understand the dataset utilised, descriptive statistics, including box plots, summarising the number of observations, mean values, standard deviations, and minimum and maximum values for child labour, GLB, HIE, UNE, and FDI are presented in Appendix S2. Burkina Faso, Chad, and Guinea Bissau show the highest average child labour rates among the 37 countries, significantly above the regional average of 28.36%. These findings could be attributed to limited schooling opportunities, inadequate labour regulations, and economic necessity driven by poverty within these countries (Basu, 1999; Edmonds & Pavcnik, 2006). The notable standard deviation of 13.34% for child labour rates indicates significant variation across African countries, reflecting diverse socio-economic conditions. Past research often highlights poverty as the key driver of child labour, with many low-income families relying on the additional income generated by their children to sustain their living conditions (Blunch & Verner, 2001; Cardoso & Verner, 2007; Edmonds & Schady, 2012). Furthermore, box plots depict considerable instability and significant outliers including a vast range of child labour rates.

The summary descriptive statistics of the GLB show noteworthy variation, with high levels of FLB in countries like Egypt, Tunisia, and Senegal, which have mean values of 66.40, 66.96, and 60.11, respectively. Conversely, countries like Somalia and Angola record lower GLB values of and 43.87, respectively. According to the study by Neumayer and de Soysa (2005) the effect of GLB the child labour is multifaceted. Intense global connections could reduce child labour through economic growth and improved access to education in inadequately regulated markets.

In terms of foreign direct investment, countries like Mozambique and Zambia, have average FDIs of 24.33 and 4.58, respectively. FDI flows in such countries can be either alleviate or perpetuate child labour, depending on the distribution of economic gains and whether labour protections are adequate, as they frequently target resource-based industries (Jensen, 2006). Moreover, these investments must be implemented with highly responsible business practices and effective regulations to prevent the abuse of child labour (Kucera, 2002). Nevertheless, there is significant disparity, with high values in the FDI distribution evident in the box plots related to the FDI variable.

There is a broad range of HIE across the 37 African countries with Somalia at the high end, at 126.39, and Comoros with an HIE of 94.32, respectively. Households with better income levels are less inclined to send their children into the child labour workforce; instead, they encourage their children to focus on their education by sending them to school (EV Edmonds & Pavcnik, 2006). In low-income countries, dependence on child labour for household income remains significant. Box plots of HIE reveal that Somalia and Comoros, despite having higher median HIE values, also display inequality within each country. Wider boxes indicate greater income disparity, while narrower boxes suggest more uniform financial conditions among households.

UNE rates also show significant variation, with Djibouti having the highest rate at 26.81%, followed by Mauritania at 10.32%. In contrast countries like Burundi and Ethiopia have much lower rates at 1.61% and 2.49%, respectively. Moreover, the average UNE rate for the region is 7.41%, indicating wide inconsistency in employment prospects across African nations. The relationship between UNE and child labour is especially pronounced in regions lacking strong labour market protections and social safety nets (Congdon Fors, 2008). Numerous studies have shown a clear link between UNE and child labour, highlighting the importance of implementing policies that foster economic stability and the creation of jobs (Galli, 2001). Focused interventions to decrease UNE can significantly help address child labour issues. Overall, the summary of descriptive statistics offers a distinct socio-economic landscape in Africa and its effects on working children.

Next, to present descriptive statistics more comprehensively, thematic maps with bar graphs were utilised, to show the significant changes in child labour rates and independent variable rates across African countries between 2010 and 2013 and 2018–2021. According to Figs. 5 and 6, the most significant difference observed in both maps is the substantial decrease in GLB from 2018 to 2021 compared to 2010 to 2013. This can be attributed to the reduction of limited participation in investments and global trade, which posed a considerable constraint on the GLB rate for the African continent (Beri et al., 2022).

Careful observations reveal that child labour remains a prominent issue in the central and western parts of the region. Figure 6 exhibits a gradual increase in FDI

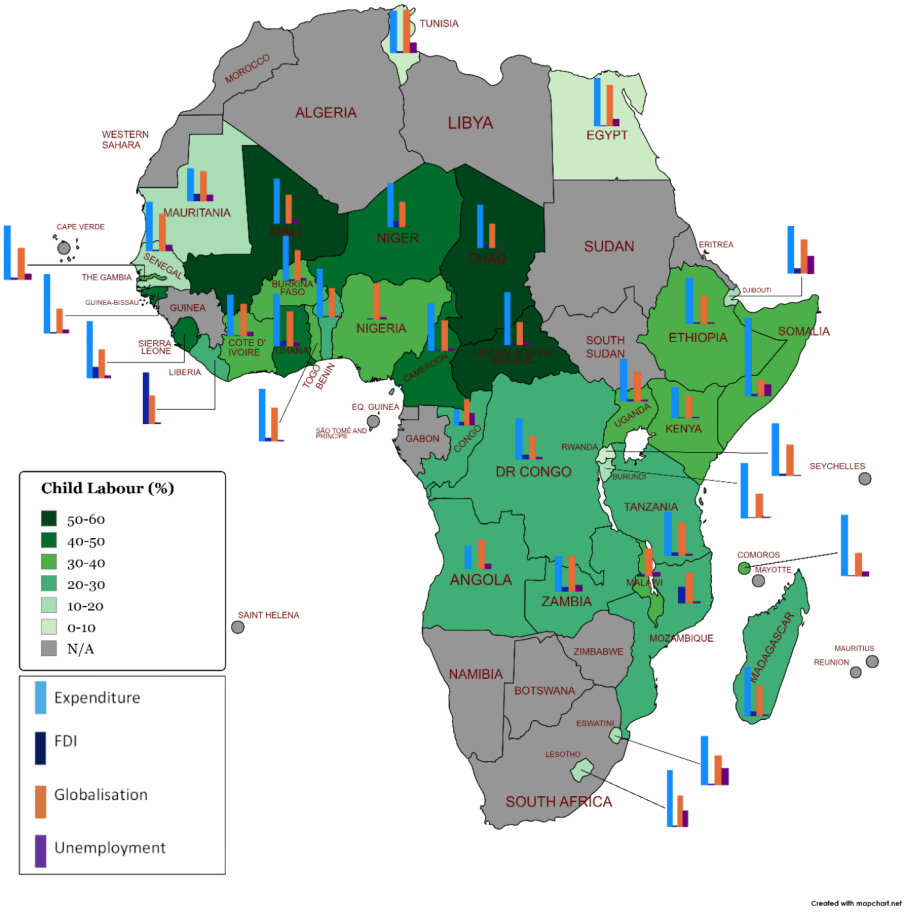

Fig. 5 Variation of variables in African countries in 2010–2013. Source: Authors' illustrations based on data from DOL (2021b); KOF Swiss Economic Institute (2021); World Bank (2021) and Our World in Data (2021) using mapchart.net

rates, which stand out as notable outliers in most African countries. According to past empirical studies, there are several reasons for this. First, Sub-Saharan African nations are increasing their efforts to attract FDI. Further, studies emphasise that FDI has a beneficial and considerable impact on economic growth over time (Ayenew, 2022). This implies that nations could experience a rise in GDP and overall economic activity by attracting foreign investments.

Somalia displayed the highest rate of HIE in 2010–2013. The bar charts demonstrate that countries with generally high rates, such as Comoros, the Central African Republic, Sierra Leone, and Guinea-Bissau, show child labour rates exceeding 30%. This dynamic is well-documented in the literature, as families facing economic hardship may resort to child labour as a coping mechanism, with children being employed to supplement household incomes (EV Edmonds & Schady, 2012). Factors beyond

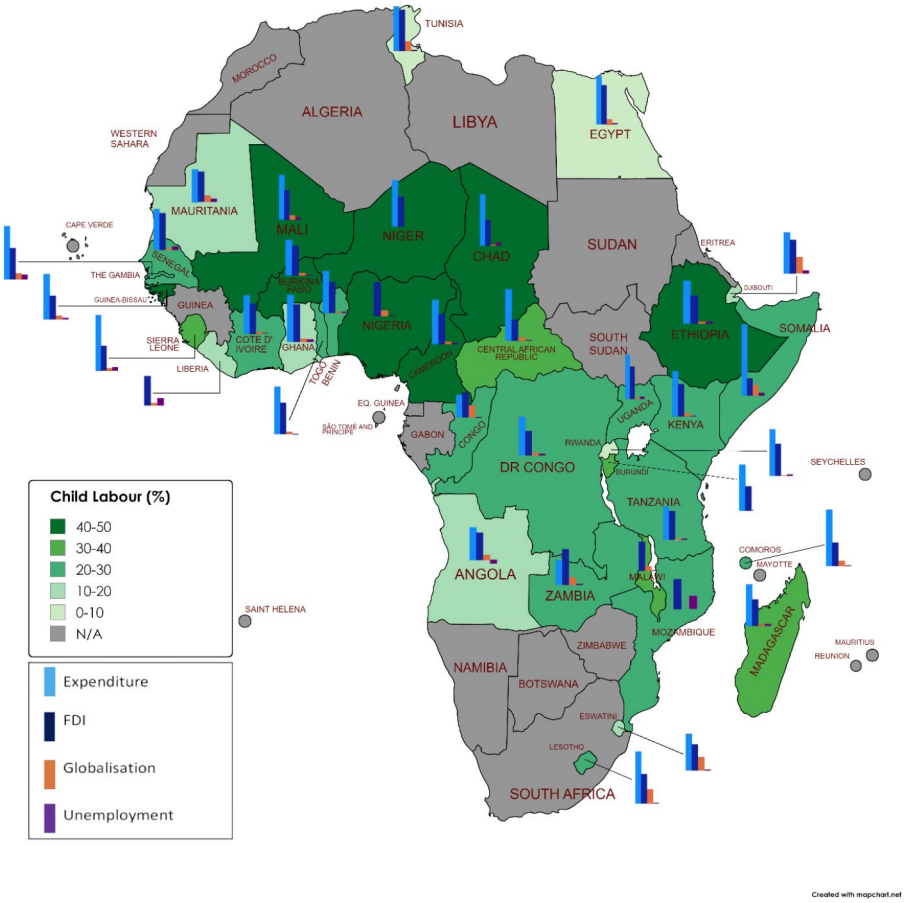

Fig. 6 Variation of variables in African countries in 2018–2021. Source: Authors' illustrations based on data from DOL (2021b); KOF Swiss Economic Institute (2021); World Bank (2021) and Our World in Data (2021) using mapchart.net

employment opportunities, such as social protection systems and access to education, play a crucial role in determining child labour outcomes (Beegle et al., 2009).

3.2 Preliminary Test Analysis

Before conducting the main analysis, the authors checked the stationarity of the key variable's child labour, GLB, UNE, HIE, and FDI. To do this, the Levin-Lin-Chu (LLC) unit root test was employed, which helps identify whether data points change excessively over time, potentially distorting results. The null hypothesis for this test posits that the panels contain unit roots, while the alternative hypothesis asserts that the panels are stationary. As indicated by their respective p-values in Appendix S3A, all variables were found to be stationary, meaning they remained stable over time. This is important because it confirms that the variables are suitable for reliable regression analysis.

Next, to ensure that the research model is stable over time, the authors used both Recursive CUSUM tests and the VAR stability test. As presented in Appendix S3B, the CUSUM test shows the cumulative sum of recursive residuals along with the 1% significance boundaries. The blue line, representing the cumulative sum of residuals, remained within the red boundaries throughout the period, indicating no significant structural changes in the model. This test specifically examines structural stability (Brown et al., 1975), providing strong support that the model fits the data and that the variables are stable for the region. In addition, the present study also utilised the VAR stability test to further confirm the systems stability. The stability of a VAR model is established by ensuring that all eigenvalues of the coefficient matrix lie within the unit circle (Hamilton, 1994; Lütkepohl, 2006). As shown in Appendix S3C all eigenvalues in the present study's model fall within the unit circle, demonstrating that the VAR model satisfies the stability criterion, and that the system is stable. Appendix S3D indicates that multicollinearity is not a concern in the model, with all VIF values below 1.14. The mean VIF of 1.08 further confirms that multicollinearity is minimal throughout the model.

Furthermore, to determine the most suitable model for performing panel regression analysis in the present study, the authors conducted three specification tests. As illustrated in Table 2, the specification tests included the F-test and the LM test to decide whether a basic model (Pooled OLS) or more advanced models (Fixed Effects or Random Effects) should be used. Both tests produced significant results, leading to the rejection of the null hypothesis that assumes the Pooled OLS model is suitable. This confirmed that a more sophisticated model was necessary, prompting the study to focus on comparing the Fixed Effects (FE) and Random Effects (RE) models. To choose between the FE and RE models, the authors then performed the Hausman test, which checks whether the unique differences between countries are correlated with the explanatory variables. In this case, the p-value from the Hausman test exceeded the chosen significance level, indicating that the null hypothesis stating that the RE model is appropriate, could not be rejected. As a result, the RE model was selected as the most suitable analysis for the present study. However, to provide a more insightful look into the context, the authors discuss both RE and FE results in the discussion section.

3.3 Panel Regression Analysis

The results from both the Random Effects (REM) and Fixed Effects (FEM) models for the African region, presented in Appendix S4, provide valuable insights into the

Table 2 Specification tests for the panel regression model

Africa	F Test	LM Test	Hausman Test
	H0: POLS: H1: Fixed Effect	H0: PLOS H1: Random Effect	H0: Random Effect H1: Fixed Effect
	50.96***	766.25***	4.74

***significant at 1% significance level

Source: Authors' calculations based on data from DOL (2021b); KOF Swiss Economic Institute (2021); World Bank (2021) and Our World in Data (2021)

relationship between child labour and the independent variables: GLB, HIE, UNE, and FDI. GLB shows a statistically significant negative impact on child labour in both models, with the coefficients suggesting that increased GLB is associated with a reduction in child labour across the African region. This indicates that as economies become more globally united, the occurrence of child labour tends to decrease, potentially due to enhanced labour regulations or economic development (Davies & Voy, 2009). As shown in Appendix S4, HIE also has a negative impact on child labour, with statistically significant coefficients. This highlights that higher HIE reduces the prevalence of child labour, supporting the argument that improved household welfare decreases the need for children to contribute economically (Basu and Dimova 2022; Kebede et al., 2021). However, FDI shows no significant impact on child labour in either model. This suggests that the inflow of foreign capital does not have a direct effect on child labour, potentially due to the varying ways in which FDI interacts with different sectors and economic contexts (Blomström et al. 2003). This nuanced finding indicates the need for further research into country-and sector-specific effects of FDI. UNE has a significant negative relationship with child labour in the REM model indicating that higher unemployment rates are associated with lower child labour. This could be attributed to effective social protection programmes that can mitigate the impact of unemployment on child labour (Homaie Rad et al., 2015; Koseleci & Rosati, 2009). However, the lack of significance in the FEM model suggests that the impact of unemployment on child labour may vary considerably by country, indicating complex socio-economic dynamics that differ across the region. The use of both REM and FEM enhances the robustness of the analysis, addressing concerns about potential bias while focusing on region-wide trends and providing a country-specific perspective.

The present study conducted a single-country analysis using Multiple Linear Regression (MLR) to further investigate the impact of socio-economic factors on child labour in various African nations. The results displayed in Table 3 are essential, as the overall findings lacked the nuance needed to understand country-specific dynamics.

The MLR results highlight the varying impacts of UNE on child labour across different African countries. A positively significant impact is observed in nations such as Benin, Egypt, Ethiopia, Niger, Eswatini, and Zambia. In these countries, higher unemployment rates are associated with an increase in child labour, suggesting that that rising unemployment worsens economic pressures on families, leading them to rely more on child labour as a survival strategy (Duryea et al., 2007; Fabre & Pallage, 2015; Fallon & Tzannatos, 1998). Among these countries, Ethiopia exhibits the strongest positive impact of UNE on child labour. This is supported by Mehari (2020) research, which shows that in Ethiopia, the employment status of the household head is directly linked to the likelihood of children engaging in labour. In contrast, countries such as Cameroon, Comoros, Kenya, Lesotho, and Togo display a significant negative impact of UNE on child labour. This indicates that even when UNE rates are low within these countries, child labour remains prevalent in comparison. This finding aligns with the study by Mehta and Mohanty (2020) which suggests that the negative impact of UNE on child labour could be attributed to various factors beyond unemployment itself. Cameroon showcases a negative relationship, which

is particularly stronger than in other countries. This might be credited to its robust safety net protection systems (World Bank, 2022), supported by previous studies that suggest when families have access to social safety nets such as cash transfers or welfare programmes, they are less likely to rely on child labour even during periods of high adult UNE (Thevenon & Edmonds, 2019).

Regarding GLB, as shown in Table 3, many countries, including Benin, Chad, Gambia, Ghana, Lesotho, Senegal, and Eswatini, exhibit a negative impact of GLB on child labour contrasting with the overall region that showed a positive significance. Among these, Ghana shows the strongest negative significance of GLB on child labour. This negative impact highlights that higher GLB is associated with lower child labour rates. This aligns with previous studies demonstrating how an increase in GLB often leads to trade policies favouring the modern sector and FDI, thereby reducing child labour by promoting skilled adult labour (Davies & Voy, 2009; Dinopoulos & Zhao, 2007). Additionally improved economic conditions and diversification which could be credited to GLB in Ghana have provided better-paying jobs for adults and reduced family dependence on child labour (Boateng & Dako-Gyeke, 2022). Conversely, Burundi demonstrates the strongest positive significance for GLB on child labour. As a low-income and underdeveloped country (World Bank, 2024), this finding could be linked to prior literature that highlights how GLB in poor countries can increase the demand for cheap labour (Panjabi 2009). These contrasting impacts reflect the complex influence of GLB on child labour, as previous studies have shown that the effects of GLB can vary depending on a country's regulatory context and the specific time period (Che & Sundjo, 2018; Cigno et al., 2002; Hindawi, 2022).

Turning to HIE, Table 3 shows that countries like Benin, the Central African Republic, Egypt, Ethiopia, Gambia, Nigeria, Eswatini, Togo, and Zambia exhibit a significant negative impact on child labour from HIE. This suggests that lower HIE levels are related with higher child labour, as children are often compelled to work to support their families, with parents relying on child labour as a survival mechanism (Hamenoo et al., 2018; Kebede et al., 2021). Among these countries, Ethiopia shows the strongest negative significance for HIE on child labour. This could be attributed to Ethiopia's classification as a low-income country (World Bank, 2024), facing issues such as income shocks and limited access to credit, which forces families to prioritise immediate economic needs by sending their children to work (Beegle et al., 2006; Webbink et al., 2013). On the other hand, Kenya shows the highest positive significance for HIE on child labour. This suggests that even as household expenditure levels rise, child labour remains an issue, as highlighted by previous studies (Admassie, 2002; Ali, 2018; Dammert et al., 2017). Notably, the situation in Kenya may not be fully explained using economic factors alone, as cultural and social norms play a prominent role. In many cases, even when HIE increases, children continue to be involved in labour due to traditional societal practices within Kenya (Maina, 2013). Furthermore, publications by the U.S. Department of Labour (DOL) show that many children in Kenya are subjected to forced labour, including domestic servitude and commercial exploitation (DOL, 2022).

Finally, regarding FDI, among the countries that show a significant negative impact on child labour, including Gambia, Togo, and Eswatini, Madagascar exhibits

Table 3 MLR model estimates for African countries

Variable	Angola	Benin	Burkina Faso	Burundi	Cameroon	Central African Republic	Chad	Comoros	Dem Rep. of Congo	Egypt, Arab Rep.	Ethiopia
GLB	3.2987**	−1.6299*	0.4028	5.5986***	−2.6839	1.1617	−4.0377*	−0.6836	−0.8310	−0.0086	−3.4155
	(1.1862)	(0.7357)	(0.8034)	(1.1063)	(1.471)	(1.5608)	(2.0911)	(0.8070)	(6.5675)	(0.1366)	(5.4087)
EXP	−0.2157	−1.1712**	0.2182	0.3939	0.9171	−0.7727*	0.6457	1.3660***	0.2758	−0.1282**	−3.1544*
	(0.1235)	(0.4117)	(0.1715)	(0.5986)	(1.2878)	(0.3547)	(0.3737)	(0.3752)	(0.5767)	(0.0484)	(1.5997)
FDI	0.1040	0.6248	−0.1924	−0.4446	−6.5445	6.7979**	1.3460	0.9277	−1.3492	0.2345	−5.0085
	(0.3059)	(2.2404)	(0.5597)	(1.5275)	(5.1309)	(2.3675)	(0.8851)	(1.9065)	(1.5003)	(0.1369)	(3.0607)
UNE	−0.5582	10.5695***	4.5013	3.5238	−67.0925***	−0.0382	−8.1390	−7.1082**	−6.6216	0.4153***	13.4559*
	(1.1782)	(1.6346)	(5.0476)	(16.1501)	(13.7531)	(6.1453)	(5.9123)	(2.7276)	(8.3271)	(0.0861)	(6.2080)
Constant	−107.9074	167.3026**	−12.6606	−231.4435**	375.7985**	56.3427	162.6376**	−19.3920	79.0609	12.0896	388.5785
	(59.8816)	(65.5858)	(18.5156)	(81.7828)	(113.5675)	(42.5176)	(55.4929)	(37.3257)	(319.2035)	(12.9117)	(326.6504)
F	23.88***	122.12***	23.71***	11.74***	20.71***	10.56***	8.76***	61.41***	1.41	25.95***	2.63
R^2	0.5967	0.8241	0.8437	0.8005	0.8235	0.5919	0.4478	0.8485	0.2280	0.8415	0.3627
Variable	Gambia	Ghana	Guinea-Bissau	Ivory Coast	Kenya	Lesotho	Madagascar	Mali	Mauritania	Niger	
GLB	−4.7015***	−5.1809**	−1.6876	−2.0614	−8.8438	−0.7723**	−1.9354	−4.0480	0.0468	−0.4590	
	(0.8557)	(1.5335)	(1.4532)	(1.7435)	(4.7020)	(3.1692)	(2.2959)	(5.5531)	(0.2598)	(0.3946)	
HIE	−0.4060*	−0.4759	−0.2167	−0.1925	4.5369**	−1.1383	0.5805	−1.3076	−0.2468	−0.3127*	
	(0.1871)	(0.4404)	(0.2351)	(1.0484)	(1.8440)	(0.4734)	(1.2404)	(2.1639)	(0.2137)	(0.1409)	
FDI	−2.6282**	2.9018*	1.5477	0.0979	−2.1266	−2.7550	−3.2105**	2.8094	−0.0281	−0.4213	
	(0.9400)	(1.3351)	(1.5716)	(4.4524)	(1.3728)	(1.5909)	(1.1709)	(4.7236)	(0.0558)	(0.2776)	
UNE	8.2036	−1.3187	−10.1749	0.9251	−4.1923**	−3.7922**	2.7690	2.4802	0.7874	3.4268***	
	(4.9527)	(4.1394)	(19.3470)	(0.6412)	(2.1497)	(1.8270)	(3.0275)	(7.7310)	(0.5952)	(0.4586)	
Constant	238.3000**	361.9869**	193.9775	147.4618*	192.2092	256.9495	85.3263	306.3445	21.3609	84.9667**	
	(56.7456)	(135.9282)	(117.9417)	(66.3189)	(145.4342)	(153.5793)	(141.2782)	(192.6930)	(12.7348)	(27.0395)	
F	27.98***	28.79***	1.53	18.34***	1.87	10.67***	3.18	2.22	1.58	14.31***	
R^2	0.8694	0.8616	0.2523	0.8056	0.6592	0.8172	0.4699	0.4421	0.2088	0.8993	
Variable	Dem Rep Congo	Rwanda	Senegal	Sierra Leone	Somalia	Eswatini	Tanzania	Togo	Uganda	Zambia	

Table 3 (continued)

GLB	−0.1376	−0.0833	−6.3637*	1.5791	−2.0908	−0.6397***	0.0640	3.4376**	−0.6324	−0.2068
	(0.4636)	(0.9003)	(3.0616)	(2.5387)	(1.6355)	(0.1784)	(0.5316)	(1.2655)	(2.0809)	(0.3474)
HIE	0.0258	0.2049	1.2948	−0.6555	0.9122	−0.3152***	−0.2395	0.1291	0.4268	0.0494
	(0.0422)	(0.3266)	(2.7441)	(0.5828)	(0.8468)	(0.0716)	(0.2461)	(0.3342)	(0.6043)	(0.0531)
FDI	0.0401	2.2320	2.0508	−0.5299	0.8468	−0.2082*	−0.4703	−0.5207*	−1.4984	0.4190*
	(0.0256)	(1.7537)	(1.6257)	(0.3247)	(5.7738)	(0.0927)	(0.6500)	(0.2432)	(1.6475)	(0.2155)
UNE	−0.4790	5.4730	−3.8023	−10.6875	3.1415	0.3660**	1.9891	−2.4200**	−0.8794	0.8233***
	(0.4772)	(5.4468)	(2.9630)	(9.2190)	(7.2951)	(0.1386)	(1.1977)	(1.0103)	(2.1951)	(0.1826)
Constant	41.8521**	−17.2285	323.9476	92.5455	−65.1395	53.3072***	35.8308*	−145.8089	37.5802	26.8260
	(14.5944)	(70.3649)	(312.8885)	(78.3479)	(170.1030)	(11.4825)	(17.6111)	(82.8247)	(137.0248)	(20.9811)
F	38.42***	0.43	4.59**	17.59***	16.38***	5.86**	2.38	6.84	0.97	7.19
R^2	0.7748	0.1768	0.6103	0.5383	0.7305	0.7914	0.5676	0.8631	0.2537	0.8564

*Significant at 10%, ** significant at 5%, and ***significant 1% significance level; MLR denotes Multiple Linear Regression. Parentheses indicate robust standard error and (*).The results presented in this table are based on a total of 12 observations for each country over a 12-year period from 2010 to 2021

the highest negative significance. This indicates that higher FDI rates are associated with a reduction in child labour, a finding supported by past studies (Braun, 2006; Burhan et al., 2016). Madagascar's strong negative impact could be attributed to government investments, which have facilitated foreign capital inflows, particularly in the mining and agriculture sectors (US Department of State, 2023; World Bank, 2023b). This aligns with Doytch et al. (2014) who discuss how sector-specific FDI, especially in mining, can help reduce child labour. Conversely, the Central African Republic demonstrates the highest positive significance for FDI regarding child labour among the positively significant countries. This suggests that in some contexts, higher FDI could also contribute to an increase in child labour. The Central African Republic, which has one of the poorest and most fragile economies, suffers from weak government structures and poor regulation of FDI (World Bank, 2023a). This finding aligns with prior research showing that while FDI can boost income, it may also drive demand for cheap labour, leading to an increase in child labour in countries with insufficient regulatory frameworks (Burhan et al., 2016; Kechagia & Metaxas, 2023). These findings underscore the need for targeted interventions and policy implications that address the aforementioned issues to reduce the incidence of child labour in these contexts.

4 Conclusion

Africa, the region with the highest child labour rates globally, is the critical focus of this study analysing the impact of GLB, UNE, HIE, and FDI on child labour using data from 37 countries across the region. This paper significantly contributes to the existing body of literature by examining both the holistic and individual effects of the aforementioned variables on child labour, an area that has not been extensively explored in the past.

The study offers valuable insights into the socio-economic factors affecting child labour in Africa using FE and RE models. GLB consistently shows a significant negative impact, suggesting that greater global integration reduces child labour. Similarly, HIE impacts negatively, implying that improved household welfare decreases reliance on child labour. UNE yields mixed results, with a significant negative effect in the REM model but varying outcomes in the FEM model, indicating country-specific differences.

FDI does not exhibit a significant overall impact on child labour; however, individual country results using MLR reveal nuanced relationships. For instance, countries like Madagascar see reductions in child labour through sector-specific investments, while countries such as the Central African Republic experience increases due to weak regulatory environments. The MLR analysis further enhances these insights, offering a country-specific understanding of other factors as well. Additionally, MLR highlights varying impacts of UNE, with Ethiopia and Zambia displaying positive relationships with child labour, while Cameroon and Togo exhibit negative relationships, likely due to stronger social safety nets. GLB showed a predominantly negative impact on child labour in many countries, such as Ghana. However, in countries like Burundi, the positive impact of GLB reflects potential to increase child labour

in underdeveloped economies. HIE exhibited a similar pattern, with negative significance in many countries, indicating that low household expenditure increases child labour, while a few countries like Kenya displayed a positive impact, highlighting the role of cultural norms in sustaining child labour despite higher HIE.

These findings emphasise that a one-size-fits-all approach to addressing child labour may be ineffective. Policies should be tailored to the specific socio-economic conditions of each country to develop more effective strategies for reducing child labour across Africa.

4.1 Policy Implications

The study emphasises the significant influence of GLB, HIE, UNE, and FDI on child labour across African countries, with Africa contributing substantially to the global rise in child labour rates. Encouraging positive globalisation through strategic trade agreements, infrastructure investment, and policies that attract responsible FDI can promote economic growth and help reduce child labour. Governments should prioritise creating strong economic conditions where families are not forced to rely on child labour for financial support. Implementing social safety nets, such as cash transfers, food assistance, healthcare access, and housing support, is vital for addressing poverty, the primary cause of child labour. Additionally, creating employment opportunities, stabilising economies, and enforcing robust child protection laws are crucial. Proper regulation of FDI to prevent exploitation, while promoting responsible investment, is also essential.

To effectively combat the issue of child labour in Africa, tailored strategies must address the region's unique challenges. Once again, fortifying social safety nets through cash transfers and food assistance, aligned with free credit programmes and remittance programmes, is quite helpful. Moreover, expanding access to quality education through a worldwide free education system, improved school infrastructure, and vocational training can keep children in school and out of the workforce. Creating gainful employment opportunities for adults through job creation initiatives, microfinance, and small business support can reduce the economic pressures driving families to rely on child labour. It is essential to recognise that child labour is often prevalent in specific sectors such as agriculture, mining, and domestic work. Therefore, targeted interventions and policies addressing these sectors are necessary.

Furthermore, fostering community engagement and empowerment can significantly contribute to eradicating child labour. Finally, raising public awareness, promoting community involvement, and establishing child protection committees are indispensable for generating a collective commitment to eradicating child labour. Ultimately, a collaborative effort involving governments, civil society organisations, international development partners, and the private sector is essential to achieving sustainable and lasting solutions to the complex issue of child labour in Africa. These strategic solutions can play a pivotal role in substantially reducing child labour over time.

4.2 Limitations and Opportunities for Future Research

There are several paths for future research expansion regarding the dynamics of child labour in Africa, particularly considering the data limitations from sources such as the U.S. Department of Labour (DOL), UNICEF, and the International Labour Organisation (ILO). One significant limitation is the frequent lack of updated data, with child labour specific to countries remaining unchanged over multiple years due to delays in new data availability. This limitation can hinder accurately depicting recent trends and shifts in child labour dynamics.

Despite these challenges, the existing data provides invaluable insights into long-term trends and policy impacts. Similar limitations have been acknowledged in various studies that successfully used historical data to draw meaningful conclusions about child labour and its determinants (Burrone & Giannelli, 2020; Chudgar et al., 2022; Colmer, 2021).

Another key limitation of this study is the lack of gender-disaggregated data on child labour, due to the unavailability of secondary data by gender across the countries and periods studied. Although the research offers a broad analysis of socio-economic factors influencing child labour, the absence of gender-specific data limits the exploration of how these factors affect boys and girls differently. Future research should prioritise gender-stratified data to gain a deeper understanding of gender dynamics and their role in shaping child labour patterns.

Additionally, while the variables used in this study are influential, they may not fully capture child labour dynamics in Africa. Limited reliable data across the 37 countries restricted the inclusion of key factors, potentially constraining the analysis. Future research should consider incorporating variables like school enrolment, family wealth, and urbanisation for a more nuanced understanding of child labour determinants. Future research should also assess the effectiveness of child labour reduction measures, such as educational initiatives, poverty alleviation programmes, and legislative enforcement, to provide more insights to policymakers. Continuous research is essential for building a robust evidence base that informs policy decisions.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s12187-025-10235-9.

Author contributions All authors contributed to the conception and design of the project. RJ, HM, TM, AB and AP composed the writing of the manuscript. HM and TM carried out a significant share of tasks on statistical work in the manuscript. RJ, HM, and TM provided critical knowledge in drafting the paper and supervised the entire study. The authors have read and approved the final manuscript.

Funding This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sector.

Data Availability All data generated or analysed during this study are included in this published article and its supplementary information files.

Declarations

Conflict of Interest The authors declare no competing interests.

Consent to Participate Not applicable.

Consent for Publication Not applicable.

References

Abiye, G., & Hailu, S. (2021). Individual, household, and community level factors of child labor in rural Ethiopia. *Cogent Social Sciences, 7*, 1961402. https://doi.org/10.1080/23311886.2021.1961402

Admassie, A. (2002). Explaining the high incidence of child labour in Sub–Saharan Africa. *African Development Review, 14*(2), 251–275. https://doi.org/10.1111/1467-8268.00054

Agbu, O. (2009). Children and Youth in the Labour Process in Africa. Codesria.

Ali, F. (2018). In the same boat, but not equals: The heterogeneous effects of parental income on child labour. *The Journal of Development Studies, 55*, 1–14. https://doi.org/10.1080/00220388.2018.1438595

Anker, R. (2000). The economics of child labour: A framework for measurement. *International Labour Review, 139*(03). https://doi.org/10.1111/j.1564-913X.2000.tb00204.x

Araya, M. (2015). *Youth labour market in Africa: Characterizing the School–to–Work transitions with a Cross-Country analysis*. University of Bergamo.

Ayenew, B. B. (2022). The effect of foreign direct investment on the economic growth of Sub-Saharan African countries: An empirical approach. *Cogent Economics & Finance, 10*(1), 2038862. https://doi.org/10.1080/23322039.2022.2038862

Bandara, A., Dehejia, R., & Lavie-Rouse, S. (2015). The impact of income and Non-Income shocks on child labor: Evidence from a panel survey of Tanzania. *World Development, 67*, 218–237. https://doi.org/10.1016/j.worlddev.2014.10.019

Basu, K. (1999). Child labor: Cause, consequence, and cure, with remarks on international labor standards. *Journal of Economic Literature, 37*(3), 1083–1119.

Basu, Dimova, R. (2022). Household preferences and child labor in rural Ethiopia. *Journal of African Economies, 33*(1), 20–45. https://doi.org/10.1093/jae/ejac030

Beegle, K., Dehejia, R. H., & Gatti, R. (2006). Child labor and agricultural shocks. *Journal of Development Economics, 81*(1), 80–96. https://doi.org/10.1016/j.jdeveco.2005.05.003

Beegle, K., Dehejia, R., & Gatti, R. (2009). Why should we care about child labor?? The education, labor? market, and health consequences of child labor?. *The Journal of Human Resources, 44*(4), 871–889.

Beri, P. B., Mhonyera, G., & Nubong, G. (2022). Globalisation and economic growth in Africa: New evidence from the past two decades. *South African Journal of Economic and Management Sciences (SAJEMS)*, 25. https://doi.org/10.4102/sajems.v25i1.4515

Bikoue, S. (2021). Determinants of child labour in Cameroon: A bivariate probit model analysis. *Asian Journal of Economic Modelling, 9*, 105–121. https://doi.org/10.18488/journal.8.2021.92.105.121

Blomström, M., Kokko, A., & Mucchielli, J-L. The economics of foreign direct investment incentives. H. Herrmann, & R. Lipsey (Eds.), *Foreign direct investment in the real and financial sector of industrial countries, Berlin, Heidelberg, 2003// 2003* (pp. 37–60): Springer Berlin Heidelberg.

Blunch, N-H., & Verner, D. (2001). Revisiting the Link Between Poverty and Child Labor: The Ghanaian Experience. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.298562

Boateng, A., & Dako-Gyeke, M. (2022). Child labor in Ghana: Current policy, research, and practice efforts. In F. M. Ssewamala, O. Sensoy Bahar, & M. M. McKay (Eds.), *Child behavioral health in Sub-Saharan Africa: Towards evidence generation and policy development* (pp. 265–281). Springer International Publishing.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods, 1*(2), 97–111. https://doi.org/10.1002/jrsm.12

Bradfield, T., Butler, R., Dillon, E. J., Hennessy, T., & Loughrey, J. (2023). The impact of long-term land leases on farm investment: Evidence from the Irish dairy sector. *Land Use Policy, 126*, 106553. https://doi.org/10.1016/j.landusepol.2023.106553

Braun, S. (2006). Core labour standards and FDI: Friends or foes?? The case of child labour. *Review of World Economics / Weltwirtschaftliches Archiv, 142*(4), 765–791.

Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica, 47*(5), 1287–1294. https://doi.org/10.2307/1911963

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society: Series B (Methodological), 37*(2), 149–163. https://doi.org/10.1111/j.2517-6161.1975.tb01532.x

Burhan, N. A. S., Sidek, A., & Ibrahim, S. (2016). Eradicating the crime of child labour in Africa: The roles of income, schooling, fertility, and foreign direct investment. *Journal of Defence and Security, 7*, 1–16.

Burrone, S., & Giannelli, G. C. (2020). Child labour, gender and vulnerable employment in adulthood. Evidence for Tanzania. *The Journal of Development Studies, 56*(12), 2235–2250. https://doi.org/10.1080/00220388.2020.1755655

Busse, M., & Braun, S. (2004). Export structure, FDI and child labour. *Journal of Economic Integration, 19*(4), 804–829.

Cardoso, A., & Verner, D. (2007). School Drop-Out and Push-Out factors in Brazil: The role of early parenthood, child labor, and poverty. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.955862

Che, G. N., & Sundjo, F. (2018). Determinants of female labour force participation in Cameroon. *International Journal of Applied Economics, 3*(2), 88–103. https://doi.org/10.33094/8.2017.2018.32.88.103

Chudgar, A., Grover, V., Hatakeyama, S., & Bizhanova, A. (2022). Child labor as a barrier to foundational skills: Evidence from Bangladesh and Pakistan. *PROSPECTS, 52*(1), 137–156. https://doi.org/10.1007/s11125-022-09614-9

Cigno, A., Rosati, F. C., & Guarcello, L. (2002). Does globalization increase child labor? *World Development, 30*(9), 1579–1589. https://doi.org/10.1016/S0305-750X(02)00053-0.

Colmer, J. (2021). Rainfall variability, child labor, and human capital accumulation in rural Ethiopia. *American Journal of Agricultural Economics, 103*(3), 858–877. https://doi.org/10.1111/ajae.12128

Congdon Fors, H. (2008). Child Labour: A Review of Recent Theory and Evidence with Policy Implications. *Journal of Economic Surveys, 26*. https://doi.org/10.1111/j.1467-6419.2010.00663.x

Cordeiro, V. C. (2021). Children of Guinea-Bissau: Realizing children's rights in Guinea-Bissau. https://www.humanium.org/en/guinea-bissau/

Dammert, A., Hoop, J., Mvukiyehe, E., & Rosati, F. (2017). Effects of public policy on child labor: Current knowledge, gaps, and implications for program design. *World Bank Working Paper, 110*. https://doi.org/10.1016/j.worlddev.2018.05.001

Davies, R. B., & Voy, A. (2009). The effect of FDI on child labor. *Journal of Development Economics, 88*(1), 59–66. https://doi.org/10.1016/j.jdeveco.2008.02.001

Dinopoulos, E., & Zhao, L. (2007). Child labor and globalization. *Journal of Labor Economics, 25*(3), 553–579. https://doi.org/10.1086/513297

DOL. (2018). *2021 Findings on the worst forms of child labor*. Cameroon.

DOL. (2023). *2022 Findings on the worst form of child labour*. DOL.

DOL (2022). 2022 Findings on the Worst Forms of Child Labor: Kenya.

DOL (2021a). 2021 Findings on the Worst Forms of Child Labor: Ethiopia. *United States Department of Labor*. United States Department of Labor.

DOL (2021b). International Child Labor & Forced Labor Reports. https://www.dol.gov/agencies/ilab/resources/reports/child-labor

Doytch, N., Thelen, N., & Mendoza, R. U. (2014). The impact of FDI on child labor: Insights from an empirical analysis of sectoral FDI data and case studies. *Children and Youth Services Review, 47*, 157–167. https://doi.org/10.1016/j.childyouth.2014.09.008

Duryea, S., Lam, D., & Levison, D. (2007). Effects of economic shocks on children's employment and schooling in Brazil. *Journal of Development Economics, 84*(1), 188–214. https://doi.org/10.1016/j.jdeveco.2006.11.004

ECLT (2019). Renewed Commitments Across Sectors to Fight Child Labour in Malawi. https://eclt.org/en/news/malawi-national-action-plan

Edmonds, E. (2016). In C. D. O. Foreign (Ed.), *Economic growth and child labor in low income economies*. FOV.UK.

Edmonds, E. V., & Pavcnik, N. (2006). International trade and child labor: Cross-country evidence. *Journal of International Economics, 68*(1), 115–140. https://doi.org/10.1016/j.jinteco.2005.01.003

Edmonds, E. V., & Schady, N. (2012). Poverty alleviation and child labor. *American Economic Journal: Economic Policy, 4*(4), 100–124.

Elamin, O. (2023). Estimating the causal effect of father unemployment on the propensity of child school dropout in Sudan. *Journal of Development and Economic Policies, 25*(1), 27–57.

Emerson, P., & Souza, A. (2002). The inter-generational persistence of child labor. In P. F. Orazem, G. Sedlacek, & Z. Tzannatos (Eds.), *Child labor and education in Latin America: An economic perspective* (pp. 103-115). Palgrave Macmillan US.

Fabre, A., & Pallage, S. (2015). Child labor, idiosyncratic shocks, and social policy. *Journal of Macroeconomics, 45*, 394–411. https://doi.org/10.1016/j.jmacro.2015.07.001

Fall, I. S. (2019). Ebola virus disease outbreak in Liberia: Application of lessons learnt to disease surveillance and control. *The Pan African Medical Journal, 33*(Suppl 2), 1. https://doi.org/10.11604/pamj.supp.2019.33.2.19074

Fallon, P., & Tzannatos, Z. (1998). *Child labor: issues and directions for the World Bank* (Vol. 2nd ed.). World Bank publications: World Bank.

Fumagalli, L., & Martin, T. (2023). Child labor among farm households in Mozambique and the role of reciprocal adult labor. *World Development, 161*, 106095. https://doi.org/10.1016/j.worlddev.2022.106095

Galli, R. (2001). *The economic impact of child labour*. Cornel University: International Institute for labour Studies.

Gatsinzi, A., & Hilson, G. (2022). Age is just a number': Articulating the cultural dimension of child labour in Africa's small-scale mining sector. *Resources Policy, 78*, 102779. https://doi.org/10.1016/j.resourpol.2022.102779

Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics, 2*(2), 111–120. https://doi.org/10.1016/0304-4076(74)90034-7

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics*. McGraw-Hill Irwin.

Hamenoo, E. S., Dwomoh, E. A., & Dako-Gyeke, M. (2018). Child labour in Ghana: Implications for children's education and health. *Children and Youth Services Review, 93*, 248–254. https://doi.org/10.1016/j.childyouth.2018.07.026

Hamilton, J. D. (1994). *Time series analysis* (Vol. 10v.). Princeton University Press.

Hausman, J. A., & Taylor, W. E. (1981). A generalized specification test. *Economics Letters, 8*(3), 239–245. https://doi.org/10.1016/0165-1765(81)90073-2

Hilliard, N. (2010). The world of child labor: An historical And regional survey. *Children & Society, 24*(4), 354–355. https://doi.org/10.1111/j.1099-0860.2010.00303.x

Hindawi, M. (2022). *How globalization impacts child labour??* Malmo University.

Homaie Rad, E., Gholampoor, H., & Jaafaripooyan, E. (2015). Child labor and the influencing factors: Evidence from less developed provinces of Iran. *Iran J Public Health, 44*(9), 1244–1252.

Hsiao, C. (2022). *Analysis of panel data*. Cambridge University Press.

Ibrahim, A., Abdalla, S. M., Jafer, M., Abdelgadir, J., & de Vries, N. (2019). Child labor and health: A systematic literature review of the impacts of child labor on child's health in low- and middle-income countries. *Journal of Public Health, 41*(1), 18–26. https://doi.org/10.1093/pubmed/fdy018

ILO (1999). C182 - Worst forms of child labour convention, 1999 (No. 182). https://webapps.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C182

ILO (2018). An introduction to legally prohibiting hazardous work for children. https://www.ilo.org/sites/default/files/2024-04/C182_at_a_glance_EN.pdf. Accessed 9th July 2024.

ILO (2020). Child labour in Africa. https://www.ilo.org/regions-and-countries/ilo-africa/areas-work/child-labour-africa. Accessed 14th April 2024.

ILO (2023a). Child Labour. https://www.ilo.org/topics/child-labour

ILO (2023b). Child labour and forced labour in Burkina Faso. Retrieved from https://www.dol.gov/agencies/ilab/resources/reports/child-labor/burkina-faso

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics, 115*(1), 53–74. https://doi.org/10.1016/S0304-4076(03)00092-7

Ingutia, R., Rezitis, A. N., & Sumelius, J. (2020). Child poverty, status of rural women and education in sub saharan Africa. *Children and Youth Services Review, 111*, 104869.

Jean-Matthew, T. (2014). Senegal children face modern-day slavery. https://www.aljazeera.com/news/2014/9/1/senegal-children-face-modern-day-slavery

Jensen, N. M. (2006). *Nation-States and the multinational corporation A political economy of foreign direct investment*. Princeton University Press.

Kebede, D., Tesfay, G., & Emana, B. (2021). Impact of land acquisition for large-scale agricultural investments on income and asset possession of displaced households in Ethiopia. *Heliyon, 7*(12), e08557. https://doi.org/10.1016/j.heliyon.2021.e08557

Kechagia, P., & Metaxas, T. (2023). Capital inflows and working children in developing countries: An empirical approach. *Sustainability, 15*, 6240. https://doi.org/10.3390/su15076240

Kechagia, P., & Metaxas, T. (2020) *FDI, child labor and gender issues in Sub – Saharan Africa: an empirical approach*. University of Thessaly, Munich Personal RePEc Archive. Retrieved from https://mpra.ub.uni-muenchen.de/104311/1/MPRA_paper_104311.pdf

Kis-Katos, K. (2007). Does globalization reduce child labor? *The Journal of International Trade & Economic Development, 16*(1), 71–92. https://doi.org/10.1080/09638190601165558

KOF Swiss Economic Institute (2021). *KOF Globalisation Index*. Retrieved from https://kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-globalisation-index.html

Koseleci, N., & Rosati, F. (2009). Child Labour and the Global Financial Crisis: An Issues Paper. Understanding Children's Work (UCW Project), UCW Working Paper. https://doi.org/10.2139/ssrn.1777109

Kucera, D. (2002). Core labor standards and foreign direct investment. *International Labour Review, 141*, 31–69. https://doi.org/10.1111/j.1564-913X.2002.tb00230.x

Kumar, S. (2024). Panel data. In S. Kumar (Ed.), *Python for accounting and finance: An integrative approach to using Python for research* (pp. 411–433). Springer Nature Switzerland.

Lancelot, R., Lescourret, F., & Faye, B. (1995). Multilevel modelling of pre-weaning kid mortality during the cold, dry season 1991–1992 in the outskirts of N'Djamena, Chad. *Preventive Veterinary Medicine, 24*(3), 171–186. https://doi.org/10.1016/0167-5877(95)00478-F

Larai, H., & Mahmoud, A. (2022). *Child labour in Nigeria: Consequences and solutions*. Federal College of Education, Kano. Retrieved from: https://www.researchgate.net/publication/364129504_CHILD_LABOUR_IN_NIGERIA_CONSEQUENCES_AND_SOLUTIONS

Lee, J., Kim, H., & Rhee, D-E. (2021). No harmless child labor: The effect of child labor on academic achievement in Francophone Western and central Africa. *International Journal of Educational Development, 80*, 102308. https://doi.org/10.1016/j.ijedudev.2020.102308

Levin, A., Lin, C-F., & James Chu, C-S. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics, 108*(1), 1–24. https://doi.org/10.1016/S0304-4076(01)00098-7

Lütkepohl, H. (2006). Structural vector autoregressive analysis for cointegrated variables. *Allgemeines Statistisches Archiv, 90*(1), 75–88. https://doi.org/10.1007/s10182-006-0222-4

Maconachie, R., & Hilson, G. (2016). Re-Thinking the child labor problem in rural sub-Saharan Africa: The case of Sierra Leone's half shovels. *World Development, 78*, 136–147. https://doi.org/10.1016/j.worlddev.2015.10.012

Maina, B. W. (2013). Child labour and its determinants in Kenya. KIPPRA Discussion Paper No. 157. Kenya Institute for Public Policy Research and Analysis. Retrieved from https://repository.kippra.or.ke/bitstream/handle/123456789/2527/DP157.pdf?isAllowed=y&sequence=1

Mehari, B. (2020). Factors associated with child labour in Ethiopia: A multilevel model approach. *Singapore Journal of Scientific Research,* (10):213–220.

Mehta, N., & Mohanty, S. (2020). Some reflections on the extent and causes of child labour. *Anvesak, 50*, 1–24. Retrieved from https://www.researchgate.net/publication/352561140_Some_Reflections_on_the_Extent_and_Causes_of_Child_Labour

Musa, I., & Magaji, S. (2023). Nexus between household income and child labor in Northeastern Nigeria. *African Journal of Social Sciences and Humanities Research, 6*(3), 57–70.

Nderi, I. (2021). Children of Mali: Realizing Children's Rights in Mali. https://www.humanium.org/en/mali/

Neumayer, E., & de Soysa, I. (2005). Trade openness, foreign direct investment and child labor. *World Development, 33*(1), 43–63. https://doi.org/10.1016/j.worlddev.2004.06.014

Our World in Data (2021). Unemployment rate. https://ourworldindata.org/grapher/unemployment-rate

Ozcan, D., & Hakan, A. (2010). The effects of globalization on child labor in developing countries. *Business and Economic Horizons, 2*. https://doi.org/10.15208/beh.2010.15

Panjabi, R. K. L. (2009) Sacrificial lambs of globalization: Child labor in the twenty-first century. *Denver Journal of International Law & Policy, 37*(3), 421–464. https://digitalcommons.du.edu/cgi/viewcontent.cgi?article=1262&context=djilp

Parker, D. L. (1997). Child labor: The impact of economic exploitation on The health and welfare of children. *Minnesota Medicine, 80*(7), 10–13. 52–15.

Roggero, P., Mangiaterra, V., Bustreo, F., & Rosati, F. (2007). The health impact of child labor in developing countries: Evidence from cross-country data. *American Journal of Public Health, 97*(2), 271–275. https://doi.org/10.2105/ajph.2005.066829

Samuel Okunade, S. L. S. (2021). The dynamics of child trafficking in West Africa. *African Human Mobility Review, 7*(3), 116–140. https://doi.org/10.14426/ahmr.v7i3.937

Sovacool, B. K. (2021). When subterranean slavery supports sustainability transitions? Power, patriarchy, and child labor in artisanal Congolese Cobalt mining. *The Extractive Industries and Society, 8*(1), 271–293. https://doi.org/10.1016/j.exis.2020.11.018

Sule Magaji, I. M., & Adegbenro Muhammed Lawal. (2024). Impact of unemployment on child labour practice in Nigeria. *International Research Journal of Economics and Management Studies, 3*(3), 397–308.

Tariq, B., & Ab-Rahim, R. (2020). Trade and Child Labor: A Review of Literature. *Journal of Public Administration and Governance, 10*. https://doi.org/10.5296/jpag.v10i1.15429

Thevenon, O., & Edmonds, E. (2019). Child labour - Causes, consequences and policies to tackle it. *235*. https://doi.org/10.1787/1815199X

TukeyJW (1972). Some graphic and semigraphic displays. *Statistical Papers in Honor of George W Snedecor, 5*, 293–316.

UNICEF (2016). Boko Haram violence in Lake Chad region leaves children displaced and trapped. https://www.unicef.org/press-releases/boko-haram-violence-lake-chad-region-leaves-children-displaced-and-trapped

UNICEF. (2021). *Ending child labour through a multisectoral approach*. UNICEF.

US Department of State (2023). 2023 Investment Climate Statements: Madagasca. https://www.state.gov/reports/2023-investment-climate-statements/madagascar/. Accessed 14th July 2024.

van der Zee, K., Filby, S., & van Walbeek, C. (2022). When cigarette sales suddenly become illegal: Evidence from an online survey of South African smokers during COVID-19 lockdown. *Nicotine & Tobacco Research, 25*(2), 325–330. https://doi.org/10.1093/ntr/ntac067

Van Niekerk, M., Neser, F., Van Wyk, J., & Ducrocq, V. (2023). Comparison of fixed and random regression models for the analysis of milk production traits in South African Holstein dairy cattle under two production systems. *Livestock Science, 267*, 105125. https://doi.org/10.1016/j.livsci.2022.105125

Velleman, P. F., & Hoaglin, D. C. (2012). Exploratory data analysis. *APA handbook of research methods in psychology, vol 3: Data analysis and research publication* (pp. 51–70). American Psychological Association. APA handbooks in psychology®.).

Waxman, S. (2021). Child Labor in the Vanilla Sector in Madagascar. https://www.fairlabor.org/projects/child-labor-in-the-vanilla-sector-in-madagascar/

Webbink, E., Smits, J., & de Jong, E. (2013). Household and context determinants of child labor in 221 districts of 18 developing countries. *Social Indicators Research, 110*(2), 819–836. https://doi.org/10.1007/s11205-011-9960-0

White, B. (1996). Globalization and the child labor problem. *Journal of International Development, 8*(6), 829–839. https://doi.org/10.1002/(SICI)1099-1328(199611)8:6%3C;829::AID-JID404%3E;3.0.CO;2-Z

Wickramasekara, P. (2008). Globalisation, international labour migration and the rights of migrant workers. *Third World Quarterly, 29*(7), 1247–1264.

World Bank (2021). World Bank Open Data. https://data.worldbank.org/

World Bank. (2022). *Project appraisal document on a proposed credit in the amount of EUR 141.4 million (U$S 160 million equivalent) to the Republic of Cameroon*. for an Adaptive Safety Nets and Economic Inclusion Project.

World Bank (2023a). Central African Republic Overview. https://www.worldbank.org/en/country/centralafricanrepublic/overview. Accessed 14th July 2024.

World Bank (2023b). The World Bank in Madagascar. https://www.worldbank.org/en/country/madagascar/overview. Accessed 14th July 2024.

World Bank (2024). World Bank country and lending groups. https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups. Accessed 13th July 2024.

Authors and Affiliations

Himashi Muthugala[1] · Tharaka Magammana[1] · Amanda Bandara[1] · Ayodhya Perera[1] · Ruwan Jayathilaka[2]

✉ Ruwan Jayathilaka
ruwan.j@sliit.lk

Himashi Muthugala
himashimuthugala2019@gmail.com

Tharaka Magammana
nuwanthitharaka8@gmail.com

Amanda Bandara
amandabandara2000@gmail.com

Ayodhya Perera
ayoddya2000@gmail.com

[1] SLIIT Business School, Sri Lanka Institute of Information Technology, New Kandy Road, Malabe, Sri Lanka

[2] Department of Information Management, SLIIT Business School, Sri Lanka Institute of Information Technology, New Kandy Road, Malabe, Sri Lanka