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**COVID-19 and the Role of Remittances on Sustainable Development:
Insights from Sub-Saharan Africa**

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Abstract

The role of remittances has received considerable attentions at various national and regional economies due to their significant influence on growth and development indicators. Because of COVID-19, however, re-examining this relationship is necessary given the realities to trade and investment occasioned by the pandemic. Also, the extant literature has largely measured the effects of this variable on economic growth and development without expansion into sustainable development. Observing this relationship is, thus, considered appropriate due to the global outcry on climate change and the environment, which sustainable development better captures. Given these, this research measures the impact of COVID-19 on the nexus between remittances and sustainable development in SSA. Based on both static and dynamic estimators on a panel data from thirty-eight SSA countries, the empirical findings suggest that remittances raise sustainable development, though a negative effect sets in where remittances exceed 0.388 percent of the SSA region's adjusted net savings. More so, the sign of the coefficient of COVID-19 is negative and the magnitude shows a severe impact. Finally, the interaction effect of remittances with COVID-19 is such that COVID-19 reduces the positive effect of remittances on sustainable development. The appropriate policies are discussed based on the findings of the study.

Keywords

Remittances

COVID-19

sustainable development

instrumental variables

Sub-Saharan Africa

JEL Classification

C26

F24

G01

Q01

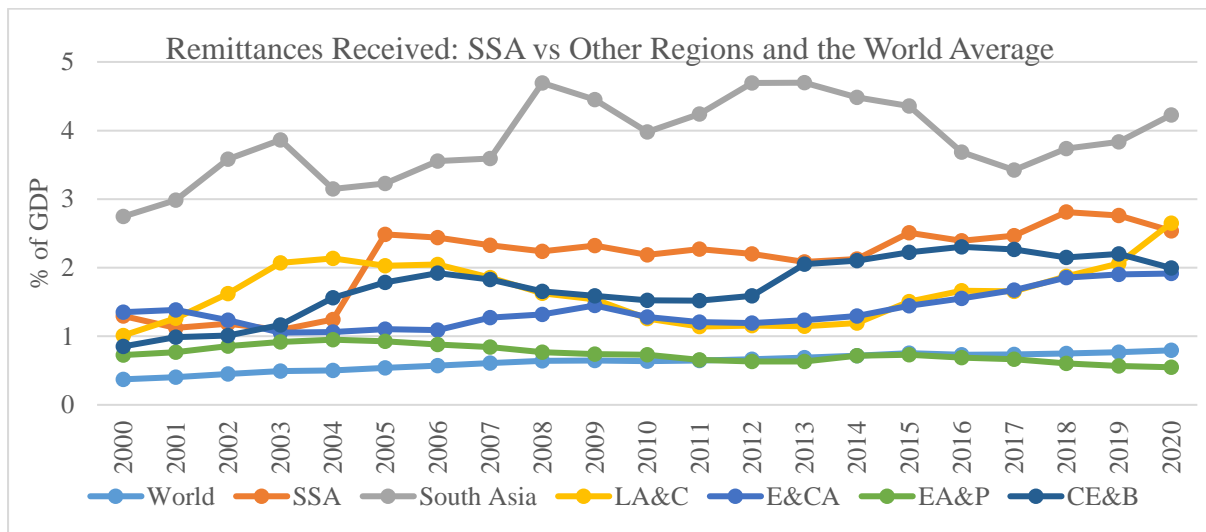
1. Introduction

The macroeconomic impacts of remittances have been extensively discussed in recent years. Being a significant source of development finance, the flows of private remittances have generally increased more than foreign direct investment (FDI) and, in the last two decades¹, their flows have exceeded that of official development assistance (ODA) (Sobiech, 2019). While not all migrant workers' job aspirations are met, neither does every migrant worker remit money back home, governments generally encourage international employments as an active labour market strategy given that the growth of remittances is one of the main sources of income to households (Wagle & Devkota, 2018). On regional comparisons, going by the trends in Fig. 1, the Sub-Saharan African (SSA) region appears to have benefitted a lot from inward remittances, second only to South Asia. In other words, inward remittances to the region exceed the global average and the flows to Latin America & the Caribbean (LA&C), Europe & Central Asia (E&CA), East Asia & Pacific (EA&P) as well as Central Europe & the Baltics (CE&B). It indicates a significant rise from 2004 through 2018, until it slightly falls in 2019 and 2020 when the pandemic began.

As in other financial flows, remittance may positively or negatively affect the general economy. For instance, remittance reduces the likelihood of violence, especially against women, thus promoting social cohesion, gender balance, and harmonious relationship (Mitra et al., 2021). It also raises investment expenditure, enhances households' economic well-being, reduces poverty level (Adams Jr & Cuecuecha, 2013; Wagle & Devkota, 2018), and aids the efficiency of the financial sector by reducing net interest margins and overhead costs (Kacou et al., 2021). Although the migration of parents tends to exert a negative effect on children's education, partly due to absence of parental control in critical areas of their upbringings, the resulting remittance inflow lessens the income constraints to human capital development, especially when it is channelled into (human) investment (Salas, 2014). Similarly, the inflow of foreign remittance supports industrialisation through enhanced market-oriented production and transfer of skills and technology (see Efobi et al., 2019).

¹ See Fig. 2 for the trends of Remittance, FDI and Foreign Aid in SSA

Figure 1: Remittance received in SSA in relation to some other regions' receipts.



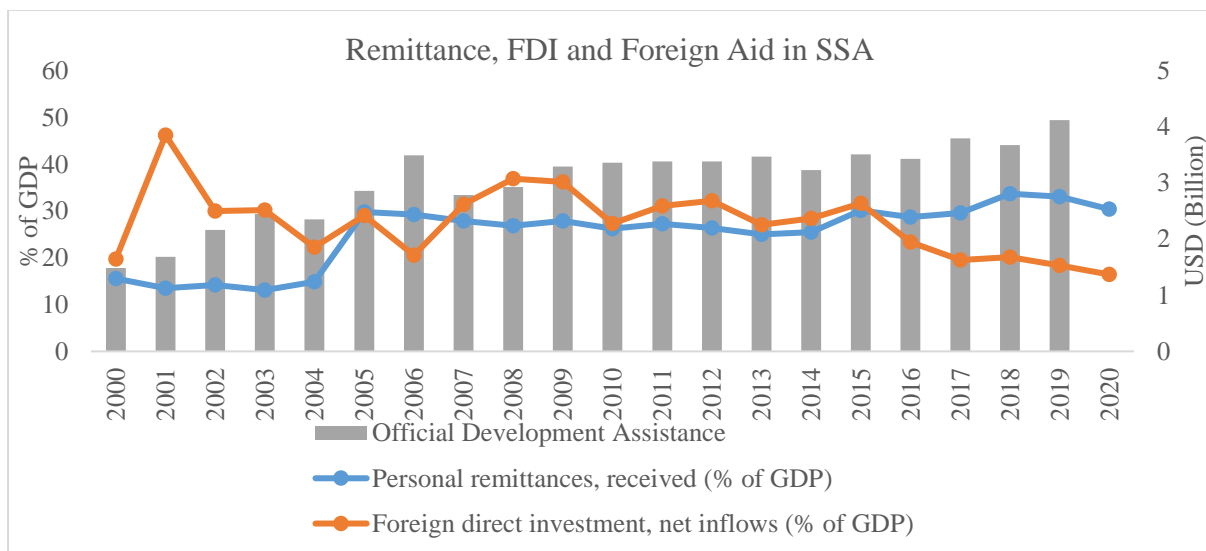
Source: Authors' computation from the World Bank dataset

In the same vein, remittance drives macroeconomic growth by enhancing investment; it facilitates the development of human capital and promotes financial system stability. Beyond this argument, Sobiech (2019) agrees that remittance promotes economic growth, but that the magnitude of the growth-impact of remittance is constrained by the efficiency of financial sector. This position contends that the impact of remittance on economic growth is less in a more financially developed economy and there could be output losses in the long-run if such economy simultaneously achieves increasing remittance inflows and high levels of financial development. Hence, remittance is considered especially useful where access to domestic credit markets is either limited or not well developed (Bahadir et al., 2018).

Notwithstanding these potential benefits, it is evident in many other studies that remittance reduces the incentives to work due to a high dependence on migrants' transfers. It may also hamper the economy in the long-run through the tradable sector because of real exchange rate appreciation (Abdih et al., 2012; Catrinescu et al., 2009). Furthermore, as much as remittance promotes household welfare and general economic development, it also tends to worsen it due to its weakening effect on the quality of institutions. This argument partly relies on the work of Abdih et al. (2012), which provides evidence that it may be easier for the government to divert public resources for private uses when remittance inflows afford households access to public commodities instead of depending on the government, thus reducing the incentives to demand public accountability. Besides, even though remittances are less expensive when compared to some other development loans – such as ODA which attracts interest rates – the government tends to lose a massive return should migrants (who may have benefitted from costly government investments in education) fail to return to their home countries (Abduvaliev & Bustillo, 2020; Isomatov, 2010).

More so, as much as it may be interesting to households benefiting from these remittances, the brain drain associated with the emigration of highly skilled workers is worrisome and does more harm in view of its net negative impact on productivity and growth of developing economies (Sharipov, 2012). Again, as explained in Acheampong et al. (2021), the inflow of foreign remittances could further deteriorate the level of poverty by enhancing income inequalities in remittance-receiving economies, if it is tilted to benefit more wealthy households' income. Besides, the families left behind tend to experience poorer mental and physical health, which the financial benefits from inward remittances may not offset (see Tachibana et al., 2019). In the same way, the social cost of family disruptions could result in lesser investments in human capital of, especially, the children left behind. This hinders the long-run development prospects via human capital formation in the left-behind children (Murakami, 2021).

Figure 2: Remittances, FDI and Foreign aid (all inwards) in SSA



Source: Authors' computation from the World Bank dataset

Although the SSA region is blessed with enormous resources (both human and natural), the ratio of debt to GDP maintains an upward trend in many countries in the region because of consistent and high government borrowings. More so, the income levels are very low, coupled with widespread current account and fiscal deficits. Besides, majority of the countries in this region feature in the category of those with the highest working poverty rates, globally². As a result of these and numerous other challenges – and since remittances may serve as an alternative to debts in some respects – the SSA region has paid close attention to the flow of foreign remittances with a view to achieving fiscal sustainability (see Adams & Klobodu, 2016).

² Working poverty rate defines the proportion of employed persons living in households with per-capita consumption or income that falls below the international poverty line of US\$1.90 a day (ILO, 2022).

To the disbelief of many international organisations, who had predicted a colossal decline in remittances to developing economies when the COVID-19 lockdown measures began in March 2020, remittances were rather stable and, in many countries, even grew higher than in the pre-pandemic periods (Dinarte-Diaz et al., 2022; Ahsan et al., 2022). In other words, as the COVID-19 pandemic continues to bite harder, even with recurring variants, private remittance flows surprisingly suggest a lower decline in 2020 even below that experienced during the GFC. This is as the World Bank (2021a) reports that remittances to low- and middle-income economies are expected to have reached \$589 billion in 2021, representing a strong growth of 7.3 percent. When compared to 2009 when remittances to developing countries are estimated to have fallen by 6.1 percent because of the GFC (see Mohapatra & Ratha, 2012), the flow of remittances is reported to be more robust than earlier estimates. It also aligns with the resilience of flows in 2020 when the flow of remittances fell by just 1.7 percent even with a severe COVID-19 – induced global recession. This resilience may be connected to the transition from informal to formal channels and from cash to digital payment platforms (World Bank, 2021b); some governments’ fees remediation and cash incentives for inward remittances through appropriate financial systems (Ahsan et al., 2022); as well as some of the policies of some host countries that allowed migrants the same vaccinations and welfare supports as the natives, thereby supporting them to continue working (Mbiba & Mupfumira, 2022).

In addition, remittances act differently from other capital flows, such that their flows increase even when financial markets decline, particularly in times of economic downturn, natural disasters, civil and political unrests. This is because migrants living abroad send more money in response to the rising needs of their families back home, especially when investors and donors may have pulled out. Thus, remittances may thwart unexpected current account reversal and curb investor panic during crisis (Ratha, 2013). This is more so as this form of financial flows is targeted at households, and not the governments, which may provide a form of social safety nets in trying times. This is because they are relatively stable when compared to many other inflows (Feeny et al., 2014), which further explains the resilience of flows and the strong growth recorded even as the pandemic rages.

It is further suggested that pandemics generally define a significant shift in capital from the more affected economies to the less affected ones (see McKibbin & Sidorenko, 2006). This is as remittance inflows to SSA returned to growth in 2021, rising by 6.2 percent (to USD 45 billion from USD 42 billion in the preceding year) and are further projected to grow by 5.5 percent in 2022 because of recoveries in Europe and the United States. However, the cost of sending remittances to SSA is most costly – at 8 percent in the first quarter of 2021, far more than the SDG target of 3 percent by 2030. This is partly due to both the utilisation of black-market exchange rates and small quantities of formal flows (World Bank, 2021a), as a result of which a significant share of these remittances is lost in intermediation (see Mbiba & Mupfumira, 2022). Again, this high cost of sending remittances has significantly underestimated the actual flows thereby prompting migrants to utilise informal channels, while a number of developing countries do not even report remittances in their balance of payments (El Hamma, 2019).

Part of the motivation for this study is the contention that attaining sustainable development and stamping out poverty in SSA (and other developing economies) entails not just economic growth but also other economic factors that lead to structural changes, chief of which include the inflow of foreign remittances (Acheampong et al., 2021). However, previous studies on the role of remittances in economic development have largely been insignificant in the context of SSA countries, as studies have majorly focused on other regions, such as Asia and Latin America (Adams Jr & Cuecuecha, 2013). Most significantly, COVID-19 has assumed a huge shock on the global and regional economies, thus estimating its impact is expected to provide important policy directions both for SSA and for other regions.

To this extent, this research attempts to address the following important questions in relation to the SSA region: (1) why is sustainable development, as opposed to growth and other development indicators, considered to be more relevant? (2) why is COVID-19 important to the nexus between remittances and sustainable development? (3) what is the nature of the relationship between remittances and sustainable development?

In the next section, the review of relevant literature is logically presented; Section Three and Four, respectively, discuss the data and methodology; the empirical analyses are presented in Section Five. Section Six concludes.

2. Literature Review

Friedman's (1957) permanent income hypothesis suggests that while a transitory income increase may be spread over a lifetime through savings and investment, a rise in permanent income only raises the current level of consumption. This hypothesis explains the direction of migrant remittance in relation to economic growth based on self-interest or altruistic behaviour. While the former allows migrants to send more money for investment, the latter suggests such money is sent to support households in economic difficulties back home (Lim & Basnet, 2017). This, thus, maintains that the household's use of remittances income is important in examining its impact on economic growth and development.

The linkage between remittances and economic growth and/or development is empirically contradictory. Some studies have contended that a positive connection exists between the variables. For example, amongst the post-Soviet states, Abduvaliev and Bustillo (2020) investigate the impact of private remittances on growth and poverty level. The authors find that remittances raise the rate of economic growth; it equally drives a decline in poverty severity via rising income and the level of consumption. Employing the GMM technique on a panel data for 136, including 25 small islands developing, countries (SIDS), for the period 1971 – 2010, Feeny et al. (2014) study the role of remittances on economic growth. Their empirical analysis suggests a positive effect of remittances on the growth of SIDS, but not in other developing countries considered. These findings, however, depict that the results are heterogeneous among different groups of SIDS. Similarly, Ofori and Grechyna (2021) examine

the joint effects of remittances and natural resource rent on economic growth in 43 SSA countries. Using the traditional panel and GMM estimation techniques on the data obtained between 1990 and 2017, the authors affirm that the positive impact of remittances mitigates the negative effect of oil rent on economic growth below a threshold point, and that the unconditional effect of remittances on growth is positive. In addition to these, Lim and Simmons (2015) measure the economic significance of remittances to the Caribbean Community and Common Market (CARI-COM) economy in the long-run. Relying on Westerlund and Pedroni cointegration techniques on the data covering 1975 to 2010, the researchers advance no evidence for the long-run association between migrant remittances and the per capita real GDP, though some empirical proofs of the long-run linkage are found between remittances and real consumption per capita. Their finding, thus, concludes that the inflow of remittances into the region largely finances consumption needs.

Away from their effects on economic growth, some other researchers have examined the nexus between remittances and economic development and some development indicators. For instance, Askarov and Doucouliagos (2020) measure the effect of remittances on education, with meta-regression analysis covering 30 countries. Their empirical findings suggest that the effect of remittances on education expenditure increases over time, without gender-based differences in the effects. Also, both internal and international remittances increase but the latter has a larger effect. While assuming that the nature of the school attended defines the quality of education obtained, Salas (2014) measures the impact of foreign remittances on the choice of public or private schools for children, based on the Peruvian data spanning 2007 – 2010. The author observes that international remittances induce the likelihood to send children to private schools. Similar to these estimates, Murakami (2021) investigates the effect of cross-country migration and foreign remittances on school enrolment of children left behind in Tajikistan. Applying the switching probit model on the data obtained from the 2013 Tajikistan Jobs, Skills, and Migration Survey, the researcher confirms that the migration of parents exerts a higher adverse effect on the school enrolment of children and that, even with their remittances back home, the compensating effect is less significant than that of the migration of other members of the household.

In line with the gender aspect of development, Mitra et al. (2021) investigate the role of remittance access on women acceptance of domestic violence. Using data from the Punjab province in Pakistan in 2014, the researchers observe that, in relative terms, women with remittance access are less likely to accept domestic violence. In a different aspect of development, Tachibana et al. (2019) estimate the impacts of remittances on the mental health of the victims of the 2015 earthquake (EQ) in Nepal, based on the data from 335 individuals in 6 villages in the Western part of the country. The investigators observe a decline in psychological distress due to the rise in remittances sent to households; however, the increased remittance did not assuage mental disorder. On its impact on the environment, Wijayarathne et al. (2022) employ the instrumental variable (IV) mediation analysis on the data from three waves of Sri Lankan Households' Income and Expenditure Survey (2009, 2012, and 2016).

Their findings suggest that inward remittances raise household wealth, thereby enhancing the transition from solid fuel to clean, modern fuel usage.

Furthermore, some researchers opine that remittances are not efficient in promoting economic growth and development when there are inefficient domestic institutions. In respect of this, Catrinescu et al. (2009) state that remittances enhance economic growth, but institutions play a crucial role, as they allow remittances to be efficiently channelled. Similar to this is the work of Zghidi et al. (2018), who confirm that institutional quality moderates the nexus between remittances and economic growth. Using the system generalised method of moments (GMM) technique on the panel data from four North African countries, from 1980 to 2012, the researchers observe evidence of a positive linkage between remittances and economic growth and that economic freedom complements the relationship. Still extolling the role of institutions, Williams (2018) asserts that with efficient democratic institutions, remittance recipients largely invest those foreign inflows into entrepreneurial activities and human capital development. Relying on the panel data from 109 developing economies, between 1975 and 2014, the author observes that remittances exert a negative impact on economic growth in those countries with deficient democratic institutions while the effect turns positive as democratic institutions improve. Another related study by Adams and Klobodu (2016) seeks to investigate the roles of remittances and regime durability on the growth of thirty-three (33) SSA countries, based on data covering 1970 – 2012. Applying the GMM procedure, their empirical estimates confirm that the growth effect of remittances is stimulated in the presence of a democratic and stable government.

Building on these studies, some other researchers obtain that it takes the efficiency of financial sector, alongside institutional effectiveness, for remittances to exert the desired impacts on economic growth and development. In this respect, Fromentin (2017) studies the dynamic impact of remittances on financial development, and whether the impact differs by income group, using developing economies' data spanning 1974 – 2014. Based on the Pooled Mean Group (PMG) technique, the researcher observes that, except for low-income countries, a positive relationship exists between the two variables in both the long-run and the short-run, as a result of which remittances complement financial development. In addition, based on a panel of 49 African countries, spanning 1980 – 2014, Efobi et al. (2019) consider if remittances indirectly (via financial development) and directly relate with industrialisation. Relying on the instrumental fixed effects, GMM, and instrumental quantile regressions (QR) estimates, the researchers observe that for particular early levels of industrialisation, remittances promote industrialisation via financial sector development.

Furthermore, Acheampong et al. (2021) investigate the roles of financial development and remittance on poverty alleviation in 44 SSA countries, based on data covering 2010 to 2019. Relying on the IV-GMM and Two-Stage Least Squares (2SLS) techniques, the researchers obtain that foreign remittance raises the level of poverty (in both female and male), while financial development reduces it. In contrast to these findings, Kacou et al. (2021) analyse the dynamic interactions between remittances and financial development in a panel of

22 SSA countries, using a panel vector autoregression (PVAR) model over the period 2004–2017. Their empirical estimates suggest that migrant remittances are detrimental to the overall financial institutions, but financial institutions positively influence remittances inflows. Also, the relationship between the two variables changes with the dimensions of financial institution.

Confirming financial development and institutional effectiveness as conduits via which remittances stimulate economic growth, El Hamma (2019) estimates the conditional impacts of remittances on economic growth in 14 Middle East and North Africa (MENA) countries. Relying on the Two-Stage Least Squares instrumental variables (2SLS/IV) technique, based on data spanning 1982 – 2016, the author obtains that remittances only promote economic growth in the presence of efficient institutional environments and developed financial systems. Along the same line, Dastidar (2017) investigates the role of openness in the connection between remittances and economic growth for a sample of 62 developing economies, for the period 1990 – 2014. The finding suggests that remittances stimulate growth only in more open economies – where there are lower incidences of corruption, better financial markets and legal systems that can subject remittances to viable investments.

In a major deviation from the earlier findings, Ruiz et al. (2009) opine that a nonlinearity exists in the remittances – economic growth nexus. Using a semiparametric model to measure the nonlinear linkage, based on data covering 1978 – 2001, the researchers find that there are no measurable effects when nonlinearities are considered, neither do institutions reinforce the role of remittances on growth. Again, while most of the studies have focused on the direct impacts of remittances on economic growth and development, Das and Chowdhury (2019) observe that the potential for reverse flows – proportion of remittances that is not locally absorbed but used to finance accumulated reserves, debt obligations, and capital flights – have been ignored. Based on the ARDL technique on Bangladeshi data covering 1976 to 2015, the authors, therefore, estimate that between 13 and 14 percent of the remittances received are used for external purposes. In a more recent study, Ahsan et al. (2022) study the impact of COVID-19 on electric power consumption and the economy of Bangladesh. Based on the ARDL procedure, the empirical findings suggest that, during partial lockdowns, a negative long-run connection between power consumption and COVID-19 cases exists.

The extant literature has revealed an extensive discussion on the direction of the nexus between remittances and economic growth and/or development, as a result of which there have been contradictory findings. Any conclusion from these findings, however, may no longer be relevant and reliable in view of the new realities to trade and the general economy occasioned by COVID-19. Even as the global economy gradually recovers from the pandemic-induced recession, available studies have not researched into why COVID-19 is important to further discussions on this cause-effect scenario and why it may be important to directly study its role in the linkage between the two variables. Although there has been some theoretical discussion on the subject-matter – which has been largely contradictory – it is difficult for governments and policymakers to formulate sound policies geared towards sustainable development without

empirically measuring the role of the COVID-19 pandemic on this relationship, a gap this study intends to cover.

Besides, several studies have measured the impact of remittances on economic growth (see, e.g., Feeny et al., 2014; Zghidi et al., 2018), level of poverty (see Abduvaliev & Bustillo, 2020; Acheampong et al., 2021), financial development (see Fromentin, 2017; Kacou et al., 2021), education (see Salas, 2014; Askarov & Doucouliagos, 2020), institutional quality (see, e.g., Berdiev et al., 2013; Ajide & Olayiwola, 2021), gender violence (see Mitra et al., 2021), exchange rate (see, e.g., Hassan & Holmes, 2013), food insecurity (see, e.g., Mora-Rivera & Gameraen, 2021); and many other aspects of economic development. None of these studies has, nevertheless, been expanded into sustainable development. Sustainable development, according to the United Nations General Assembly (UNGA, 1987, p. 43), explains “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Given the global outcry on climate change and the environment, sustainable development is a much better measure as it raises the national income per capita while maintaining a reasonable limit to environmental degradation.

Finally, very few studies have examined a nonlinear relationship between remittances and economic growth (see, e.g., Ruiz et al., 2009), while a large body of recent literature assumes a linear economic relationship between the two variables. Along this line, Hassan et al. (2016) propose a different standpoint on remittances – growth nexus and submit that there is a U-shaped relationship between the variables in the long-run: the growth effects of remittances are at first negative but later turn positive. The use of a quadratic term to measure the nonlinear effect may, however, result in misleading conclusions and specification bias because of the arbitrary introduction of this functional form. To the extent that remittances may make or mar economic progress, establishing an extreme point beyond which remittances may be linked with financial crisis is necessary, especially in this pandemic-induced global economy. This is equally an important gap in this area of research, especially as it relates to the SSA region.

3. Data

This research is based on a panel of thirty-eight countries³ in SSA, with data covering the period from 2000 to 2021. The choice of temporal and geographical scopes is dependent upon contingencies in data availability. Except otherwise specified, the data, along with the descriptions, are available on the World Bank’s World Development and Governance Indicators’ databases.

The data on COVID-19 is extracted from the World Pandemic Uncertainty Index (WPUI); this index tracks global uncertainties by text mining the Economist Intelligence Unit (EIU)’s country reports. It is calculated by counting the percent of the word “uncertain” (or its

³ The list of these countries is provided in Appendix A

variant) in the EIU reports; multiplied by 1,000,000. Hence, a higher (lower) index value connotes a higher (lower) uncertainty (see Ahir et al., 2018 for details). It is anticipated to affect sustainable development through remittances.

Sustainable development (SD) refers to several processes of achieving sustainability – a more sustainable world – and is composed of four dimensions: economy, society, environment, and culture (United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2021). This is measured by adjusted net savings (percentage of GNI), which is net national savings plus education expenditure minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide; it excludes particulate emissions damage (World Bank, 2022). Few other studies that have employed this variable as a measure of SD, though in other research areas, include Aidt (2009), Güney (2019), and Azam et al. (2021).

Remittance (REM) is composed of all current transfers (in kind or cash) received by resident households from non-resident households. It includes the income of seasonal, border, and other short-term workers employed in an economy where they are not resident, and of residents employed by non-resident entities. Workers' remittances, compensation of employees, and migrants' transfers are the three components that are commonly accepted as constituting remittances (World Bank, 2022; Feeny et al., 2014). In line with Berdiev et al. (2013), this variable is deflated by GDP in order to appropriately estimate the degree of its flows in relation to the receiving economies' sizes. As in extant literature, the a priori sign of the coefficient of remittances in relation to economic growth and/or development is ambiguous.

FDI and foreign aid (FA) are some other important external drivers of growth and development in SSA and their inclusion better positions the model for efficiency. While FDI (measured by inflows of FDI as a percentage of GDP) aggregates reinvestment of earnings, equity capital, other short-term and long-term capital – as shown in the balance of payments, FA (measured by net official development assistance and aid received) refers to disbursement and aid flows (net of repayment of principal) to countries on the DAC list of aid recipients (World Bank, 2022). Each of these variables is anticipated to stimulate economic growth and sustainable development.

Natural resource endowment (NRR) is included since almost all countries in Africa are endowed with one or more forms of natural resources and is, therefore, expected to define the rate of growth and development in the region (Musibau et al., 2022). Measured by total natural resources rents, NRR is the aggregate of natural gas rents, oil rents, mineral rents, coal rents (soft and hard), and forest rents and estimating its impact on economic output is relevant in projecting a logical framework for sustainable development (World Bank, 2022).

The quality of institutions is measured by rule of law (ROL), which reflects the views of the degree to which agents abide by, and exert confidence in, the societal rules – such as property rights, quality of contract enforcement, the probability of violence and crime, as well as the police and the court system (Babalola & Shittu, 2020; Kaufmann et al., 2010). The data on this is available on the World Bank's World Governance Indicators (WGI).

Financial development (FD) is measured by domestic credit to private sector by Banks. In line with extant literature, the coefficient of financial development with respect to remittances is ambiguous, based on the substitutability hypothesis – that remittances may substitute financial development in the short-run – and financialisation of remittance markets hypothesis – that the former may complement the latter in the long-run (see Kacou et al., 2021).

4. Methodology

The fixed effects and the instrumental variable (IV) regression techniques are used in estimating the role of COVID-19 on the nexus between remittances and sustainable development in SSA. The fixed effects model partials out the effects of time-invariant unobservable and reduces omitted variable bias. However, the endogenous nature of remittances and migration decisions is still a challenge. This is partly because the presence of time-variant omitted variables influencing the level of remittances cannot be excluded, and an improved level of sustainable development may further promote the level of remittances. In addition, the use of fixed effects regression gets rid of unobserved and observed heterogeneities in remittances but may produce biased estimates where there are time-variant omitted variables. In order to overcome this problem, the fixed effects estimator is combined with the IV regression, since the latter addresses any potential endogeneity arising from reverse causality and measurement problems from unrecorded remittances (Murakami, 2021; Hassan & Shakur, 2017) while also correcting for any likely biases caused by simultaneity (see, e.g., Gao et al., 2021).

To confirm the validity of a standard panel model assumption, the cross-section dependence tests are employed to see if the variables bear some common dynamics among the countries. Both the semi-parametric tests developed by Friedman (1937) and Frees (1995, 2004) and a parametric procedure suggested by Pesaran (2004) are relevant where N is large, and T is small.

The equation constructed to achieve the objectives of this research is modelled after the works of several researchers (such as Das & Chowdhury, 2019; Kacou et al., 2021).

$$SD_{it} = \beta_0 + \beta_1 REM_{it} + \beta_2 COVID19_{it} + \beta_3 (COVID19 * REM)_{it} + \beta_4 X_{it} + \mu_t + \varphi_i + \epsilon_{it} \dots \dots \dots [1]$$

where:

μ_t is the time – specific effect

φ_i is the unobserved country – specific fixed effect

ϵ_{it} is the disturbance term

Equation [1] models the role of COVID-19 on the nexus between REM and SD in SSA. X represents a set of other explanatory variables, based on extant literature and parsimony, included in order to avoid any possible specification bias. These variables include FD, NRR, ROL, FDI, and FA. Population growth rate (POPGR) is also included to account for the dynamics of population in long-run growth, since a higher population growth lowers capital per worker and results in slower long-run growth (Mankiw et al, 1992; Solow, 1956; Barro, 1991); government expenditure (SIZE) is to account for the role of stabilisation policy. β_i ($i = 0, 1, 2, \dots, 38$) denotes the representative parameters for the intercept and slope coefficients.

5. Empirical Estimation

This section presents the empirical results, which incorporate five (5) estimations as shown in Table 3. The first model presents the fixed effects threshold regression results from which the value of remittances at the reversal point is estimated. Models 2, 4 and 5 detail the estimates of the IV regression (with fixed effects and 2SLS options), including the interaction of remittances with COVID-19, financial development and institutional quality. To account for country heterogeneity, the fixed effects estimates (with country cluster) is presented in model 3. In each of these models, the dependent variable is sustainable development. Finally, the preliminary estimations are discussed in Tables 1 and 2.

Table 1 presents the results of the descriptive statistics, which suggest that sustainable development has an average value of 2.661 percent; this is higher than the average growth rate of population at 2.404 percent.

Table 1: Descriptive Statistics

	SD	REM	COVID-19	FDI	FD	SIZE	ROL	FA	POPGR	NRR
Mean	2.661	3.593	5.205	3.816	19.346	14.963	32.489	8.51E+08	2.404	10.678
Maximum	38.977	53.826	68.915	57.877	106.260	43.484	82.587	1.22E+10	5.605	58.688
Minimum	-50.010	0.000	0.000	-18.918	0.000	0.952	0.478	-18389999	-2.629	0.001
Std. Dev.	13.591	6.092	16.830	5.587	17.501	6.453	20.187	1.02E+09	0.902	10.573
Skewness	-0.570	4.164	3.069	3.378	2.228	1.348	0.346	3.393	-1.155	1.910
Kurtosis	4.059	26.434	10.863	23.443	8.408	5.956	2.218	26.391	4.976	6.988
Jarque-Bera	68.158	19662.92	3465.761	15412.73	1579.512	511.973	36.242	19648.91	321.793	1013.957
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observation	675	763	836	798	772	768	798	795	836	798

Also, the average private sector credit from Banks is relatively higher than remittances received since their mean values are, respectively, 19.346 percent and 3.593 percent. While

FDI inflow is observed to have a comparatively lower mean than what the proportion of natural resources is to the GDP, the inflow of foreign aid has been high, at an average of US\$ 8.51E+08 (at constant 2020 US\$) between 2000 and 2021. Furthermore, the governments of the SSA region, in the periods under study, have spent an average of 14.963 percent of their GDP. While the rule of law ranks is low – which is consistent with low quality of institutions – the average effect of COVID-19 is comparatively low. Finally, the Jarque–Bera test confirms that each of the series is not normally distributed.

In Table 2, the results of the correlation analysis suggest that each of remittances, FDI, financial development, government size, institutional quality, foreign aid, population growth, and natural resource endowment is positively correlated with sustainable development, while a negative correlation exists between COVID-19 and sustainable development.

Table 2: Correlation Analysis

	SD	REM	COVID-19	FDI	FD	SIZE	ROL	FA	POPGR	NRR
SD	1.000									
REM	0.589 (0.000)	1.000								
COVID-19	-0.358 (0.000)	-0.302 (0.000)	1.000							
FDI	0.395 (0.000)	0.599 (0.000)	-0.513 (0.000)	1.000						
FD	0.420 (0.000)	0.570 (0.000)	-0.454 (0.000)	0.671 (0.000)	1.000					
SIZE	0.489 (0.000)	0.152 (0.000)	-0.094 (0.007)	0.166 (0.000)	0.165 (0.000)	1.000				
ROL	0.103 (0.004)	0.128 (0.000)	-0.009 (0.800)	0.116 (0.001)	0.046 (0.198)	0.030 (0.399)	1.000			
FA	0.407 (0.000)	0.409 (0.000)	-0.962 (0.000)	0.642 (0.000)	0.559 (0.000)	0.132 (0.000)	-0.010 (0.775)	1.000		
POPGR	0.063 (0.070)	-0.004 (0.901)	-0.027 (0.438)	0.020 (0.573)	-0.007 (0.831)	0.115 (0.001)	-0.437 (0.000)	0.046 (0.185)	1.000	
NRR	0.316 (0.000)	0.484 (0.000)	-0.410 (0.000)	0.696 (0.000)	0.576 (0.000)	0.151 (0.000)	-0.129 (0.000)	0.543 (0.000)	0.172 (0.000)	1.000

In Table 3, the efficiency of the regression estimates is confirmed by a relatively high value of R-squared and a significant value of F-statistic. This is especially reliable given that the IV regression minimises the biases from a possible reverse causality and the measurement problem arising from unrecorded remittances. Moreover, the instruments used, the lagged values of the explanatory variables, tend to reduce biases due to omitted variables and reverse causality associated with remittances and economic growth / development (see, e.g., Adams & Klobodu, 2016). Again, the result of the Friedman’s cross-section dependence (CD) test fails to reject the null hypothesis that the countries are cross-sectionally independent.

Table 3: Estimation of Coefficient

Dependent Variable = SD	Model 1 (FE Threshold)	Model 2 (IV-2SLS)	Model 3 (FE)	Model 4 (IV-FE)	Model 5 (IV-2SLS)
L.SD	–	0.226*** (0.061)	–	–	0.199*** (0.059)
REM	1.141*** (0.134)	1.935*** (0.176)	2.169*** (0.503)	2.848*** (0.274)	2.952*** (0.466)
COVID-19	-44.984* (25.461)	-63.724** (24.906)	55.170 (67.664)	85.459 (64.342)	80.580 (60.681)
FDI	-0.417 (0.413)	-1.122*** (0.385)	0.610 (1.026)	-0.026 (0.613)	-1.122** (0.473)
FD	0.063 (0.078)	0.041 (0.070)	-0.014 (0.199)	-0.096 (0.098)	0.701*** (0.229)
SIZE	0.311*** (0.029)	0.335*** (0.037)	0.438*** (0.101)	0.436*** (0.033)	0.358*** (0.037)
ROL	59.925*** (14.915)	10.043* (5.832)	75.087 (49.722)	60.266*** (18.541)	-55.936*** (21.833)
FA	-0.022 (0.167)	-0.001 (0.162)	-0.036 (0.117)	-0.001 (0.192)	0.041 (0.171)
POPGR	937.797*** (265.690)	210.447* (125.220)	699.114* (378.355)	1329.293*** (338.798)	181.787 (126.658)
NRR	0.218 (0.490)	0.077 (0.419)	1.048 (0.999)	1.200* (0.630)	0.184 (0.450)
REM*COVID-19	–	–	-0.026* (0.014)	-0.033*** (0.011)	-0.031*** (0.011)
REM*ROL	–	–	–	–	0.016*** (0.005)
REM*FD	–	–	–	–	-0.0002*** (0.0001)
_cons	-5394.2*** (1478.573)	-3083.2** (1346.311)	-11563.782*** (4001.186)	- 13846.58*** (3043.005)	-7718.68*** (2819.095)
Instrument	–	Regressors and the lags of regressors			
Friedman's CD Test (Probability)	–	15.031 (0.999)			
Threshold Value	0.388*** (0.023)	–	–	–	–
Adjusted R ²	0.573	0.681	0.569	0.534	0.682
Wald Chi2 / F-Stat	9.48***	1337.12***	85.977***	4.19***	1364.20***
Observation	798	722	798	722	722
Country Dummy			YES		

Note: ***, ** & * denote significance at 1 percent, 5 percent & 10 percent, respectively; standard errors are included in parenthesis

Source: Authors' computation

Sustainable development appears to be influenced by its previous value, as the coefficient of its lagged value is positive. Given a significant coefficient, at 1 percent level, of the lagged value in models 2 and 5, the estimate suggests that sustainable development is persistent. The coefficient of remittances is found to be significant and positive across all estimates, such that, on average, remittance raises sustainable development by 2.2 percent. This finding relates with the empirical findings of Ofori and Grechyna (2021), Askarov and Doucouliagos (2020), and Wijayarathne et al. (2022) who observe a positive connection between remittances and economic growth, education, and environmental quality, respectively.

This relationship, however, holds on a threshold value and a negative effect sets in where remittances exceed 0.388 percent of the SSA region's adjusted net savings. This confirms an inverted U-shaped nexus between remittances and sustainable development. As much as remittances promote sustainable development, which is good for the SSA economies, it tends to hurt development when it is highly relied upon. This explains why, despite a huge inflow of remittances over the years, the SSA region is still among the worst regions in nearly all development indicators. A case in point is poor access to education and health care that has persistently impeded the region's development prospects, as well as poor financial system to assist the disadvantaged and low-income families (Bare et al., 2022). Similarly, the region has lost a sizeable proportion of its labour force to industrialised countries; while this may have resulted in increased inward remittances, there have been reduced productivities and the average standard of living has consistently declined. Besides, the national cost of investment in their education constitutes a huge loss to the governments, which remittances may not immediately compensate for, especially when the migrants fail to return to their home countries.

The sign of the coefficient of COVID-19 is inconsistent across all models; its negative impact is, however, statistically validated and the magnitudes show a severe impact. As expected, based on theoretical expositions, the COVID-19 pandemic has adversely affected nearly all economic activities and brought almost all economies to their knees. The SSA region is not an exception as the ravaging pandemic has affected both developed and developing economies. Even with some of the lowest cases and deaths from COVID-19⁴, the region has witnessed some of its worst economic impacts arising from slower growth and first recession in more than two decades (World Bank, 2020), while the progress towards the attainment of SDGs has been slow in the region and globally (Tonne, 2021). Although the industrialised economies also suffer some severe economic impacts, that of SSA (and other developing economies) may be particularly disturbing because of unprecedented fall in some commodity prices – which is a premise of their annual budgets – and the foreign financial inflows, upon which many of the countries in this region rely, may have been less appealing as various economies seek to restore and deal with domestic issues before looking elsewhere (Franz, 2021; Fenner & Cernev, 2021).

The interaction effect of remittances with COVID-19 is statistically significant and negative, with a magnitude ranging between 0.026 and 0.033 percent. Although with a lesser magnitude, this estimate suggests that COVID-19 reduces the positive effect of remittances on sustainable development by (an average of) 0.03 percent. This is possible, given that majority of remittances that accrue to the region during the pandemic are largely targeted at softening the impacts of the pandemic on households left behind, not to directly enhance economic growth and development. In other words, the remittances inward during COVID-19 may have mostly been directed at cushioning the effect of job losses, slower economic activities and inadequate reliefs from the governments of the region.

⁴ Refer to Appendix B

Going forward, the role of financial development is observed with conflicting signs but only statistically significant where the effect appears positive. This suggests that sustainable development rises by 0.70 percent with an improved financial system. The interaction effect of remittances and financial development is, however, observed to be negative, thereby upholding the substitutability hypothesis. This hypothesis is further evident from the positive impact of each of the variables and a negative interaction effect involving the two variables. This contends, following El Hamma (2019), that in an atmosphere of a developed financial system, sufficient credits can be raised for investment without significantly depending on remittances. In other words, remittances tend to substitute inefficient credit markets by giving domestic entrepreneurs another credit source capable of bypassing high lending rate and/or lack of collateral facilities.

The coefficient of institutional quality is conflicting (with both positive and negative signs), though the positive effect dominates. This dominant effect is reflected in the work of Rodrik and Subramanian (2003), who propose that an improved institutional environment promotes economic development. More so, those economies with high quality of institutions are more likely to experience higher growth and greater development than those with low quality of institutions (see, e.g., Musibau et al., 2022). Furthermore, the interaction effect of institutional quality on remittance – sustainable development nexus confirms that institutional quality stimulates the impact of remittances on sustainable development. This follows the finding of Zghidi et al. (2018) and reiterates that institutional quality and remittances exert a complementary effect on sustainable development. Hence, remittances are largely efficient in enhancing sustainable development where there are improved institutional environments.

Furthermore, the coefficient of FDI is inconsistent across all models; it is, however, negative where it is significantly connected to sustainable development. This maintains that a percentage increase in FDI reduces sustainable development by 1.12 percent. While this is not a common finding in the extant literature, a possible justification is that FDI may both crowd-out domestic investments and many of these inflows may have been directed at the natural resources sector. In the case of the former, local firms may be technically pushed out of the market as international investors may have deprived them of credit when they borrow heavily from local financial markets. In the latter case, the inflows of FDI into natural resources sector may adversely affect economic growth and sustainable development since the sector has little linkages with the local economy (see, e.g., Agbloyor et al. 2014). Being the major driver of the region's economy, however, the rent from natural resources is found to positively affect sustainable development and the effect is significant at the 10 percent level.

Finally, each of population growth and government size is found to propel the wheel of sustainable development, while the coefficient of foreign aid is not found to be statistically significant across all models. The insignificant foreign aid – sustainable development nexus upholds a similar empirical finding by Babalola and Shittu (2020), who assert that foreign aids may rather be channelled towards enhancing welfare and social services; to mitigate the effects

of disasters; and / or for humanitarian and other non-economic reasons as opposed to directly stimulating economic growth and development.

As a robustness check and to further confirm the validity and efficiency of the estimates, the role of COVID-19 on the nexus between remittances and other sustainable development indicators – such as forest area, carbon dioxide and methane emissions – is estimated and the results are presented in Table 4. Again, this is done using the IV regression (with fixed effects and 2SLS options). While environmental degradation is measured by both carbon dioxide and methane emissions, the inclusion of forest area is premised on the submission that deforestation is among the main environmental issues in respect of biodiversity and climate change (Afawubo & Noglo, 2019).

In what could be regarded as a disaggregated effect of remittances on sustainable development, the relationships obtained appear to be similar in most cases to those of the baseline models. For example, the signs of the coefficients suggest that remittance is positively connected to forest areas and negatively associated with environmental degradation. These findings uphold the baseline estimates, since remittance reduces environmental degradation even as it enhances the preservation and regeneration of forest areas in the SSA region. These results align with that of Afawubo and Noglo (2019), who obtain that inward remittance tends to alleviate poverty, lowers deforestation – since it enables households to transit towards clean energy – and fosters the spread of low-carbon technologies. They are equally in line with that of Sharma et al. (2019), who infer that remittances may be directed at promoting environmentally friendly consumption, and the proportion of remittances invested in better technologies, health and education could reduce emission intensity and expand energy efficiency. This, in turns, lessens heat-related deaths, particularly among the elderly, that are common under a high-emissions scenario.

Similarly, these estimates suggest that COVID-19 reduces environmental degradation. This is justified given that the major manufacturing (and other emitting) activities were almost non-existent during the pandemic, thus reducing both carbon dioxide and methane emissions. In a mild deviation from this, COVID-19 is observed to reduce forest areas. This is reasonable given that considerable reductions in manufacturing (and other economic) activities have mostly degraded people's economic and social conditions, as a result of which many (mainly the rural areas residents) may have remained in the forests and revert to deforestation for their energy needs. The interaction effect of COVID-19 and remittance, however, suggests that remittance inward during COVID-19 reduces the negative effect of the pandemic on forest area. This is possible given that inward remittances to the SSA region during the pandemic may have got people to be well off enough to preserve the environment, knowing that forest protection and conservation is important to avoid climate catastrophe and tends to limit global heating, thereby promoting ecological stability.

Table 4: Effect of Remittances on Sustainable Development Indicators

The Impact of Remittances on:	Model 6: Environmental Degradation		Model 7: Forest Area
	DV = MH ₄	DV = CO ₂	DV = FASQ
REM	-0.208*** (0.038)	-0.002 (0.040)	0.086*** (0.027)
COVID-19	-6.729*** (1.091)	-7.842*** (0.654)	-1.723*** (0.442)
FDI	0.062** (0.025)	0.054*** (0.017)	0.091*** (0.012)
FA	0.020 (0.024)	-0.008 (0.016)	0.028*** (0.010)
RGDPPC	-0.031*** (0.008)	0.016 (0.022)	-0.006 (0.005)
RGDPPCSQ	2.43e-06*** (5.50e-07)	-1.58e-06* (9.59e-07)	–
URB	3.147*** (0.504)	5.203*** (1.469)	-4.653*** (0.905)
ROL	0.836** (0.407)	-2.765*** (0.599)	-0.396 (0.393)
REC	-0.131*** (0.039)	–	–
FFEC	0.126* (0.067)	–	–
REM_COVID-19	0.005*** (0.002)	0.004*** (0.001)	0.005*** (0.001)
_cons	193.764*** (59.050)	203.348*** (65.180)	373.062*** (44.145)
Adjusted R ²	0.401	0.658	0.597
Wald Chi ² / F-Stat	487.87***	43.82***	181.04***
Observation	722	722	722
Instrument	Regressors and the lags of regressors		

Note: ***, ** & * denote significance at 1 percent, 5 percent & 10 percent, respectively; standard errors are included in parenthesis

Source: Authors' computation. The definitions and data on the following variables are available on the World Development Indicators of the World Bank.

- I. MH₄ defines methane emissions, which is measured by methane emissions (kt of CO₂ equivalent)
- II. CO₂ defines carbon dioxide emissions, which is measured by CO₂ emissions (kg per 2015 US\$ of GDP)
- III. RGDPPC defines real economic growth by deflating it with the size of population (GDP per capita, constant 2015 US\$)
- IV. FFEC defines non-renewable energy consumption, and it is measured by Fossil fuel energy consumption (% of total)
- V. REC defines renewable energy consumption, and it is measured by Renewable energy consumption (% of total final energy consumption)
- VI. URB measures the rate of urbanisation in the SSA region (i.e Urban population as a % of total population)
- VII. FASQ defines forest area, which is measured by Forest area (% of land area)

Likewise, the reduction effect of FDI on sustainable development obtained in the baseline model may be connected with its tendency to raise environmental degradation through both carbon dioxide and methane emissions, as observed in Model 6. It is equally observed that the effects of renewable energy and non-renewable energy on methane emissions are negative and positive, respectively. This suggests that renewable energy reduces environmental degradation, while non-renewable energy worsens it.

6. Conclusion

In view of the rising international labour migration, discussions on the economic impact of remittances are ever relevant. It becomes even more desirable because of the impact of COVID-19 on the global economy, to which the African economy bears a significant impact. This is important to get the region's economy back on track and to better prepare it against any similar shocks in the future. Again, the debate on sustainable development is premised on the fact that for any development to be sustainable, sufficient and adequate resources need to be efficiently mobilised for the attainment of social, economic, and environmental sustainability. In the light of the foregoing, this study examines the role of COVID-19 on the relationship between remittances and sustainable development in the SSA region. Relying on the permanent income hypothesis and other theoretical propositions, studies have contended that due to a temporary increase in income, the families left behind by migrants tend to consume a part of the remitted money and invest others, thereby stimulating economic growth and development. Drawing insights from these previous studies, however, one of the main uniqueness of this study is in the estimation of the role of COVID-19 on the relationship between these important economic variables.

Empirical findings from the instrumental variable regression and the threshold estimates suggest that remittance is positively connected with sustainable development on a threshold value and a negative effect sets in where remittances exceed 0.388 percent of the SSA region's adjusted net savings. In addition, COVID-19 is observed to adversely affect sustainable development, both directly and when it is interacted with remittances. Among the other variables considered, the coefficient of financial development upholds that sustainable development rises with an improved financial system. This, alongside the interaction effect of remittances and financial development, contends the substitutability in the effects of the two variables on sustainable development. Besides, the quality of institutions is positively associated with sustainable development, both directly and when it moderates the role of remittances, while foreign direct investment is observed to retard sustainable development

These empirical findings have important policy implications, both for the SSA governments in the pursuit of sustainable development, and for others to draw insights. Given the threshold value obtained, the SSA region is advised to reduce reliance on remittances as a major driver of growth and development; financial sector could be improved as an alternative. This is important for several reasons. First, the threshold obtained for which the effect of remittances turns negative is relatively small and the region does not seem to reach a higher level of sustainable development in the long-run with remittances. Second, financial development appears to substitute the role of remittances in driving sustainable development, as evident from the empirical results. A developed financial system could also be a driving force for higher remittances, from which the region greatly benefits in the long-run. Third, the fact that years of greater reliance on remittances by the region have not significantly promoted

sustainable development calls for the attention of policymakers and governments towards other drivers, chief of which is financial development. Fourth, COVID-19 has particularly echoed the need to develop the region's financial system as an endogenous variable should there be any other global shocks that tend to de-globalise trade, wherein the SSA region is always at the receiving end.

Moreover, friendships that promote complementary inflows of foreign capital (such as remittances, FDI, and foreign aid) between SSA and the rest of the world should be strengthened, as they tend to reduce the burden of COVID-19. There should, however, be a reduced reliance and the region's economy should be better developed so that the primary sector does not, again, fall victim should there be any similar global shock in the future. This is especially important given that a relatively small interaction effect of remittances and COVID-19 further recommends that the SSA region target other development drivers beyond remittances if it aims at attaining sustainability. In the same way, the SSA governments should prioritise the development of governance infrastructures by promoting the rule of law. Likewise, policies targeting the inflow of foreign direct investment should be pursued but not at the expense of domestic industries. As much as appropriate credits are made available to foreign investments, local firms should also be encouraged with credits availability; while foreign investments should be better linked to the local economy. Finally, the use of emission-reduction technology in manufacturing activities is necessary to reduce environmental degradation and promote sustainable development.

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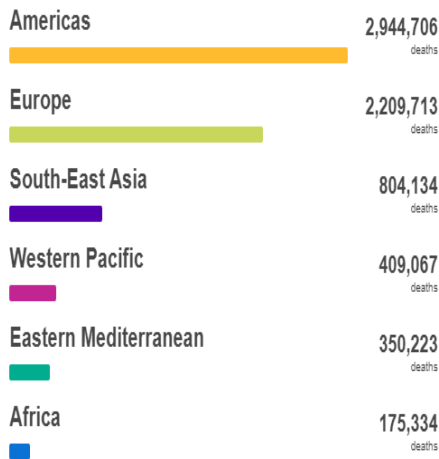
Appendix

Appendix A: List of Countries Considered

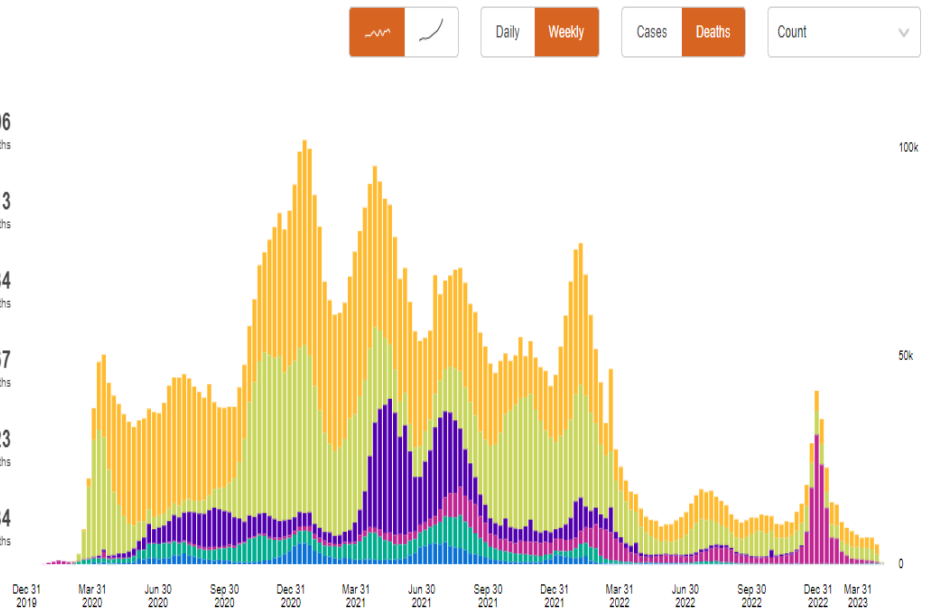
Benin	Congo, Dem. Rep.	Guinea	Senegal
Botswana	Congo, Rep.	Guinea-Bissau	Seychelles
Burkina Faso	Cote d'Ivoire	Kenya	Sierra Leone
Burundi	Eswatini	Lesotho	South Africa
Cabo Verde	Ethiopia	Madagascar	Tanzania
Cameroon	Gabon	Mali	
Comoros	Gambia, The	Mauritania	
Togo	Ghana	Mauritius	
Uganda	Angola	Mozambique	
Zambia	Namibia	Nigeria	
Zimbabwe	Niger	Rwanda	

Appendix B: Weekly confirmed cases and deaths from COVID-19, as at 31 March 2023

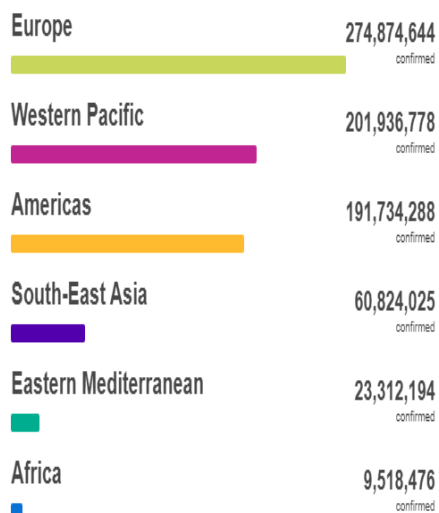
Situation by WHO Region



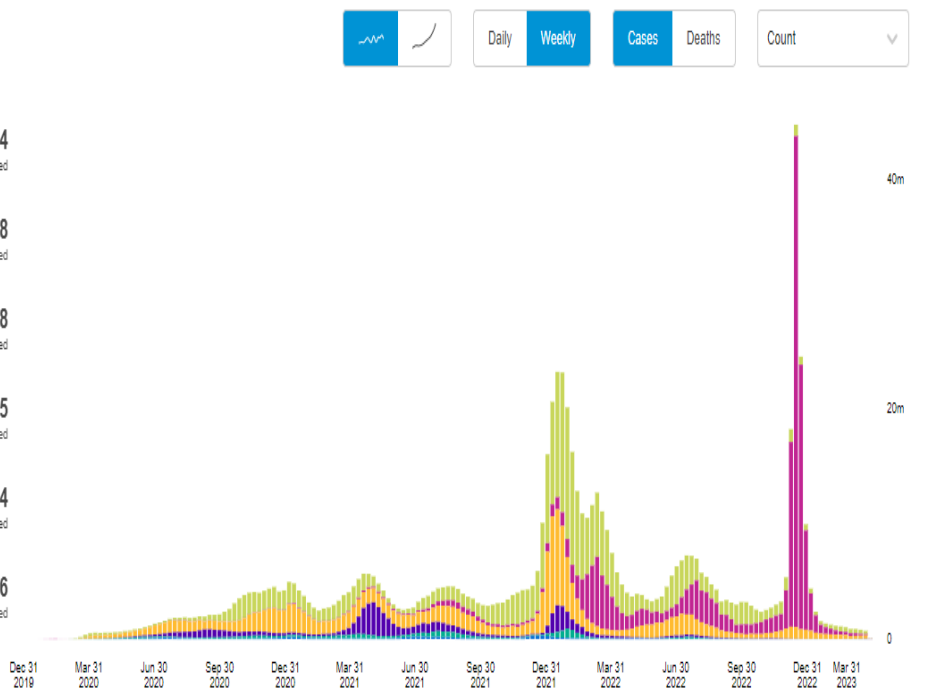
Source: World Health Organization
 Data may be incomplete for the current day or week.



Situation by WHO Region



Source: World Health Organization
 Data may be incomplete for the current day or week.



Source: World Health Organisation (2023).