PRODUCTIVITY, HUMAN CAPITAL DEVELOPMENT AND COVID-19 PANDEMIC IN NIGERIA

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ABSTRACT
The Covid-19 pandemic resulted in lockdowns, loss of productivity, and a decline in economic growth. Africa and indeed Nigeria were adversely affected due to a lack of mechanisms such as adequate investments in health and education, and the absence of fiscal stimulus such as social safety net programs to withstand the shock. This study seeks to examine the nature of the structural break in labour productivity in the aftermath of the Covid pandemic, particularly given investment in health and education. The data for the study which covers the period of 1991-2022 were obtained from the World Development Indicators and the Central Bank Statistical Bulletin of various years. The Chow test was used in this study to test for the presence of structural breaks in the productivity model. Findings from the estimation of the model reveal the presence of significant structural breaks due to the pandemic. This implies that the period of the Covid-19 pandemic significantly impacted the level of productivity within the economy measured by the output per worker. Findings also revealed that mobile subscriptions which allow access to the internet had a significant positive effect on productivity. Government spending on health and education did not have a significant impact on productivity before and after the pandemic.
Keywords; Productivity, Human capital, Covid-19, Pandemic, Health, Education, Nigeria

JEL Classification Codes: E2, E24, I0, I19

1. INTRODUCTION

The COVID-19 pandemic substantially impacted the economies of many countries worldwide, resulting in decreased productivity and a rise in unemployment rates. The pandemic disrupted global supply chains, created massive job losses, and impacted various sectors, underscoring the need for transformative economic recovery strategies. Governments and policymakers especially in developing countries still grapple with the challenge of reviving economies while addressing societal inequalities and ensuring sustainable growth (The World Bank, 2020). The COVID-19 pandemic, in particular, exposed the vulnerabilities in economies and highlights the importance of investing in human capital and building resilience through innovations such as ensuring increased access to mobile and internet facilities and promoting entrepreneurship.

The impact of the pandemic has been felt in several ways within the Nigerian economy. The Nigerian economy grew by just 0.01% in 2020, the lowest rate of growth in 30 years. The unemployment rate rose to 33.3% in 2020, the highest rate since 1999 resulting in 23.3 million unemployed Nigerians (National Bureau of Statistics, 2022). The challenges of insecurity heightened with an estimated 40.1 percent of the population living below the poverty line (The

World Bank 2021; Sopko et al., 2020). Productivity levels declined by 2.8 percent between the period of 2019 to 2020 (ILOSTAT, 2023). In the aftermath of the Covid-19 pandemic public expenditure on education as a share of GDP declined from 5.86 percent in 2019 to 5.13 percent in 2022 (The World Bank, 2022). In 2019, the government's health expenditure accounted for 3.75 percent of the total, while out-of-pocket expenses made up a significant 49.82 percent. Moving into 2020, these figures increased, reaching 4.22 percent for government health spending and 52.1 percent for out-of-pocket expenses (The World Bank, 2022). These estimates show that the share of government spending on health to total health expenditure remains very poor and has generated increased direct payment for health care services. Increased public healthcare spending holds particular importance for developing nations, as it plays a pivotal role in bolstering population health and enhancing overall productivity. The motivation behind advocating for increased public funding for healthcare stems from the realization that heavy reliance on out-of-pocket payments for medical care can potentially plunge individuals into poverty (Oyedele, 2023).

Understanding the association between human capital development, and output per worker is important in today's world which has changed since the Covid-19 pandemic. The concept of human capital development, encompasses the skills, capabilities, and knowledge embodied in individuals, is a critical driver of labour productivity and economic growth (Becker, 1993). At the same time, the need for resilience, the capacity to withstand and adapt to shocks and challenges, has become increasingly important in the face of various disruptions such as economic crises, natural disasters, and global pandemics (Cutter et al., 2008). Against this backdrop, it is crucial to understand the intricate correlation between productivity and human capital development captured by expenditure in health and education. The objective of the study is to analyze the impact of human capital development on productivity in Nigeria especially in the aftermath of the COVID-19 pandemic. By examining this relationship, we can explore whether investments in education and health care have led to increased productivity before and after the pandemic.

The rest of this paper is structured as follows; section 2, discusses the literature review. The methodology is presented in section 3, while section 4, presents results and a discussion of findings. Section 5, contains the conclusion and policy recommendations

2. LITERATURE REVIEW

2.1 Theoretical Literature Review

The theoretical foundation regarding the impact of human capital on productivity was initially introduced by Becker in 1962. He argued that investments in education, a form of human capital, are akin to investments in health. According to the theory of human capital investments in individual education and training play a crucial role in determining the overall value of human capital within a country (Becker 1962; Schultz 1961). These investments can significantly enhance productivity (Lee et al., 2019). The theoretical literature has documented two primary ways in which human capital promotes productivity. First, Lucas (1988) recognized that the accumulation of human capital leads to growth in productivity. Productivity growth is predominantly driven by the accumulation of human capital, often referred to as the 'factor accumulation channel. Lucas (1988) and Mankiw et al., (1992) opine that the growth rates of different countries are positively correlated with the rate at which they accumulate human capital over a specific period. Secondly, Romer (1990) emphasized that productivity relies on the existing stock of human capital as an input. This input generates new knowledge and facilitates the imitation or adoption of foreign technologies. In this context, human capital primarily drives growth by impacting total factor

productivity, often referred to as the 'productivity channel.' A higher level of human capital enhances a country's ability to innovate and adapt to current technologies. This channel implies that differences in growth rates among nations are largely attributed to variations in human capital levels across different countries.

2.2 Empirical Literature review

The relationship between human capital development and productivity has been examined in previous studies. These studies have addressed the issue of the short run and long run relationship using time series data, while other have applied the methods for analyzing panel data. Popoola et al., (2019) study for Nigeria observed that the coefficients of primary/secondary school enrollment and public spending on education were positive and had an insignificant effect on productivity. Gul et al., (2022) in a similar study for Pakistan, it was observed that education and employee wage has a significant positive effect on productivity. Okunade et al., (2022) conducted a study in which they employed the Dumitrescu-Hurlin non-causality test and the cross-sectional augmented autoregressive distributed lag (CS-ARDL) to examine how human capital development and productivity growth in Africa are connected. The results of their research indicated that globalization has a beneficial impact on long-term productivity growth. However, they found no statistically significant relationship between human capital and productivity growth, both in the short and long term.

Other studies have explored the correlation between human capital development and the growth of the economy. These investigations indicate a strong connection between education and economic growth. It is widely acknowledged that education exerts both direct and indirect influences on economic growth, serving as a valuable complement to labor and capital within the production cycle. Empirical investigations into the association between education and economic growth can be categorized into three main approaches: cross-sectional, panel, and time-series data analysis. The association between health and economic growth highlights the existence of a positive and significant relationship between the variables. Boosting economic growth, typically measured by gross domestic product (GDP), is frequently regarded as a pivotal policy tool for enhancing the health of a population. The underlying logic posits that as economic growth expands, so does investment in healthcare, ultimately resulting in improved overall health. Findings from a panel study conducted in Europe revealed that both education and health had a positive and significant effect on economic growth (Chaabouni and Mbarek, 2023). The findings further indicate that following the COVID-19 pandemic, there was no substantial causal link observed between economic growth, education, and health. Li and Liang (2010) carried out a similar study in East Asia using panel data from 1961 to 2007. They studied the effect of health and education as components of human capital and their impact on economic growth. Their findings revealed a causal relationship between health and economic growth. Okonkwo et al., (2023) study on the relationship between capital expenditure and economic growth in Nigeria, observed a strong and positive association between capital expenditure and economic growth. Contrasting other studies that have analyzed the effect of human capital development on productivity, this study extends the existing literature by analyzing this relationship given the COVID-19 pandemic which is a global health shock.

3. METHODOLOGY

The theoretical foundation of this work is the endogenous growth model proposed by Lucas (1988) which extends the Solow growth model. This model allows for the inclusion of human capital in the growth model.
Assuming a Cobb- Douglas production function specified as:

$$Y_t = A_t K_t^{\propto} (\omega HC_t\, L_t)^{1-\alpha} \dots\dots\dots\dots\dots\dots\dots i$$

Where; the output Y_t is produced using three key inputs: the stock of capital ($K_t^{\propto}$), human capital (HC_t) and the labor ((L_t). Additionally, the level of technology innovation and efficiency in the economy is represented by the labor-augmenting factor (A), ω is the proportion of total labour spent working , $0 < \alpha < 1$.

The production function can be specified in per capita terms;

$$y_t = A_t k_t^{\propto} (\omega h_t)^{1-\alpha} \dots\dots\dots\dots\dots\dots\dots ii$$

In equation ii , $y_t = \frac{Y_t}{Lt}$ is output per worker; $k_t = \frac{k_t}{Lt}$ is capital-labor ratio; $h_t = \frac{HC_t}{Lt}$ is the human capital labour ratio;

Specifying equation ii in a log form the equation is specified as;

$$Iny_t = InA_t + B_1 Ink_t + B_2 Inh_t + B_2 In\omega + \varepsilon_t \dots\dots\dots\dots iii$$

Notably, this model considers technology as an endogenous variable, meaning it is determined by factors such as human capital and various macro and institutional control variables. These are incorporated within the production function specified below. β_1, β_2, *and* β_3 are the coefficients that indicate the effect of each independent variable on output per worker. ε represents the error term, accounting for unexplained variation in output per worker.

In this study, we utilize the Chow test as our analytical method. The Chow test is applied to time series data to identify the presence of a structural break at a specific point. We use this method to test if there is any break in labour productivity before and after the Covid-19 pandemic. The Chow test serves as a tool to assess whether the regression coefficients for each regression are uniform. When the test reveals disparities in these coefficients, it suggests compelling evidence of a structural break within the dataset. It indicates a significant distinction in the data pattern before and after this structural breakpoint. The following assumptions underlie the Chow test:

i. The test assumes that the residuals of the regression models are independently and equally distributed from a normal distribution with unidentified variance.

ii**.** The Chow test is applicable when the presumed period of the structural break is known.

4. RESULTS AND DISCUSSION OF FINDINGS

Table 1: Regression Estimates for the Effect of Human Capital on Labour Productivity

Productivity	**Coefficient**	**Standard Error**	**t-statistics**
Total Govt. Health Exp.	0.006	0.027	0.23
Total Govt. Education Exp.	0.007	0.027	0.26
Mobile Subscription	0.005**	0.001	4.85

Labor Force Participation Rate	-0.022	0.017	-1.35
Gross fixed capital formation	-0.052	0.202	-0.26
Constant	9.933	1.045	9.50
R2 = 0.901, Adjusted R2 = 0.886			
SSR 1 = 0.215, n = 33			
F-stat = 63.43			

Source: Computed by Author. ** and ** imply significance at the 1% and 5% significance level respectively*

The findings from Table 1, revealed that the coefficients for total government expenditure on health and education (0.006 and 0.007) through positive were not statistically significant. Suggesting that they did not affect improving output per worker. Mobile subscription with a coefficient (0.005) was significant. Implying an increase in mobile subscriptions by 10 percent among the population would increase output per worker by 0.05 percent. The coefficient of the labor force participation rate (-0.022) had a negative impact on output per worker however the estimate was not significant.

Table 2: Regression-Based Chow Test Result for the Effect of Human Capital on Labour Productivity. The Covid- 19 Pandemic

Productivity	**Coefficient**	**Standard Error**	**t-statistics**
Total Govt. Health Exp.	0.035	0.022	1.57
Total Govt. Education Exp.	-0.026	0.023	-1.13
Mobile Subscription	0.007**	0.000	6.39
Labor Force Participation Rate	0.128	0.357	-0.18
Gross fixed capital formation	-0.058	0.165	-0.35
Break	-26.72	33.13	-0.81
B*Total Govt. Health Exp.	-0.704	0.836	-0.84
B*Total Govt. Education Exp.	1.214	1.45	0.83
Constant	10.44	4.19	2.49
R2 = 0.92, Adjusted R2 = 0.94			
SSR 1 = 0.116, n = 33			
F-stat = 52.95, Chow Test; F(3, 24) = 6.79 (0.002)			

Source: Computed by Author. ** and ** imply significance at the 1% and 5% significance level respectively*

Findings from Table 2, suggest that the estimated of the chow break test (6.79) indicate the presence of significant structural breaks in the model. This implies that the period of the Covid-19 pandemic significantly impacted the level of productivity within the economy measured by the output per worker. This finding is confirmed by the steady decline in output per worker in Nigeria from the period of 2019-2022 (ILOSTAT, 2023). Findings also revealed that mobile subscriptions (0.007) which allow access to the internet through data connectivity had a significant positive effect on productivity. This could have occurred because the lockdown occasioned by the pandemic forced people to work from home resulting in the term remote work this could only have been possible due to the presence of increased mobile subscription services. The findings suggest that to ensure greater levels of output per worker in Nigeria and recovery of the economy innovations in the area of increased access to mobile subscriptions and the internet should be promoted. The coefficient of government spending on health (0.035) although positive, did not have a significant impact on productivity before and after the pandemic. This finding is not improbable because government spending on health as a percentage of its total budgetary

allocation was 5.6 percent which is still below the 15 percent agreed upon in the Abuja declaration by African heads of State in 2001. Also, government expenditure on education (-0.026) did not have any significant impact on output per worker. This finding is similar to that of Popoola et al., (2019) and Okundaye et al., (2022) who observed that the coefficient of public spending on education did not have any significant effect on productivity in Nigeria and Africa respectively. However, Gul et al., (2022) observed that investment in education had a positive effect on productivity in Pakistan.

5. CONCLUSION AND POLICY RECOMMENDATION

This study which focuses on the effect of human capital on productivity in the aftermath of the COVID-19 pandemic seeks to harness empirical knowledge to inform policy responses to the pandemic shock in the economy. The argument is that COVID-19 presents a unique opportunity for Nigeria to rethink its policies on improving labor productivity because this has a direct impact on economic growth and development. The findings from the study show that expenditure on education and health did not affect output per worker before and after the pandemic. This finding poses a challenge to the current government to increase funding in the area of education and health sectors which play are key drivers of human capital development. Increased public spending on healthcare and education is strongly recommended at all levels of government. Investments in health can result in improved health outcomes for the populace, fostering a more productive workforce by reducing absenteeism caused by illnesses or disabilities. On the other hand, government spending on education can cultivate an innovative and technologically adept workforce. Highly educated individuals are more inclined to participate in research and development endeavors, spurring advancements in technology and innovation. These breakthroughs can pave the way for the creation of novel products and processes, ultimately bolstering economic output, which aligns with the objectives of sustainable development goal target 8.1. Consequently, public spending on education in Nigeria should be channeled towards research and development efforts in the area of skills acquisition and enhanced innovations required to improve the productivity of workers.

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