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Healthcare Accessibility and Inclusive Human Capital Development in ECOWAS Member State: A Dynamic Panel Data Analysis

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Abstract

Health is a direct determinant of human well-being and an essential input to economic productivity and societal resilience. In the Economic Community of West African States, persistent deficits in equitable access to healthcare and inclusive human capital development are caused by socioeconomic inequalities, financial barriers, and a fragmented healthcare system. These factors lead to low economic productivity and a continuous cycle of poverty and also violate people's fundamental right to health and education. This research examined the impact of healthcare accessibility on inclusive human capital development among ECOWAS countries using a time series data from 1980 to 2023. Human capital theory is the theoretical framework for this study. The variables used are the inequality human development index (IHDI) (dependent variable) and other independent variables, such as education expenditure (EDEx), public health expenditure (PHEx), real GDP per capita (GDPp), poverty headcount ratio, and institutional quality (INSQ). An instrumental variables (IV) estimator of dynamic panel models based on the System Generalized Method of Moments (SGMM) was used in the estimation. The study found that public health expenditure, GDP per capita, and institutional quality have a negative and significant impact on the inclusive development of the region due to structural corruption lag, high administrative overhead and systemic leakages. Education expenditure and poverty headcount ratio have a negative and insignificant impact. This study recommends, amongst others, that access to health care

such as county or community hospitals, mobile clinics, and Ward ambulance services should be provided to increase health accessibility. The government can also promote inclusive growth policies, such as free or sponsored access to education and health care, to ensure that economic gains reach the poor in ECOWAS countries.

Keywords: Health Care Access, Inclusive Human Capital Development, Low-Income, System Generalized Method of Moments (SGMM), Public Health Expenditure, ECOWAS.

Introduction

Inclusive development is a holistic and equitable approach to economic development and social progress that prioritizes the empowerment and participation of all individuals and groups regardless of their socio-economic status. It aims at reducing inequality, poverty, and social exclusion by promoting equal access to economic resources and fostering an environment that enables the individuals and groups to reach their full potential. Inclusive development has emerged as a critical framework for promoting equitable and sustainable growth in developing countries (United Nations Development Program [UNDP], 2016). Midgley (2014) argues that development is not a by-product of economic growth but a proactive process that must be pursued through integrated, people-centered approaches that address both economic and social vulnerabilities. The ECOWAS region, which includes some of the world's most impoverished low-income nations, such as Niger, Sierra Leone, Guinea, and Liberia, continued challenges relating to health financing, infrastructure, personnel shortages, and geographic inequities. These challenges have continued creating not only health disparities among the ECOWAS nations but also poverty. Health is both a direct determinant to human well-being and an essential input to economic productivity and societal resilience. According to the Human Capital Index (World Bank, 2022), low-income ECOWAS countries score significantly below the global average, reflecting high rates of child mortality, maternal mortality, malnutrition, and inadequate access to skilled health providers. The Inequality Adjusted Human Development Index (IHDI) is a metric of human development that considers disparities among individuals within a nation. It adjusts the traditional Human Development Index (HDI) by factoring in inequalities in education, income, and life expectancy. By including inequality in its measurement, the IHDI highlights the importance of not only improving overall levels of human development but also reducing the disparities and guaranteeing that development is shared more equally among all members of the society. It was introduced by the United Nations Development Programme (UNDP) in 2010 as a way to provide a more comprehensive picture of human development beyond just just income levels.

The IHDI is measured by altering the traditional HDI for inequality in the distribution of health, education, and income. These measures, IHDI and HDI, underscore the need for investing in human capital.

Investing in education and health enhances economic productivity, stimulates innovation, and fosters inclusive and sustainable growth. ECOWAS comprises 15 nations. Benin, Gambia, Cabo Verde, Guinea-Bissau, Senegal, Mali, Côte d'Ivoire, Ghana, Burkina Faso, Guinea, Liberia, Niger, Togo, Sierra Leone, and Nigeria. They are among the world's most undeveloped nations, with a majority of their populations living in multidimensional poverty. Despite being generously endowed with natural resources, such as oil (Ghana, Nigeria), diamonds (Sierra Leone, Liberia), and gold (Guinea, Ghana), countries' long-term development exhibits classic signs of the natural resource curse. Inclusive human capital development has not just become vital for her sustenance but also a necessity for productivity and improved well-being. Also, according to the World Bank 2023 classification, six of the countries were lower-middle-income (Benin, Cabo Verde, Côte d'Ivoire, Ghana, Nigeria, and Senegal), while nine others were in the low-income countries' classification, which may have serious economic and human developmental impact.

Education is a catalyst for development, providing persons with the skills, knowledge, and innovative mindset needed to participate effectively in their society. According to Adebayo and Olayemi (2017), the level of education significantly influences the level of knowledge, interaction, and inclusive development, with better-educated individuals demonstrating superior abilities. Conversely, limited access to education often forces inequality and a lack of skills to participate more actively in issues of society. The importance of education goes beyond the economic survival of the country to its sustainability. Statistics from the World Bank (2021) indicated an increase in educational spending in 39 out of 53 economies in the Sub-Saharan Africa region. Yet its expected impacts are still in doubt; according to the 2024 ECOWAS Human Capital Development (HCD) Report, ECOWAS has experienced a 12% improvement in its HCD Index since 2022 but has a concerning 7% decline in education, skills development, and labor participation, emphasizing the need for re-evaluation of its impacts from different perspectives.

Health expenditure constitutes a major factor in most disparities found in health outcomes (WHO, 2019). It is one of the major sources of financing healthcare and making it accessible in most developing countries. In most cases, medical care systems are not maintained, so maintaining or improving health outcomes to a great extent depends on the countries' health expenditure framework. Several studies have highlighted health expenditure as significantly contributing to improved health access and increasing inclusive development by increasing healthcare investments, awareness, and provisions of healthcare facilities (Olatunde et al. 2019). Health expenditure is broadly divided into two categories, public and private health expenditures. In this study, our focus will be on the public health expenditure to align with our objectives of the study.

Gross domestic product (GDP) per capita is a widely used indicator to measure the economic

performance and standard of living of the people. It is measured in real or nominal GDP per capita and purchasing power parity (PPP). It is expected that growth in GDP per capita will positively and significantly improve inclusive development in ECOWAS. However, the result is not always the case, as most of the ECOWAS countries (Niger, Burkina Faso, Mali, Sierra Leone, and Guinea-Bissau) are increasingly being plunged into multidimensional poverty (UNDP, 2021).

Institutional quality is one of the major keys of inclusiveness. It entails fulfilling the required task rightfully in the most economical way. It is through a quality institution that resources could be equitably distributed, such as a progressive tax system. Piketty (2014) argues that tax policy is a powerful lever for reducing income and wealth concentration, which is critical for reversing rising inequality trends in both developed and developing countries. The International Labour Organization (ILO, 2019) notes that strong institutions reduce wage gaps, promote decent work, and protect vulnerable workers, especially women, youth, and informal sector employees. It can be measured through different indicators, as Olatunde et al. (2019) used the Corruption Perception Index (CPI), and Limazie and Woni (2024) used an indicator of government (estimated value). But for this study, principal component analysis (PCA) will be used to generate an index of instructional quality.

Efforts to enhance access to health included targeted and universal measures, such as health equity funds, conditional cash transfers, and community-based health insurance. However, the success of these treatments varies, and governments in low-income countries generally lack a significant emphasis on the needs of the poor in their health policies and implementation strategies (Peters et al., 2008). According to the ECOWAS human capital Development Maternal mortality rate improved from 510 to 620per 1,000,000 live births indicating progress in maternal health, with a gap of 0.0359 to the target. Life expectancy at birth: slightly declined from 0.26 to 0.252 (2.89% regression), with a gap of 0.0761 to the target. Government health expenditure increased from 0.17 to 0.220 (29.21% progression), with a gap of 0.0217 to the target (ECOWAS, 2024). However, despite this progress, there are persistent deficits in equitable access to health care and inclusive human capital development. Financial obstacles, a disjointed health care system, and socioeconomic disparities all contribute to the population's capacities while weakening human capital investment. This leads to low economic productivity and a continuous cycle of poverty and also violates people’s fundamental right to health and education. Public health spending averages 5.6% of GDP in ECOWAS, which is below the World Health Organization's 15% target (World Bank 2023). The uneven distribution of healthcare resources exacerbates disparities, as wealthier individuals can access well-equipped private health facilities. In contrast, the underprivileged rely on public hospitals that are often underfunded and overstretched (Ridge et al., 2019). Economic inequality across ECOWAS nations, measured by the Gini Index, revealed that Guinea-Bissau, Nigeria, Liberia, and Benin recorded the highest rate of inequality compared to other nations, suggesting that these countries experience high levels of income disparities among their citizens, as this often hinders equitable healthcare access. However, Niger and Mali are the countries with lower

inequality rates, implying an economic balance system. This shows that most of the ECOWAS nations experience high rates of income inequality, which highlights the urgent need to address income disparities and improve healthcare accessibility (Lawal & Hafiz, 2025).

Therefore, this study will objectively investigate access to health care and inclusive human capital development among low-income ECOWAS countries. The findings of this study will help in providing policymakers, development practitioners, and scholars with evidence to evaluate the impact of social policies and allocate resources more effectively and equitably. The rest of the paper is arranged as follows: Section two gives a detailed literature review. Section Three explains the methodology. Section Four addresses the Results and Discussion. Finally, Section Five presents the Conclusion and Recommendations.

Problem Statement

Access to healthcare is a fundamental determinant of well-being, yet in ECOWAS, systemic barriers hinder equitable health service provision. Studies have shown that individuals in the lowest income brackets are less likely to seek medical care due to financial constraints, inadequate insurance coverage, and high out-of-pocket expenses (Harikrishnan & Hiremath, 2024; Johar et al., 2018). The lack of universal health coverage intensifies inequality, since affluent persons may get private healthcare, while low-income populations depend on inadequately supported public health services. (Dickman et al., 2017; Zhang et al., 2023). Many disparities in healthcare access across ECOWAS states are shaped by gender, socio-economic status, regional geography, and inequalities. These disparities hinder economic development and work productivity, which perpetuates the cycle of poverty. In ECOWAS nations, 60% of the population experiences inadequate healthcare facilities (World Bank, 2023). Rural women are three times less likely to receive competent birth attendance compared to urban women, leading to considerable maternal mortality (UNICEF, 2023). The lowest quintile in ECOWAS allocates 30% of household income to health care, while the richest quintile allocates just 5% (UNDP, 2023). Chronic malnutrition impacts 40% of rural children in Burkina Faso, hindering cognitive development and future productivity (World Food Program, 2023). Cape Verde allocates $300 per capita annually for health, whereas Niger provides a mere $20 (WHO, 2023). Economic inequality and healthcare disparities remain critical challenges affecting the Economic Community of West African States (ECOWAS).

Facts and Trends on ECOWAS Countries with their GDP per Capita and Human Capital Index, Expenditure on Education and Health from 1981 to 2023 in Relationship to their GDP Growth Rate

Human capital development (HCD) has been described as an end or objective of development and not the growth of the economy (Adenuga, 2002). It is the increase of the knowledge, skills, productivity, and creativity of individuals via a process of human capital creation (Aluko & Aluko, 2017). Therefore, human capital development is not a goods or production-centered strategy but a human-centered strategy of development. As a people-centered strategy

of development, human capital development is an agent of national development, acquired through a process of increasing the number of people who have the skills, good health, education, and experience that are critical for economic productivity and sustainability. Human capital development is thus connected with the assets in man and his development as a creative and productive resource (Jhingan 2013).

What defines a healthy population is not solely the absence of illness but a broad set of physical, mental, environmental, and social determinants that together create an environment where individuals and communities can thrive. Metu (2021) and Kolawol (2016**)** argued that healthy individuals are more likely to participate in and contribute to the workforce, leading to increased productivity and economic output. Similarly, investments in health improve human capital by enhancing cognitive abilities, reducing absenteeism, and increasing labor force participation, thus promoting economic growth and reducing inequalities (Raheem, 2018). Therefore, achieving and maintaining a healthy population requires coordinated efforts across sectors, including health, education, agriculture, environment, and governance.

Table 1: West African Countries, GDP per Capita, and Human Capital Index at Glance

Country	GDP per capita (current US$) 2023	Human capital index (HCI) (scale 0-1) 2023
Liberia	400	0.32
Niger	400	0.32
Gambia	500	0.42
Burkina Faso	600	0.38
Guinea-Bissau	600	0.39
Togo	666	0.43
Guinea	730	0.37
Benin	800	0.40
Mali	800	0.32
Senegal	1,400	0.42
Cote d'Ivoire	1,600	0.38
Nigeria	2,049	0.36
Ghana	2,200	0.45
Cabo Verde	3000	0.42
Sierra leone	758	0.36

Source: World Bank Development Indicator 2023.

From the trend in table 1, one can observe a disparity between the economic performances of the countries and the human capital development, which affirms the assertion that human capital development transcends an increase in economic performances due to its inclusivity. It has further led to a critical investigation of the access to these known pillars of development, healthcare, education, and inclusive human development among the low-income ECOWAS countries. It can also be observed that economic disparities may not be a major factor in human development.

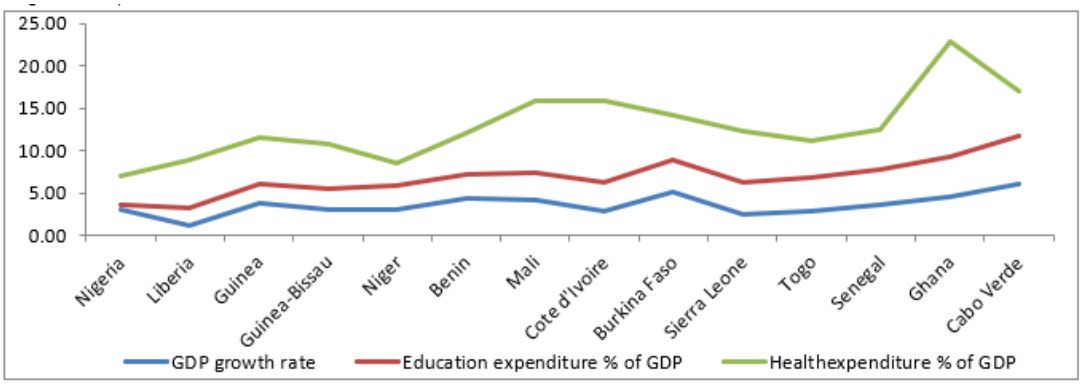


Figure 1.1: Trend of health and Education expenditure from 1980 to 2023 (% of Government Expenditure)
Source: World Bank Indicator 2023

Expenditure on education is a basic required function of the intuition of the government of the ECOWAS member states on one hand, while on the other hand, the method of transmission and inclusivity of this knowledge, skills, and character traits seems to be more important. From table 1.1. The economic growth indicated an uneven and non-steady growth, but education expenditure is constantly on an upward trend. Then how can this trend be justified? However, the ECOWAS needs to re-evaluate the educational policy framework of the region, most especially its inclusivity through accessibility.

Tables 1.0 and Figure 1.1 demonstrate a notable rise in government spending on education and even more on health, although their spillovers on human development remain a matter of discussion among researchers and policymakers. Based on the post-assessment of the Millennium Development Goals (MDGs) in 2015, it was found that the ECOWAS subregion has made significant progress toward universal basic education, as most of its countries saw a significant increase in primary and secondary school enrollment rates (World Bank, 2023). The positive trend of investment in these two critical sectors of the economy cannot be questioned, but what is left to be desired are their significant successes in human capital development indices, as the majority of the member states have not been inspiring in the earlier few years. For example, inclusive development, which is based on the Human Development Index (HDI) of 11 of the 15 nations, is found in the nations that are at the bottom of the global HDI ladder (World Bank, 2023; UNDP, 2023).

Review of Related Literature

Theoretical Literature Review

Human Capital Theory (1776)

Human capital theory evolved since 1776 from John Stuart Mill, Adam Smith, Irving Fisher, and Alfred Marshal, each addressing issues of human capital in his own right. Smith opines that labor inputs and ability acquired through education are two principal components, which

serve as the foundation of all productive human capital frameworks. But in 1848, Mill argues that human abilities are inseparably fixed in person and could not be reasonably counted for wealth. A country would hardly be said to be richer by precious possessions it might have in the genius or accomplishments of its inhabitants unless they are marketable articles by which it could attract the material wealth of other countries. The underlining assumption of Mills' human capital theory is that it is market exchange that determines the value of any country's human capital assets. Human abilities are economic utilities, i.e., means to wealth. Marshal purposefully centered his discussions of human capital on the premise of it as an agent of producing wealth. Education helps to develop skills for work, i.e., improves the capacity of the worker to be productive. Earned income reflects marginal productivity of different categories of workers. Whereas Mill and Marshall pursued an empirical definition of wealth, Fisher (1906) relaxed the requirements of the definition to include qualities. He argued that qualities are more important than their market-determined values. This theory becomes important to this study following its inclusiveness of both direct and indirect variables of human capital determinants. The theory is not without criticisms; its criticisms stem mainly from its methodological imperfections on the assumptions and statistical construct of the theory on education (Benson, 2006, and Blaug, 1978). Benson argues that on-the-job training would logically contribute more to workers' productivity than conventional education of human capital analysis. Additionally, he said that there is little correlation between a person's level of education and their performance in a particular field of employment. Salary and compensation disparities reflect not just variations in performance but also the employer's basic perception of educational level.

Human Capital Endogenous Growth Theory (1988)

This is a theory propounded by Lucas (1988); it is a variant of endogenous growth theories. Endogenous growth theorists argued that internal processes such as human capital, innovation, new forms of technology, and investment capital are critical factors for the sustainability of any economy rather than the external, uncontrollable forces of the neoclassical economics view. According to Lucas, human capital consists of skill level advancements that may boost an individual worker's output. According to his theory, human capital affects a production function in two ways. Time allocation has an impact on the accumulation of human capital, and human capital influences the production function and current factors of production (Lucas, 1988). Finding an equilibrium route and an optimum path are the two issues that the human capital development model must resolve. The goal of the optimum route is to maximize consumer utility while taking into account the endogenous human capital accumulation function and the production function. According to Lucas (1988), the equilibrium route entails optimizing the endogenous human capital accumulation function.

He believes that increased investments in human capital development and technological innovation are linked to increased productivity in every economy. The theory questioned the persistence of the wealth gap between developed and underdeveloped countries if investment

in physical capital is subjected to diminishing returns. The theory also integrated infrastructural development and investment in education, health, and telecommunications to catalyze increasing returns to scale. According to the assumption, human capital and technical knowledge are equivalent, and saving is determined by intertemporal utility maximization rather than a predetermined saving rate. However, this theory is not without criticisms. It has been criticized for its inability to be empirically validated. It was also accused of immeasurable assumptions upon which it was built. Despite these shortfalls, the theory remains the best for this study since it highlighted the function of human capital development and the diminishing function of human capital to scale.

Empirical Literature Review

Although there is a dearth of empirical literature on access to health care and inclusive human capital development in ECOWAS countries, empirical studies have evolved around macroeconomic variables and human capital development variables in the ECOWAS region. Some of these studies using the panel autoregressive distributed lag (Panel ARDL) model, Oloke et al. (2022), provide important insights into how educational investment affects the development of human capital over the long run in ECOWAS nations. The research discovered a strong and favorable correlation between the subregion's human capital development and government investment in education.

The study recommended that ECOWAS countries should commit to sustained educational spending, aligning with global benchmarks such as the United Nations and the Abuja Declaration, which advocates allocating 26% of the annual budget to education. The study by Okoi and Bwawa (2020) on how health inequality affects responses to the COVID-19 pandemic in Sub-Saharan Africa, particularly in low-income countries, applied non-empirical, narrative synthesis of existing knowledge and a secondary data framework. The study explored how health inequalities, pre-existing disparities in access to healthcare, financing, and infrastructure exacerbated the impact of the COVID-19 pandemic across Sub-Saharan Africa. The study found that health systems in many Sub-Saharan and ECOWAS countries are under-resourced and poorly equipped, with rural and low-income communities facing greater challenges in accessing care. It also found that health inequalities contribute to lower resilience and poorer health outcomes, weakening human capital development and economic productivity. Furthermore, the study found social determinants such as poverty, lack of education, and weak governance structures as major contributors to persistent disparities in health service delivery. The finding was supported by the findings of Agyepong et al. (2017) and Witter et al. (2016), who emphasized the importance of equitable health financing in West Africa. The study highlighted the weaknesses of primary health care systems and equity failures in West Africa, linking them to poor human capital outcomes. Its weakness is focusing on educational spending without incorporating health expenditure, which is critical component of human capital development. UNDP (2021) similarly emphasized that health inequality is a major barrier to achieving inclusive development in low-income regions of Sub-Saharan

Africa. Gaye and Jolly (2019) studied achieving universal health coverage in West Africa through the role of equitable financing using review and synthesis of existing literature, regional reports (WHO and World Bank), and country-level policy developments regarding universal health coverage (UHC) and found that West African countries, especially the poor, rely heavily on out-of-pocket expenditure, which limits access to their healthcare and exacerbates health inequalities within the region. The authors argue that equitable health financing is not only a matter of fairness but also essential for building a healthy and productive population that can contribute meaningfully to economic development. Gaye and Jolly (2019) are of the view that equitable health financing is key to inclusive human capital development but requires governance reforms to prevent leakages and ensure scalability. Agyepong et al. (2017) examine how priority-setting in national health systems influences the attainment of Universal Health Coverage (UHC) and justice, with a focus on West Africa. The study adopted a scoping review synthesizing multiple studies and policy reports on health care prioritization and governance in LMICs, including ECOWAS countries. It found that lack of clear and equitable priority-setting mechanisms often results in misallocation of limited resources, favoring curative over preventive services and urban over rural populations. This undermines inclusive health outcomes and limits human capital development.

In an examination of the degree to which the development of human capital impacts economic growth, Keji (2021), using VECM models, examined the relationship between economic growth and the development of human capital from 1981 to 2017 in Nigeria. The research discovered a considerable long-run relationship between the development of Nigeria's economy and the improvement of its human capital. GDP, total labor force, gross capital formation, and government expenditure were variables used for the analysis. This study to a great extent aligns with the objective of his investigation but differs from the variable of interest. Abubakar et al. (2020) analyzed their associations using time series data from 1983 to 2018 using an autoregressive distributed lag technique. The study showed that the human capital development component had a beneficial impact on economic advancement both in the short and the long run. Furthermore, the findings showed that education had a greater impact than other elements or metrics of human capital development. The World Bank (2020) and the World Health Organization (2021) also reported that high out-of-pocket health expenditures in ECOWAS countries impede universal health coverage and inclusive growth. However, its criticism was on lack of empirical data or rigorous statistical analysis. It does not also disaggregate country-specific health financing systems across the ECOWAS countries, which would provide a more nuanced understanding.

Contribution to Knowledge

Empirical evidence across various studies consistently shows that health care access and equitable financing are critical for inclusive human capital development in ECOWAS. However, the effectiveness is often undermined by other macroeconomic factors, including governance challenges, poor targeting, and inadequate prioritization. In addition to these

impediments is the argument by this study that inclusive human capital development should be all-inclusive, not just focused on finances, as was mostly found in the reviewed literature. Thus, there is need to incorporate more other socio-economic variables into the search for improved institutional reforms, and regional collaboration is necessary for achieving long-term inclusive human capital development outcomes. Again, some of the existing literature used real gross domestic product in its measurement of human capital development. But the report by HCD Index in 2022 supports the fact that government expenditure on education in the sub region has increased. It is appropriate to measure its accessibility, affordability, and inclusivity. Therefore, this study used IHDI rather than RGDP used by other authors (Usman & Adeyinka, 2019; Obialor & Udumaga, 2017).

Research Method

This study formulates its model based on economic theories, observations, and empirical literature reviewed. Simple linear specification of the multivariate time series function was used in studying the cross-sectional data of the model. In so doing, an instrumental variables (IV) estimator of dynamic panel models based on the Generalized Method of Moments (GMM), developed by Arellano and Bond (1991), was used and justified.

Theoretical Framework

Theodore W. Schultz's synthesized theories of human capital as an investment theory form the theoretical framework of this study. According to him, earnings and incomes vary depending on one's degree of education and training; the more knowledge, skill, and talent one has, the more likely one is to get a better job. Backer (1964) defined human capital as a tangible means of production that may be amassed by various training, education, and health programs. Because they see people as an asset and anticipate a return, businesses invest in human capital. The significance of this theory to this study is its incorporation of socio-economic factors as the determinants of human capital development. It also used an empirical method to come to a conclusion about the issue in the theory, as can be seen in Mill and Marshall concluding that human capital is the bedrock of development after empirical analysis.

The human capital production functions by Ben Porath (1967) and Grossman (1972) were adopted for this study. These models perfectly suit the objective of this study as it encompasses all areas of human capital development. In all human capital development literature, education and health were two main channels through which human capital can be accumulated. It is from this perspective that human capital production functions of Ben Porath (1967) and Grossman (1972) were developed. Ben Porath (1967) built his model of human capital from the perspective of education, while Grossman (1972) had his function built on the health perspective (Dauda, 2018). Therefore, to produce human capital, investment in both education and health are inevitable inputs in the production process.

Ben Porath (1967) and Grossman (1972) stated that human capital is a form of commodity produced using different input combinations. Households can invest in individuals, firms, the

public, etc., all in the quest to enhance individual productivity (Dauda, 2018). However, the inputs extend beyond education and health to include social, environmental, epidemiology, and other variables. These presumptions served as the foundation for Ben Porath's (1967) and Grossman's (1972) model of the human capital production function. Activities that use time as an input do not determine an individual's utility. Earnings and the stock of human capital production have a certain length of time. A person's utility function does not take into account the stock of human capital, K, which is homogenous and subject to an exogenously specified rate of degradation. Each person has an initial endowment of this stock. Lastly, lending and borrowing are unrestricted and occur at a fixed interest rate (R).

Therefore, in the production function, time is allocated between earning and human capital production. The matching investment expenditures that optimize the discounted value of any given period t of disposable income from t to T, where T is unquestionably the end of life. In the case of physical capital, the idea of the stock of human capital is comparable to that of machinery. A rental, α_0, is established for the services of a unit of human capital, K, per unit of time in a market where human capital services are exchanged. An input used to produce other products and services is the total of the services provided by different people in the market.

Once again, it is assumed that each person only owns a little portion of the economy's homogenous pool of human capital and is seen as a perfect competitor facing a certain rental α_0 that is unrelated to the quantity of services he provides.

Thus, the model may be defined as follows: earning capacity at time t, Yt, is thus the maximum supply of human capital that can be given in the market valued at α_0.

$$Y_t = \alpha_0 K_t \qquad 3.1$$

Where Y_t is earnings at time t, $\alpha^0 is\ the$ market value of human capital.

Let Et represent the amount of current earnings that may be used for consumption or to buy non-human assets during time t. If the person produces human capital, it can be less than earning capability; other times uses are assumed to be ignored. The cost of investment, represented by the differential (Y - Et), is contingent upon both input prices and the production function.

The human capital production function can be specified as

$$Q_t = \beta_0 (s_t K_t)^{\beta}{}_1 D^{\beta}{}_2 \qquad 3.2$$

Where β_1 and β_1 and $\beta^1, \beta^2 > 0\ and\ \beta^1 + \beta_2 < 1$; The flow of human capital produced is denoted by Q, and Q_t is the quantity of the human capital output at time t. s_tK_t is the amount of human capital allotted for production, where D is the quantity of acquired inputs, the price of which is indicated by Pd, and st is the percentage of the available stock of human capital assigned to the production of human capital. S_t is also the percentage of time spent on human capital creation if activities are not combined; that is, if earnings and human capital are not produced together. The constraint $0 \leq s_t \leq 1$ constrains the fraction s_t.

The rate of change of the human capital stock is given by

$$\acute{\kappa}_t = Q_t - \delta K_t \quad 3.3$$

A derivative with regard to time is shown by a cap above any variable (K), where δ is the pace at which the human capital stock degrades. A unit of capital may be employed as soon as it is generated, according to equations (3.1) and (3.3). There are two parts to investment expenses in the manufacturing process:

$$I_t = \alpha_0 s_t K_t P_d D_t \quad 3.4$$

Where it is an investment at time t, other variables are as defined before. This implies that human capital development is a function of the market price of factors of human capital less the initial endowment or investment of the individual. From equation 3.4, human capital accumulation is specified thus:

$$\acute{\kappa}_t = P_d D_t + I_t^{\alpha_0 s_t} \quad 3.5$$

In view of equation 3.5, different empirical variables have been used in literature in determining human capital (Barro, 1991; Mankiw-Romer-Weil, 1992; Didenko, 2015). Some of these include education expenditure, health expenditure, GDP per capita, infant mortality rate, life expectancy, etc. (Dauda, 2018). The choices of this variable were chosen based on the central roles they played in the human capital development and the objective of the study. In view of equations (3.4) and (3.5), the human capital production function according to Ben Porath (1967) and Grossman (1972) can be given as

$$\acute{\kappa}_t = P_d D_t + \alpha_0 s_t K_t P_d D_t \quad 3.6$$

Equation (3.6) serves as the basic equation of our model, showing that inclusive human capital development is a derived function of the available stock of human capital by the quantity of purchased inputs at a point in time and investments in human capital development.

Therefore, equation 3.6 can be modified to

$$IHDI = f(eDEx, pHEx, GDPp, pOvty, InSQ) \quad 3.7$$

Where *IHDI* is the inequality-adjusted human development index, $eDEx$ is education expenditures, $pHEx\ is$ public health expenditure (Public health expenditure was used as a variable in this study because it represents the level of government investment in the provision of health care services which enables the government to expand its infrastructure), $GDPp$ is gross domestic product per capita, $pOvty$ is the poverty headcount ratio, and $InSQ$ is institutional quality.

Empirical Model Specification

All variables for determination of the objectives of this study are incorporated in equation (3.7). By building an econometric model of the functional model above, the model is specified thus:

$$\boldsymbol{IHDI}_{it} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1} eDEx_{it} + \boldsymbol{\beta_2}\, pHEx_{it} + \boldsymbol{\beta_3}\, GDPp_{it} + \boldsymbol{\beta_4}\, pOvty_{it} + \boldsymbol{\beta_5}\, InSQ_{it} + \boldsymbol{\mu}_{it} \quad 3.8$$

Where ***IHDI*** is the inequality-adjusted human development index, $eDEx$ is education expenditures, $pHEx\ is$ public health expenditure, $GDPp$ is gross domestic product per capita, $pOvty$ is poverty headcount ratio, and $InSQ$ is institutional quality. μ = Disturbance

term/error term; across section i, in time t, β_0 = Constant term, β_1, β_2, β_3, $\beta_{4,}$ β_5 = parameters to be estimated.

Table 2 presents the summary of measurements and sources of data used in the study.

Variables	Definition	Measurement	Sources
IHDI	Inequality adjusted human development index	Multiple indicators (Ratio)	UNDP, 2024
eDEx	Education expenditure	as annual % of GDP (millions US$)	WDI, 2024
pHEx	Public Health expenditure	as annual % of GDP (millions US$)	WDI, 2024
GDPp	Real Gross domestic product per capita	GDP per capita (constant 2021 international $)	WDI, 2024
pOvty	Poverty headcount	Ratio	WDI, 2024
InsQ	Institution quality	Index using (PCI) (Ratio)	WGI,2024

Source: Researcher's compilations, 2025

Method of Estimation

This study combined both descriptive and inferential statistics. It also highlighted the aggregated and disaggregated analysis on the bases of World Bank classifications of the ECOWAS countries from 1980 to 2023. The study employed instrumental variables within the system generalized method of moments (SGMM) approach. The inequality-adjusted human development index is the dependent variable. Other variables that affect inclusive human capital, such as education, health, and institutional quality, will be independent variables, while economic growth will act as a control variable.

To analyze the impact of health access on inclusive human capital development in the ECOWAS sub-region, the paper employed an econometric approach, employing a dynamic panel data method. It adheres to the guidelines set out by Ben Porath (1967) and Grossman (1972), who conducted the majority of empirical research on human capital development. But the model is modified to fit the study's goal in equation 3.8.

The error term μ_{it} in equation 3.8 is a composite disturbance term that includes an unobserved country-specific effect, a time-specific effect λ, and an error term ε_{it}. The composite error could be specified, thus

$$\mu_{it} = \eta_i + \lambda_t + \varepsilon_i \quad (3.9)$$

The endogeneity of inclusive human development and correlation of the unobserved country fixed effects possible with the error term implies that the orthogonality condition is not likely to be met for the fixed effects (FE) or random effects (RE) estimator to produce consistent estimates. Consequently, the Generalized Method of Moments (GMM), created by Arellano and Bond (1991), serves as the foundation for the study's instrumental variables (IV) estimator of dynamic panel models. Additionally, it analyzes the short-run influence by taking into

consideration the data's time series dimension. It takes into account the endogeneity issue that might arise from the association between the error term and the lagged dependent variable since it also counts all of the explanatory factors and the non-observable country-specific variables as endogenous variables.

The possibility of invalidity of the lagged differences of the explanatory variables was examined by the Sargan test of over-identifying restrictions and the Arellano and Bond (AB) test of serial correlation. Additionally, Durbin (1954), Wu (1974), and Hausman (1978) endogeneity tests were used to examine the endogeneity issue. To account for the degree of measurement scale, all of the variables are stated using the natural logarithm.

Theoretical and empirical literature reveals that the impact of education expenditure, health expenditure, institutional quality, and GDP per capita is expected to be negative, as an increase in a country's investment in human capital will reduce the inequality level (Okun's Law, 1962).

A priori Expectation: $-\beta_1, -\beta_2, +\beta_3, -\beta_4, -\beta_5$

Presentation and Analysis of Results

Table 3. Descriptive statistics

	IHDI	EDEX	PHEX	GDPP	POVTY	INSQ
Mean	0.302840	44.23766	4.908619	3691.859	52.74028	26.05028
Median	0.284000	42.35768	4.429614	3191.671	53.65000	24.40500
Maximum	0.471000	69.34212	10.61633	10308.68	89.40000	60.48000
Minimum	0.236000	14.37250	2.320522	1161.325	10.40000	6.190000
Std. Dev.	0.046178	12.39308	1.838575	2001.160	21.88771	13.90336
Skewness	1.390834	-0.068009	1.369553	1.129886	-0.134814	0.529104
Kurtosis	5.519968	2.796030	4.515066	4.019234	2.028253	2.275924
Jarque-Bera	42.26376	0.180314	29.39439	18.43624	3.050973	4.932265
Probability	0.000000	0.913788	0.000000	0.000099	0.217515	0.084913
Sum	21.80450	3185.111	353.4206	265813.9	3797.300	1875.620
Sum Sq. Dev.	0.151403	10904.78	240.0055	2.84E+08	34014.11	13724.54
Observations	72	72	72	72	72	72

Source: Authors' Estimation using Eviews (2025)

From Table 3, the mean value of IHDI in ECOWAS is (0.303), while the median value is (0.284). This implies that the (0.302) ECOWAS population is suffering under a severe rate of inequality. The result also shows that the mean and median values of the education index (eDEX), poverty headcount ratio (POVTY), and institutional quality (INSQ) did not differ by more than two units from one another. The data showed an asymmetric distribution, with public health expenditure, GDP per capita, having more than two units from the mean value. Similar to the eDEX, the mean and median of poverty (POVTY) are relatively close, indicating low variability and a nearly symmetric distribution.

The positive skewness of the data is another observation made from Table 3. Three series have a probability value greater than 5%, which means that at the 5% level of significance, the null

hypothesis of normal distribution is rejected, while it is accepted in two where it is less than 0.05. This can be attributed to the cross-sectional and heterogeneous nature of the data. But the use of panel data will take care of these problems during the estimation process.

Table 4. Correlation Matrix

	IHDI	EDEX	PHEX	GDPP	POVTY	INSQ
IHDI	1.000000					
EDEX	-0.363368	1.000000				
PHEX	-0.170504	-0.130109	1.000000			
GDPP	0.666905	-0.417463	-0.356417	1.000000		
POVTY	-0.136814	0.312358	-0.010749	-0.460970	1.000000	
INSQ	0.619922	-0.118383	-0.455252	0.647030	0.028101	1.000000

Source: Authors' Estimation, (2025)

Table 4 shows a negative correlation of the inequality-adjusted human development index (*IHDI)* with education, public health expenditure, and poverty handouts, while indicating a positive correlation with the GDP per capita and institutional quality. It could be observed that none of the variables is above 0.80, which shows that the variables are not perfectly correlated.

Panel Unit Root Tests

Before the regression is estimated, the time series properties of the variables must be checked to correctly apply a suitable panel regression technique, which is most suitable for variables that are integrated of I(0) and purely I(1) and not for I(2) (Pesaran, Shin & Smith, 2001). Hence, panel unit root tests were performed using Levin, Lin, and Chu's and Im, Pesaran, and Shin's W-stat for stationarity. The decision rule is to reject H_0 if the absolute value is greater than the 5% critical value; otherwise, accept. The panel unit root test result is presented in Table 5.

Table 5: Unit root test

Variables	Levin.Lin and Chu@ Level	5%critical value at Level	Im, Pesaran andShin W-stat @ level	5% critical value at level	Levin.Lin and Chu@ First Diff	5% critical value (first diff)	Im, Pesaran andShin W-stat @ First Diff	5% critical value (first diff)	Order of integration	Remarks
IHDI	*(-5.193)*	*(0.000)*	*(-5.193)*	*(0.012)*					*I(0)*	*Stationary*
eDEx	*(0.456)*	*(0.676)*	*(-0.071)*	*(0.001)*	*(-3.225)*	*(0.001)*	*(-3.495)*	*(0.000)*	*I(1)*	*Stationary*
PHEX	*(-3.225)*	*(0.001)*	*(-4.075)*	*(0.000)*					*I(0)*	*Stationary*
GDP	*(7.736)*	*(1.000)*	*(8.245)*	*(1.000)*	*(-3.599)*	*(0.000)*	*(-1.204)*	*(0.004)*	*I(1)*	*Stationary*
POVTY	*(-1.339)*	*(0.090)*	*(1.087)*	*(0.861)*	*(-5.661)*	*(0.000)*	*(-0.795)*	*(0.002)*	*I(1)*	*Stationary*
INSQ	*(-0.891)*	*(0.186)*	*(-0.136)*	*(0.554)*	*(-3.235)*	*(0.001)*	*(-3.677)*	*(0.000)*	*I(1)*	*Stationary*

Source: Authors' Estimation, (2025)

Table 5 shows that the unit root results have mixed orders of integration *I(0)* and *I(1).* The inequality-adjusted human development index (*IHDI)* and public health expenditure are stationary at their levels. Other variables such as education expenditure (EDEx), GDP per capita (GDPp), poverty headcount ratio (POVTY), and institutional quality (INSQ) were stationary at first difference.

Table 6: The Results of System GMM Estimation

Dependent Variable: Inclusive human development LOG(IHDI)				
Variable	Model 1	Model 2	Model3	Model4
	GMM Fixed	GMM	GMM	GMM
LOG(IHDI(-1))	12.901	9.461	10.570	1.426**
	0.0116	0.073	0.087	0.0000
	(1.607)	(1.841)	(1.753)	(9.149)
LOG(EDEX)	-0.236	-0.117	-1.192	-0.007
	0.417	0.535	0.409	0.853
	(-0.820)	(-0.186)	(-1.835)	(-0.186)
LOG(PHEX)	-0.386		-0.392	-0.011*
	0.391		0.289	0..011
	(-0.866)		(-1.074)	(-2.635)
LOG(POVTY)	0.142	0.145		0.019
	0.465	0.313		0.435
	(0.738)	(1.021)		(0.785)
LOG(GDPP)	-2.187	-1.691	-1.913	-0.106*
	0.174	0.127	0.136	0.021
	(-1.381)	(-1.554)	(-1.520)	(-2.361)
LOG(INSQ)	-0.426	-0.2814	-0.274	-0.070*
	0.323	0.335	0.374	0.014
	(-1.000)	(-0.978)	(-0.900)	(-2.537)
Obs.	72	72	72	72
Sargan Test		1.800	1.798	1.801
		(0.376)	(0.103)	(0.421)
Hausman Test		63.994	62.181	62.261
		(0.000)	(0.000)	(0.000)
AR(1)		2.181	2.811	2.631
		(0.029)	(0.005)	(0.009)
AR(2)		1.305	1.251	1.201
		(0.192)	(0.211)	(0.230)

NB: * denote significance at (5%) levels, ** denote significance at (5%) first difference.
All figures in parentheses are the P-values.
Source: Researchers' Computation (2025)

Table 6 shows the estimation results of equation (3.8) using the dynamic GMM method. Column 2 is the stable outcome estimations of the variable to ensure the robustness of the analysis, which is presented for comparison in column 3 and 4. The results of System GMM estimation based on the countries' income classification.
To answer the question of income disparity as having an impact on health access on inclusive

development, the regression was analyzed and result is in table 7.

Table 7

Dependent Variable: Inclusive human development LOG(IHDI)		
Variable	Low-income countries	Low-middle-income countries
	GMM	GMM
LOG(IHDI(-1))	0.728*	0.958
	0.000	0.250
	(4.285)	(1.184)
LOG(EDEX)	-0.005	-0.074
	0.805	0.640
	(-0.249)	(-0.480)
LOG(PHEX)	0.033	-0.475
	0.264	0.067
	(1.141)	(-1.935)
LOG(POVTY)	-0.001	-0.036
	0.926	0.558
	(-0.001)	**(**-0.595)
LOG(GDPP)	-0.012	-0.570
	0.841	0.057
	(-0.202)	(-2.014)
LOG(INSQ)	0.011	0.256
	0.583	0.133
	(0.556)	(1.561)
Obs.	39	33

Source: Researchers' Computation (2025)

NB. * represents the significant while the one in parentheses represents the insignificant one.

Regression Analysis

The estimation is based on a two-step system GMM, and the instruments used are the first lagged differences of dependent variables. The Durbin–Wu–Hausman and Sargan tests are based on asymptotic chi-square distribution. The empirical result demonstrates that there are no instrument-related issues with any of the regressions, as shown by the Sargan, Arellano, and Bond tests, and that the estimated models do not have any 16-second-order serial correlation issues. The Durbin–Wu–Hausman test statistic led to the rejection of the null hypothesis, which states that all regressors are exogenous at any tolerable level of confidence. The GMM approach to analysis is thus warranted. There is no disagreement between the instruments and the regressors, according to the Sargan over-identification test. The model has first-order serial correlation, but no second-order serial correlation, according to the AR test of serial correlation.

According to the Durbin–Wu–Hausman test result, all regressors are endogenous because the null hypothesis of all exogenous regressors has been rejected with significance at the 5% level.

Since the majority of the calculated coefficients show the predicted signs and are consistent with the theory, this suggests that Model 4 Column 5 in Table 6 is robust. The consistency of Model 4 is demonstrated by its robustness, which shows that the absence of public health spending (LOG(PHEX)) in Model 1 and poverty (POVTY) in Model 2 (see Columns 3 & 4) did not impact the significance and signs of almost all variables or the outcomes of diagnostic tests. The results of Model 1 in Column 2 and Model 4 in Column 5, while PHEX, GDPp, and INSQ were significant and in line with theory, differ nonetheless. Thus, column 5 estimations will be the study's main emphasis.

Generally, inclusive development is measured from differing inequality, and it is measured on the scale of 0-1; this implies that negative results reduce inequality, thereby increasing inclusiveness. The reverse is positive results.

The result from Table 6. column 5, shows that education expenditure (EDEx), public health expenditure (PHEx), GDP per capita (GDPp), and institutional quality (INSQ) have a negative and significant impact on the inclusive development of the region, except EDEx, which has a negative and insignificant. The coefficients of the variables PHEx, GDPp, and INSQ are -0.011, -0.106, and -0.070, respectively, with significant values of 0.011 for PHEx, 0.021 for GDPp, and 0.014 for INSQ. The EDEx also is negative but insignificant, with a value of 0.853. This implies that a 1% increase in public health expenditure and GDP per capita will significantly increase inclusive development of the ECOWAS region. While education expenditure (EDEx) is -0.007,a 1% increase will decrease IHDI which is not significant.. A 1% increase in the quality of institutions (-0.070) will decrease IHDI and it is significant at (P=0.014). The insignificance of educational expenditure indicated that the educational expenditure of the region is below the international benchmark of 26% by the United Nations. These findings resonate with the theory of Schultz (1961), human capital as an investment theory that anchored human development on the significance of education and training. It is also in alignment with Keji (2021), who argues that increased economic growth (GDP) will have an increase in human development. It also supported the findings of Oloke et al. (2022) that government educational spending forms a major prerequisite for improving human development in the ECOWAS sub-region. The finding reaffirms the Witter et al. (2016) argument that equitable health financing in health and education are the twin developmental tools for inclusivity in human development in West Africa. However, it differs from the assumption that human capital is a stock as opined by Porath (1967). Since development is a process, it is derived mostly from education and health.

Poverty, as was found in Table 6, has a coefficient of 0.019 and an insignificant value of 0.435, indicating that an increase of 1% in the poverty handouts ratio of the ECOWAS countries will cause an increase in the ECOWAS inequality ratio, thereby insignificantly (0.435) reducing the inclusive development of the region by 1.9%. This finding aligned with the findings of Gaye and Jolly (2019) of West African countries; especially the poor rely heavily on out-of-pocket expenditures, which limit access to their healthcare and exacerbate health inequalities within the region. It is also supported by Witter et al. (2016); the World Bank (2020) and

WHO (2021) report that poverty in ECOWAS countries impedes universal health coverage and inclusive growth.

This study empirically investigated if inequality in health access of the ECOWAS countries has an impact on inclusive human development. The result of the analysis is shown in Table 6, which indicated that in low-income countries of ECOWAS, education expenditure (eDEx), poverty (POVTY), and GDP per capita (GDPp) have negative coefficients of -0.005, -0.001, and -0.012, respectively, with insignificant values of 0.805, 0.926, and 0.841, respectively. This implies that each of the variables will insignificantly increase inclusive development by 0.5%, 0.1%, and 1.2% with an increase of 1% of each of them, respectively. However, the public health expenditure (PHEx) and institutional quality have a positive coefficient of 0.033 and 0.011 with insignificant values of 0.264 and 0.583, respectively. However, institutional quality reduces inclusive development.

It can be observed from the analysis in Table 6 that there is disparity in the drivers of the access to health and inclusive development. In low-income countries, all except public health expenditure and institutional quality increase inclusive development. This result may be justified since in low-income countries the major focus is mostly on survival, and there is also a lack of health safeguards like insurance, pool funds, and much out-of-pocket health expenditure. On the other hand, in low-middle-income countries all the variables were negative, which is suggestive of an increase in inclusive development except institutional quality, which has a positive coefficient. This resonates with the regional reports (WHO & World Bank, 2021) and country-level policy developments regarding universal health coverage (UHC) that emphasized that West African countries, especially the poor, rely heavily on out-of-pocket expenditures, which limit access to their healthcare and exacerbate health inequalities within the region. Therefore, it will be unjustifiable to advocate the same policy instrument for both categories.

Conclusion and Recommendations

This study investigated the impact of access to health care and inclusive human capital development in the ECOWAS using time series data from 2009 to 2023. Samples of 15 ECOWAS countries are grouped into two based on their income classification by the World Bank in 2021. Inclusive human development is conceptualized as development that promotes equitable, inclusive, and integrated development; hence, it was proxied by the inequality-adjusted human development index (IHDI). Based on theories and literature, education and health were generally recognized as the most efficient and effective channel of human development. The access to health care, which is the independent variable, is captured through public health expenditure (PHEx); education is captured by public education expenditure (eDEx); and poverty (POVTY) and GDP per capita (GDPp) are used as a control variable. Data were majorly sourced from World Development Indicators by the World Bank (WDI, 2024) and analyzed using a system dynamic panel GMM.

The results indicated that there is no one side that may fit all, meaning that there are mixed results among the low-income countries and low-middle-income countries. Therefore, different policy measures are required for different income groups. While in the low-income countries, access to public health expenditure (PHEx) reduces inclusive development, because there are very few benefits in public health care expenditure; an increase in public health expenditure (PHEx) only increases inequality among them. The low-middle-income countries indicated that access to public health expenditure (PHEx) increases inclusive development, meaning there is no equity in access to quality services, which might be as a result of bad governance or corruption. The negative real GDP means there is inequality in economic growth, which widens the income gap between the rich and the poor. The negative institutional quality means there are poor institutions, which hinders equality in access to human capital development. Therefore, this study recommends that access to health care such as county or community hospitals, mobile clinics, and ward ambulance services should be provided to increase health accessibility in low-middle-income countries, while effort should be channeled into educating the population in low-income countries to increase their literacy, especially in the local health care practices. The government can also promote inclusive growth policies such as free or sponsored access to education and health care to ensure that economic gains reach the poor in ECOWAS countries. Also, education incentives such as free school feeding programs, bursary awards, and student loans as practiced in Nigeria and the like should be initiated in low-income countries of the ECOWAS.

This paper suggests further studies on the mediating role of institutions and cultural beliefs on healthcare utilization and inclusive human development. This will help in giving insight and better understanding for an efficient policy framework in ECOWAS due to disparities in governance.

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