

Modelling Income Inequality and Child Labour: Effect on Child Nutrition

Semiu Ayinla Alayande^{1,*}, Ankeli Uchechi. C²

¹Department of Mathematical Sciences, College of Natural Sciences, Redeemer's University, Ede, Osun State, Nigeria

²Federal Polytechnic Ede, Ede, Osun State, Nigeria

*Corresponding author: alayandesa@run.edu.ng, remiak2000@yahoo.com

Received June 02, 2022; Revised July 05, 2022; Accepted July 11, 2022

Abstract Childhood malnutrition is a real-life chronic problem and one of the global major public health challenges, especially in developing countries like Nigeria. Income inequality causes socio-political unrest and it has been directly linked to a reduction in happiness level as well. The returns to capital are distributed unequally enough that some families still must send their children to work in order to sustain themselves. In this article, Augmented Dickey-Fuller unit root test and Phillip Peron test are used to determine the existence of long run equilibrium relationship among the variables. There is a long run positive relationship between the Gini coefficient, unemployment rate and mortality rate. The model shows that education, real GDP, inflation and government growth in expenditure does not affect child labour directly.

Keywords: income inequality, child labour, Gini co-efficient, Augmented Dickey-Fuller

Cite This Article: Semiu Ayinla Alayande, and Ankeli Uchechi. C, "Modelling Income Inequality and Child Labour: Effect on Child Nutrition." *Journal of Finance and Economics*, vol. 10, no. 2 (2022): 43-46. doi: 10.12691/jfe-10-2-2.

1. Introduction

The last two decades have seen a general deterioration of income distribution in most countries around the world. An indication shows inequality has increased as a consequence of the 2008 world financial crisis and the following recession. Unlike earlier crises of a global scale, the recent crisis for this country had a much more significant impact on the income distribution. A variety of economic factors such as increased globalisation, corruption and other institutional failures, as well as demographic trends have been used in attempt to explain the forces driving larger inequalities in market incomes. Most working children in developing countries like Nigeria are engaged in domestic tasks, such as caring for other dependants in the household and assisting on the family farm/business. While these children are not involved in 'hazardous' forms of child labour, which are targeted by the International Labour Organisation (ILO) and popularised in the media, the tasks they undertake may nevertheless have adverse effects, including permanent loss of education and earlier marriage [1].

The ability of households to cope with shocks is linked to the permanent income hypothesis and consumption smoothing literature (e.g. Townsend 1995). Within this framework, household optimal response to transitory shocks is to borrow or use up buffer stocks. In the presence of credit constraints, however, less effective mechanisms have to be used. These may include child

labour. Assuming that there is a trade-off between child labour and human capital accumulation, this may be an inefficient strategy [2].

Beegle et al. [1] explore transitory income shocks as a determinant of child labour empirically, using data from rural Tanzania. They find that child labour increases in response to income shocks, but that this increase is mitigated by household asset holdings. This is consistent with better off households being more able to cope with transitory shocks due to better access to credit. Childhood malnutrition is a real-life and a chronic problem and one of the global major public health challenges, especially in developing countries like Nigeria. Several attempts from governmental and non-governmental organizations to address the problem have fallen below expectation. It is recognised that the existing studies and nutrition intervention strategies are inadequate and hence not working to expectation.

Income inequality in Nigeria is a conterminous problem. Wealth and economic power are concentrated in a few hands to detriment of the under privilege and the common people in Nigeria. Nigeria among the thirty-one most unequal countries in the world with respect to income distribution, the poorest half of the population holds only 10% of national income [3]. There is a general consensus in the literature that the high level of income if unchecked can ferment internal conflict [4]. The problem then arises as to how the high level of income inequality can be reduced because of its inherent social and economic implications which affects child labour at the end affect the nutrition of the child.

The focus in this paper is on the specific modelling of income inequality and child labour with a view to find their major effect on child nutrition and physical health age 5-12 years old.

2. Literature Review

There is little or no study so far concerning income inequality, child labour and child nutrition together. Different authors have worked on income inequality, child labour and child nutrition independently, sometime discussed about two variables. Income inequality causes socio-political unrest and it has been directly linked to a reduction in happiness level as well. This reduction is greater among those at lower income levels, riots and other disruptive activities [5,6]. This increase in unrest huts the economy and more importantly decreases the quality of life of all people in the country, especially those without the means to protect them from that unrest.

In a path breaking paper, Basu and Van (BV: [7]) developed a theoretical framework that can be adapted to address these questions. BV focused on the question of when an outright ban on child labor could be an effective policy tool. Countries in which a ban could be effective were those that were well-off enough to be able to support all of their children without sending any to work (i.e., in which an equilibrium with no child labor coexisted with the equilibrium with some child labor). Only countries with relatively high labor productivity would fit this description.

In work that builds on a simple version of the BV framework, Swinnerton and Rogers (SR: [8]) showed that income inequality was related to a nation's child labor force participation. SR found that in precisely those circumstances where, according to BV, a ban on child labor would be effective, child labor exists because the returns to capital are distributed unequally enough that some families still must send their children to work in order to sustain themselves. In those cases, a more equal distribution of those returns could be found for which child labor would be eliminated.

Other papers have also linked reductions in inequality to reductions in child labor. Ranjan [9] explains how child labor can arise due to borrowing constraints. He then goes on to show that if the economy is wealthy enough, a more egalitarian income distribution relaxes credit constraints on enough households to reduce child labor. Dessy and Vencatachellum [10] show that child labor can arise from a coordination failure between parents and firms. In their model, if an economy is wealthy enough, then child labor arises among the least-wealthy households when wealth is unequally distributed.

It is estimated that a third of the 6 million preventable deaths of young children occurring in poor and middle-income countries each year can be ascribed to under-nutrition [11]. Of those that survive, an estimated 200 million children under 5 years fail to reach their potential in cognitive development because of poverty, poor health and nutrition, and deficient care [12]. About 52 million children experience wasting, whereby their weights are low given their heights, and 165 million are stunted, that is have heights that are low for their age

[13]. Unlike wasting, stunting is likely to be permanent and has been shown to have an impact on the physical and cognitive development of children, and to have a significant impact on an individual's adult health and life prospects. These socioeconomic status gaps in child morbidity are "not simply inequalities, they are also inequities – inequalities that are unjust and unfair" [14].

It has also been shown that policies that achieve reductions in household poverty can ameliorate child malnutrition. The increased incomes that resulted from the introduction of the Child Support Grant in 1998 produced substantial reductions in stunting of young children and these are highly likely to produce, in turn, substantial increases in those children's productivity and wages once they grow up [15].

Lawrence Aber et al [16] addressed the association between poverty and child health and development, as yet there is no consensus on how poverty should be operationalized to reflect its active nature. It was found that in modelling this relationship, there is need looked at the effect of lack of agreement so that "true" or net effect of poverty can be determined.

Eric V. Edmonds et al [17] claimed that in policy circles child labor is often viewed as a rights issue and also as an economic issue. They looked at the issue of working children are due to both cause and consequence of a lack of economic development. It was further revealed that widespread child employment in any country dampens her future economic growth. Because it will have negative impact on child development and consequently depresses current growth their by reducing skilled wages and discouraging the adoption of skill-intensive technologies.

UNICEF [18] reported that every infant and child has the right to good nutrition according to the "Convention on the Rights of the Child" and undernutrition is associated with 45% of child deaths. It was ascertained that, globally in 2020, 149 million children under 5 were estimated to be stunted (too short for age), 45 million were estimated to be wasted (too thin for height), and 38.9 million were overweight or obese.

Dwivedi, and Marjit [19] used some micro level empirical studies that questioned the validity of the poverty hypothesis of child labour. The paper provides probable explanation to why increase in absolute income cannot sole problem of child labour.

Francesco Burchi [20] through his paper though there is no statistically significant difference in the effect of parents' education on child nutrition while the presence of a literate household member has significant effect on child height but not on weight.

Finally, little work has been done on impact of income inequality and child labour on nutrition. The strands of literature contribute to an interesting, insightful and progressive body of work. However, since prevalence and intensity of child labour is explained by a range of factors simultaneously, a shopping list of determinants is only half of the story; the other half is the interrelation between these determinants and the relative importance of each. There is, in short, scope for unifying the existing literature into a more cohesive story of which children work, why and how much effects on their status.

2.1. Data and Methods

The heights and weights of children and infants can be used to calculate anthropometric indices which can then be used to investigate changes in individual nutritional status as well as providing evidence of past growth failure [21]. At the population level, such indicators can serve as a way of assessing inequalities in terms of health status and, potentially, future productivity and earnings [22]. Stunting, or low height-for-age, results from failure to grow at an adequate rate and is usually a sign of prolonged (chronic) under-nutrition and/or repeated disease or illness. It is considered to reflect the cumulative effects of socio-economic, environmental, health and nutritional conditions. Wasting, or low weight-for-height, is a short-term indicator that identifies children affected by current (acute) under-nutrition or recent illness and is a strong predictor of child mortality. Low weight-for-age identifies children that are underweight for a specific age and reflects both chronic and/or acute under-nutrition. Although being underweight may reflect no more than a temporary setback, stunting and wasting are useful indicators of sub-optimal mental and physical child development and, as a result of this, factors that predispose children to poorer health, lower earnings, and higher mortality later in life, and contribute to the persistence of intergenerational poverty.

Ordinary least square (OLS) regression analysis was carried out on data ranging between 2000 and 2018. The statistical analysis used for this study is SPSS 27.0 and E-views 12. To avert the emergence of spurious result, a unit root test was carried out using Augmented Dickey-fuller unit root test and Phillip Peron test to determine the existence of long run equilibrium relationship among the variables.

2.2. Model Specification

The model of past studies, Toggero et al, [23] and Awe A. & Rufus O. (2012) [24] were looked into before proposing our own model. We derived our estimates on the prevalence of child labour among children 10-14 years; ‘World development indicators’. This source limits its estimates of working children to the economically active population.

The functional relationship between the dependent variable and its associated independent variable can be expressed in the following form:

$$MRC = f(GEX, GINI, GE, RGDP, U, Inf)$$

OR

$$UDM = f(GEX, GINIO, GE, RGDP, U, Infl)$$

In linear for,

$$MRC = b_0 + b_1GINI + b_2GEX + b_3ED + b_4RGDP + b_5U + b_6INF + \epsilon_t$$

OR

$$UDM = b_0 + b_1GINI + b_2GEX + b_3ED + b_4RGDP + b_5U + b_6INF + \epsilon_t$$

Where;

- MRC = Mortality rate in Children 10-14 years
- UDM= % of population under 10-14 that are malnourished
- GINI = Gini Coefficient (proxy for income inequality)
- GEX = Government expenditure
- U= Unemployment rate
- INFL = Inflation rate
- RGDP = Real Gross domestic product

$$\epsilon_t = \text{Error Term}$$

3. Results and Discussion

Table 1. Unit Root Test result

Variables of Interest	ADF Values	Critical values (5% sig. level)	Order of integration
Educ	-3.3389	-3.066	I(0)
Gini	-3.7338	-3.081	I(1)
Gexp	-4.4631	-3.066	I(0)
Rgdp	-4.2551	-3.081	I(1)
Infla	-3.4442	-3.066	I(0)
MRC	-3.5343	-3.066	I(0)
Unemp	-3.1101	-3.081	I(1)

The result of the unit root obtained shows that Education (Educ), Growth in expenditure (Gexp), Inflation (Infla) and Mortality Rate (MRC) were stationary at levels of order I(0) since their absolute ADF statistics values of 3.3383, -4.4631, -3.4442, and -3.5343 are greater than absolute critical ADF values of -3.066 at 5% level of significance respectively. Gini coefficient (Gini), Real GDP (Rgdp), and Unemployment (Unemp) were non stationary at I(0) levels since their absolute ADF statistics values were less than their absolute critical ADF values at 5% level of significance. In order to ensure stationarity of all variables, there was need to take their first difference. After the first difference, it was found out that the variables that were non-stationary at I(0) levels became stationary. In order words, Gini coefficient (Gini), Real GDP (Rgdp), and Unemployment (Unemp) were stationary at I(1) with 3.78338, -4.2551 and -3.1101 greater than ADF values of -3.0811.

According to Alayande S.A [25], where he proposes using additional tests for confirmation of the results of cointegration test. Here we apply Phillips – Perron test as an abridge test.

Table 2. Philip Peron Unit root Test for the variables.

Variable of interest	PP statistics		Critical value		Order of integration.
	Level	I st difference	1%	5%	
Educ	-2.256946	-3.987720	-3.920350	-3.065585	I(1)
Gini	-1.117572	-3.959148	-3.920350	-3.065585	I(1)
Gexp	-4.328246	-17.72542	-3.920350	-3.065585	I(1)
Rgdp	-1.268821	-4.240845	-3.920350	-3.065585	I(1)
Infla	-3.417748	-7.999114	-3.920350	-3.065582	I(1)
MRC	-3.575007	-8.034474	-3.920350	-3.065582	I(1)
Unemp	0.643767	-3.924705	-3.920350	-3.065582	I(1)

The result in table indicates that all variables are non-stationary at their levels but made stationary at their first difference. All variables are integrated of order one, denoted by I(1). This corroborates the work of Alayande,

S.A [25] to use two test to test for the presence of cointegration in single equation model. The null hypothesis of no cointegration is accepted since the estimated Phillip Peron (PP) test statistics is less than the critical values at 1% and 5% levels.

3.1. Results of the Model

Table 3. Results of Regression Model equation

Variable	Coefficient	Standard error	T-Statistics	Prob.
Constant	27.69083	24.16548	1.145884	0.2785
Gini	0.317537	0.598163	0.530853	0.6071
Educ	-0.119129	0.060511	-1.968733	0.0733
Gexp	-0.052582	0.095047	-0.553215	0.5923
Infla	-0.018908	0.190268	-0.099376	0.9223
Rgdp	0.183695	0.416712	0.440820	0.6687
Unemp	-0.38075	0.165241	-2.303933	0.0440

R-squared= 0.788199

Adj R-square = 0.661199

Prob. F statistics 0.006078.

Analysis of the Regression equation result:

The evidence of cointegration indicates that inflation rate, employment rate, Gini coefficient, expenditure rate real GDP and unemployment are long run determinants of mortality rate. Gini coefficient and unemployment show positive relationship while the rest variables show negative relationship to mortality.

4. Conclusion

There is a long run positive relationship between Gini coefficient and mortality rate. If Gini coefficient is improved, then mortality rate too will improved i.e reduced. Subsequently for unemployment rate, increase in employment rate is bound to reduce mortality rate among the youth between age 9-14 years old and the child abuse will be totally reduced. Education which shows negative sign may be as a result of Gini coefficient, because education too contributes in one way or the order to Gini coefficient. Increase in education is bound to reduce mortality rate.

References

- Beegle, K., De Weert, & J. Dercon, S, (2008). "Orphanhood and the Long-Run Impact on Children." (Available at http://www.sarpn.org.za/documents/d0001651/P2000Orphanhood_children_Sept2005.pdf).
- Baland J. & Robinson J.A (2000). Is Child Labour Inefficient? *Journal of Political Economy*, 108(4),pp. 663-679.
- Adegoke, D.O. (2013). Personal, Situational and Socio-Cultural Factors as Correlates Of Intimates Partner Abuse In Nigeria. *Journal of Social Sciences*, 57-62.
- Cramer, C. (2005). "Does inequality cause conflict?" *Journal o International Development*, Vol. 15, No. 4, pp. 397-412.
- Barr, Talia & Kaushik Basu. (2009). "Children, Education, Labour and Land: In the Long Run and Short Run." *Journal of European Economic Association*.
- Alesina A. and Perotti, R. (1996). *Income Distribution, Political Instability and Investment*. (online). Dash.Havard.edu.
- Basu and Van (BV: 1998). "The Economics of Child Labour." *American Economic Review*, 88(3) June pp. 412-427.
- Swinnerton and Rogers (SR: 1999)" *The Economic of Child Labour Comment*," *American Economic Review* 89(5). pp 1382-85.
- Ranjan K (2001). "An Economic Analysis of Child Labour." *Economics Letters* 64.pp.99-105.
- Dessy and Vencatachellum. (2001). *Accounting for Cross Country Differences in Growth*." Working Paper.
- Black M & Aboud F. (2011). Theoretical basis of responsive feeding among infants and young children in high and low income countries. *Journal of Nutrition*. 141: 490-94.
- Grantham-McGregor S, Cheung YB, Cueto S, (2007). Developmental potential in the first 5 years for children in developing countries. *Lancet*. 369: 60-70.
- UNICEF (UN Children's Fund) (2012) *Child Marriage: A Harmful Traditional Practice. A Statistical Exploration*. New York: UNICEF.
- Victoria Cesar G, Adam Wagstaff, Joanna Armstrong Schellenberg, Davidson Gwatkin, Mariam Claeson, Jean-Pierre Habicht (2003). *Applying an Equity Lens to Child Health and Mortality*. *PubMed*. 362(9379): 233-41.
- Aguero, J.M., Carter, M.R. and Woolard, I. (2009). *The impact of unconditional cash transfers on nutrition: the South African Child Support Grant*, Cape Town: SALDRU, University of Cape Town: South African Labour and Development Research Unit Working Paper No. 06/08.
- Lawrence Aber J., Neil G. Bennett and Dalton C. Conley. (1997). *The Effect of Poverty on Child Health and development*. *Annual review of public health*. Vol. 18: 463-483.
- Eric V. Edmonds and Caroline Theoharides (2020). *Child Labor and Economic Development Handbook of Labor, Human Resources and Population*.
- UNICEF (United Nations Children's Fund) *Children's Report 2020*.
- Dwibedi, and Marjit. (2015). *Relative Affluence and Child Labor - Explaining a Paradox*. Centre for Studies in Social Sciences. Calcutta 28 August.
- Francesco Burchi. (2012). *Whose education affects a child's nutritional status? From parents' to household's education*. *Demographic Research*. Volume 27, Article 23 Research Article.
- CogillBruce. (2003). *Food and Nutrition Technical Assistance. Project, Academy for Educational Development, Washington, D.C.*
- Braveman, Paula, and Laura Gottlieb. (2014). *The social determinants of health: it's time to consider the causes of the causes*. *Public health reports (Washington, D.C. 1974)*. vol. 129: 19-31.
- Toggero, P., Mangiaterra V., Bustreo F., & Rosati F. (2007). *The health impact of child labor in developing countries: evidence from cross-country data*. *Pub Med. Publications*.
- Awe A.A & Rufus Ojo O. (2012). "Determinants of Income Distribution in the Nigerian Economy: 1977-2005." *International Business and Management*. Vol. 5(1). PP. 126-137.
- Alayande S.A. (2018). *Why Segregating Cointegration Tests?* *American Journal of Applied Mathematics and Statistics*. Vol. 6(4). Pg 121-125.

