THE INTERNATIONAL JOURNAL OF HUMANITIES & SOCIAL STUDIES

Education and Adolescent Fertility: A Multilevel Cross-Sectional Analysis

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Abstract:
The steady decline in global adolescent fertility rate masks poor performance in many countries and regions. High levels of adolescent fertility rate still persist in many Sub-Saharan Africa countries. This study examines the effects of education on adolescent fertility across regions and over selected periods of time. The main objective of the study is to ascertain if the effect of education on adolescent fertility varies with regions and time. The simple econometric analysis conducted using global, SSA and OECD countries' data in 2000, 2010 and 2014, revealed remarkable results. The three data sets employed shows different but consistent effects of education on adolescent fertility over the three different periods. Education had a negative and significant effect on adolescent fertility in all the estimations. However, the effect of education was found to be highest in Sub-Saharan Africa region. In view of the fact that female secondary education is still very low in the region, policies that promote girl child education up to secondary school level will go a long way in addressing the challenge of high adolescent fertility rate in Sub-Sahara Africa.

Keywords: *Adolescent fertility, education, government policy.*
JEL Classification: J13, I25, I28

1. Introduction

In the past five decades adolescent fertility rate (AFR) declined by almost 50 per cent globally - from 87/1000 in 1960 to 45/1000 in 2014 (World Bank, WDI, 2016). However, large variations exist when country-specific cases are considered. During this period, some countries experienced substantial reduction in AFR; others experienced minima / moderate reduction while AFR actually increased in some countries. In 1960, nine countries had AFR of at least 200/1000 while countries like
Japan and Democratic People's Republic of Korea had 4 and 8/1000 respectively. In 2014, twenty three countries still have AFR greater than 100/1000; the worst case being Niger with 204/1000. It is interesting to note that all these countries are in Sub–Saharan Africa (SSA). Twenty two countries across the world achieved at least 100 points decline in their AFR between 1960 and 2014. Top among these countries is Maldives; whose AFR declined from 206/1000 in 1960 to just 7/1000 in 2014. At the other extreme, some countries' AFR increased rather than decreased. For instance, Somalia's AFR increased from 55/1000 in 1960 to 105/1000 in 2014. It is argued in the literature that higher levels of education are associated with a lower probability of giving birth. The reasoning is that adolescent girls delay childbearing in order to complete their formal education. However, some countries that have improved their education status still have high levels of adolescent fertility rate. Does the effect of education on adolescent fertility vary with time and region? This paper examines the effect of education on adolescent fertility across regions and economic groups over a range of time periods.

2. Literature Review

The effects of socioeconomic, cultural and other factors on adolescent fertility have been investigated by researchers in the past. Mwaba (2000) found that adolescent pregnancy is more common amongst people who are financially disadvantaged. He asserts that their financial status adversely affects their level of education which in turn hampers job security in the labour market. Schultz (2008) found the place of residence to be associated with women's fertility behaviour. On the other hand, differential patterns in reproductive behavior that are not readily explained by socioeconomic and cultural variables can often be attributed to ideational differences such

as mass media which is believed to play a significant role in promoting social change with respect to attitudes about adolescent fertility and reproductive behaviors.

The theoretical link between education and adolescent fertility is that it improves their overall economic and social status, which greatly influences the number and spacing of children desired and eventually attained. Formal education also goes a long way in overcoming the challenges posed by cultural values. Several empirical studies have corroborated this notion. Singh (1998) hypothesized that young girls living in urban areas may have greater motivation to attain higher education and to work for wages, as well as a greater availability of work opportunities, and thus, are less likely to have teenage pregnancy compared to their rural counterparts. A study based Bangladesh supports this hypothesis and suggest that early childbearing among teenagers is less common among urban residents than rural residents. Other non-economic factors of adolescent fertility rate as noted by Pregnant Teen Help (2012), explains the dynamic nature of fertility due to age at first birth, teenage pregnancy and motherhood, birth intervals, children overborn, age at first sexual intercourse, postpartum amenorrhea, abstinence and insusceptibility.

David (1994) examines the correlation between Teenage Fertility and High School completion using Multinomial Logit Analysis. He found that decisions individuals make as teenagers have important consequences later in life. Aligning to his study, two significant decisions could be said to confront teenage women: whether to complete a high school education or whether to become a parent. He argues that women who fail to complete high school face diminished employment prospects as adults and run an increased risk of being impoverished. Nicholas *et al* (2016) examines School-Based Interventions Going Beyond Health Education to Promote Adolescent Health: Using qualitative analyses, they found that multicomponent school-based interventions, for example, including school policy changes, parent involvement, and work with local communities, are effective for promoting sexual health and preventing bullying and smoking. Economic incentives to keep girls in school can reduce teenage pregnancies. They concluded that from evidence that various whole-school health interventions are effective in preventing teenage pregnancy.

Previous studies on the effect of education on adolescent fertility rate laid emphasis on the impact of teenage child bearing on educational outcome, determinants of adolescent fertility on the level of education, the correlation between teenage fertility and high school completion among others. Few studies have actually examined the effect of education on adolescent fertility. More so, these studies failed to test the consistency of the results obtained across regions and time.

3. Methodology

Theories that relate education to adolescent fertility in particular and sustainable development in general abound. Among these are Caldwell (1980), Rihani (2006) and the Microeconomic Household Theory of Fertility.Caldwell (1980) posits that people behave rationally; that reproductive behavior in particular is economically rational within bounds set for the individual 'by biology and psychology'. There exist essentially two types of society, in Caldwell's view; one of stable high fertility where there is no net economic gain to the family (or its decision-maker) from lowering fertility and the other society where economic factors imply the undesirability of childbearing. In the former society, children provide their parents, over their lifetime, with more economic resources than they receive, and in the latter society children receive resources from their parents, on balance. When this cumulative flow of resources between generations, which Caldwell awkwardly designates the "wealth flow," changes direction from the regime which favours parents to that which transfers resources to children, parents lose the key incentive to have children, and fertility falls to a low level. Caldwell argues that this reversal in the direction of intergenerational transfers within the family is associated with mass education, shift in employment opportunities from family production to wage labor markets, and the cultural influence of Western ideas on the family, all of which have the effect of equalizing consumption among family members and weakening the moral obligations of individuals to the traditional extended family, the broader kinship system, and the local community or tribal unit.

The Microeconomic Household Theory of Fertility used household and consumer behaviour of economics and optimization to explain family size decisions. The conventional theory states that an individual with a given taste will choose to consume based on its utility function and given its budget constraint. In family size theory children are considered a special kind of consumption good so that fertility becomes a rational economic response to the family's demand for children relative to other goods showing direct relationship between children and income (which doesn't apply to some poor societies). In developing countries children are seen partly as economic investment goods, with expected return from child labour and financial support for parents at old age.

In addition to the benefits of education on female adolescent, the Sustainable Development Goals (Goal 4) aimed at educating women especially, adolescent female. The presence of secondary schools increase primary enrollment and completion, and improves quality via greater parental involvement. Girls' secondary education results in social benefits to the whole society such as increased civic and political participation, lowered levels of sexual harassment, and reduced sexual and labor trafficking of young women. Girls' secondary education is associated with a multitude of health benefits in addition to those associated with delayed marriage and fertility: decreased infant and child mortality, higher immunization rates, improved household nutrition, and lower rates of domestic violence (United Nations SDGs, 2015).Girls' secondary education can mitigate HIV and AIDS by offering information on ways to prevent HIV and encouraging future-oriented thinking and self-protective behavior. Numerous studies link higher education levels with delayed sexual initiation and reduced risk of HIV. Girls' secondary education is a tool for poverty alleviation. Increasing the percentage of women with secondary education boosts national per capita income growth.

Rihani (2006) describes the "vicious cycle" of low participation of girls in secondary education followed by early childbearing, high infant and child mortality, an inability to break out of poverty, and early marriage and childbearing in the next generation. The "virtuous cycle," however, changes the pattern through high secondary school participation, later marriage and childbearing, fewer and healthier children, greater civic participation, and a greater likelihood of sending daughters to secondary school (an intergenerational benefit).

3.1. Model Specification

In view of the theories highlighted above, a single variable approach to explain the vital role of education on adolescent fertility rate is implicitly expressed as:

AFR = f (EDU) …… (1)

Where:

AFR: Adolescent Fertility Rates.

EDU: Education (Gross Enrolment Ratio, Upper secondary, female (%))

Equation (1) above can be specified in econometrics form:

$AFR_i = \beta_o + \beta_1 EDU_i + U_i$ …… *(2)*

Where: i: the ith country; β_o: *the Intercept;* β_1: the slope. i.e., the coefficient of Education

U: the disturbance term which captures other exogenous variables apart from education which affects adolescent fertility rates that are not explicitly specified in the model?

A priori expectation:

$\beta_1: \frac{\delta AFR}{\delta EDU} < O$

The model is estimated using Econometric Views (E-views, version 7). Data is adopted from the World Development Indicators (WDI) of the World Bank and the United Nations Educational, Scientific, and Cultural Organization (UNESCO).

The ordinary least squares (OLS) method is used to estimate the parameters of the model. The estimation of the model was conducted on three broad classifications of countries these are:

1. At global level: this covers all countries of the world that have data relevant to this study.
2. The Sub-Saharan (SSA) countries
3. The Organization for Economic Cooperation and Development (OECD) countries.

The estimation was conducted over three distinct periods 2000, 2010, 2014 relative to the beginning, the middle and end of the MDG timeline.

4. Results

This section addresses adolescent fertility presented for three distinct groups of countries: at Global level, Organization for Economic Co-operation and Development (OECD) and Sub- Saharan Africa (SSA) estimated over three periods: 2000, 2010 and 2014. The summary of the results is shown below:

Year	Group / Region	Coefficient	t-Statistics	P-value	R^2/Adjusted R^2
2000	Global	-0.710625	-10.20598**	0.0000	0.444829 / 0.440558
	Sub-Saharan Africa	-1.144589	-2.887682*	0.0073	0.223326 / 0.196544
	OECD	-0.135228	-2.14*	0.0415	0.145 / 0.1134
2010	Global	-0.864921	-11.45864**	0.0000	0.500573 / 0.496760
	Sub-Saharan Africa	-1.064275	-2.665278*	0.0145	0.252768 / 0.217185
	OECD	-0.245	-2.027*	0.0526	0.132 / 0.0999
2014	Global	-0.752971	-9.298504**	0.0000	0.492768 / 0.487069
	Sub-Saharan Africa	-1.136983	-2.769132*	0.0126	0.298740 / 0.259781
	OECD	-0.2118	-2.177*	0.047	0.2529 / 0.1995

Table 1: Summary of Regression Results
Source: Author's Computation using E-views
*Note: * *Significant at 1% level: * Significant at 5% level*

Education conformed to a priori expectation across all regions and time. This shows that irrespective of time and space, education has an adverse effect on adolescent fertility rate. At the global level, all three coefficients were statistically significant at 1 per cent, while this is true at 5 per cent for the other two groups. An examination of the coefficient of determination (R^2) reveals that the model explains over 40 per cent of the systematic variation in adolescent fertility in the three periods when global data was employed. In 2000 R^2 for global estimate was 44 per cent. This increased to 50 per cent in 2010 and decreased slightly to 49 per cent in 2014. In SSA countries, R^2 increased from 22 per cent in 2000 to 25 per cent in 2010 and further to 29 per cent in 2014. In OECD countries R^2 decreased from 14 per cent in 2000 to 13 per cent in 2010 and rose again to 25 per cent in 2014.

The summary of the result suggests that the relevance of education in reducing adolescent fertility rate increases with time. The result also shows that education explains a larger proportion of changes in adolescent fertility in SSA countries than in OECD countries. In terms of the effect of education on AFR, the results shows that on the average, a one unit increase in female enrolment rate in secondary reduces adolescent fertility rate by 0.76, 1.1 and 0,2/1000 at the global level, SSA and OPEC countries respectively. In conclusion, adolescent fertility rate still responds to female education in SSA. Thus, policy measures that promote female education will invariably ensure the reduction in adolescent fertility in the region.

5. Conclusion

High level of adolescent fertility in an economy has numerous consequences for sustainable development. These problems documented in McDevitt (1995), include higher risk of both maternal and child mortality, low birth weight, as well as prematurity; discontinued education and subsequent reduction in employment opportunity and career choices later in life; societal ostracism; and possibility for higher fertility rate. Previous empirical studies found female education to have a significant and negative effect on adolescent fertility. This study extended the literature by examining the effect of education on adolescent fertility across different regions and time period. The results show that there is no marked difference on the effect of education on adolescent fertility across the different regions investigated. However, the effect was strongest among in SSA compared to OECD countries. The implication of this is that governments of SSA countries should place more emphasis on female secondary school education. Currently, female secondary gross enrolment ratio in SSA stands at 39.5 per cent. The benefits to derive from this are enormous as highlighted in the study.

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