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Fertility and Maternal Labour Participation in Developing Countries: Evidence from Nigeria

Ovikuomagbe Oyedele

Department of Economics, Babcock University, Ilishan, Ogun State, Nigeria.

ABSTRACT

High fertility levels as is the case in Nigeria, has negative implications on women's health due to the health risks it poses. Several studies have shown that labour participation could reduce fertility. This paper examined the relationship between fertility and maternal labor participation in Nigeria. Despite the negative fertility-employment relationship established in Western countries, arguments for the case of developing countries exist. Estimating a simultaneous equation model using a two-stage estimation method, fertility and maternal labor participation were found to have a bicausal relationship. A negative relationship was seen to exist which supported the incompatibility hypothesis in both formal and informal sectors of urban and rural locations only when the effect of maternal labor participation on fertility is considered. However, when the effect of fertility on maternal labor participation is examined, the negative relationship was only consistent in the rural informal sector. A positive relationship was obtained in the formal sector of both urban and rural locations. Thus whether some compatibility or incompatibility exist in the relationship, depends on the direction of causality.

Keywords: Number of children ever born, labour participation, mothers, relationship.

INTRODUCTION

The relationship between the number of children a woman has and her decision to work is a pertinent topic for consideration in developing countries especially in Nigeria where fertility levels are relatively high and labor participation of mothers is still low. Nigeria's total fertility rate (TFR) in 2013 was 5.6 births per woman, which places her as the third highest in West Africa. [1] Female labor participation rate (%) in Nigeria was 39 in 1990, 42 in 1995, 45 in 2000, 48 from 2004 to 2012, and 49 in 2013. [2] The female labor force participation rate experienced a minimal but consistent yearly increase from 1990 until 2009, when a decline was recorded. [3] It rose from 34.5 per cent in 1990 to 37 per cent in 1995 and 40.1 per cent in 2000 and further to 43.4 in 2004. It however declined to 43.0 in 2009 and further declined to 42.8

per cent in 2010 and 2011. It is always lower than the male labor force participation rate.

High fertility poses health challenges to women since they tend to have short birth interval. Low maternal labor participation ultimately reduces the total labor force output and hence per capita welfare. Whilst the participation of women in the labor force could influence the number of children she decides to have, the number of children she has can also determine whether she works or not. A working woman has less time available for child care; however she enjoys increased household income by working. Therefore though there could be a trade off with respect to time allocation, the level of compatibility of both variables would determine whether this trade off exists. There are contradictions and inconsistencies reported by studies on the

relationship between fertility and maternal labor participation. While a negative relationship showing an incompatibility is mostly seen in developed or western countries, it is not consistent in the case for developing countries. Unlike the west, some labor force activities are compatible with childcare and there is substantial availability of parental surrogates. [4] High fertility reduces the participation of women in the labor force as a result of their trade-off relationship [5,6] however, it could also increase the labor participation of mothers, especially in developing countries where the compatibility of work and childbearing is higher in rural areas or in the informal sector. [7]

Other studies have shown a positive effect due to the availability of surrogate parenting from relatives and friends and from hiring the labor of childcare givers. [8-10] Most studies some of which have been mentioned above examined the relationship between maternal labor force participation and fertility with a focus only on employed women in the formal and informal sectors as well as those unemployed. This study takes a broader look by including the case for women who are outside the labor force and thus are not working nor searching for a job. From the literature, a positive relationship was observed in rural agricultural areas where fertility is usually high and a negative relationship in urban industrial areas and nations. [11] It was identified that a closely-knit extended family that could depend on each other and elderly relatives for childcare and a low cost of the domestic labor needed to provide substitute childcare are two conditions under which fertility is least likely to constrain women's work activities. [12] Arguing for the Case of Developing Countries, economic theories for industrialized societies have observed a negative relationship between women employment and fertility [13,14] but there have been criticisms about such Western theories and their applications to the realities of the African society. Some deviations from the negative association

between fertility and maternal labor participation have revealed the peculiarity of African societies such that women's market activities might not necessarily reduce their time for childcare. Two reasons for the non-consistent negative impact of women employment on fertility in Africa compared to Western countries to include the extended organization of an African family which provides mothers with child rearing alternatives, thereby reducing the costs associated with children of working mothers and the patriarchal structure of most African societies such that women have little contributions to decisions on the number of children while husbands and or their relatives have greater contributions. [9]

It has also been argued that an inverse relationship exists between the number of children and the working hours of a woman in developed nations and the industrial sectors of some developing countries but in the Third World, her work is often unrelated to her fertility or is positively related to it. [4] The first reason for this is that the organization of production in the rural Third World is kin and household-based and such jobs do not necessarily restrict closeness to their children, thus they enjoy proximity to their children while they work and greater flexibility of scheduling work than women in the industrial sector. Second, there is a greater availability of parental surrogates, for instance, servants and extended family members, usually female that provide inexpensive and reliable babysitting support than is seen in Western countries.

MATERIALS AND METHODS
Theoretical Framework
The theoretical framework employed in this study is the New Home Economics Model, derived from Becker (1965) theory of the allocation of time, which examines the role of female employment and wages on fertility.

The main assumption of the theory is that children are like consumer durable goods from which parents consume a flow

of services. The family is attempting to achieve numerous consumption goals with limited resources and parents compare their utility derived from children with that from other goods. The services of children and the parents' standard of living are assumed to be non market commodities produced within the home, with the inputs of the wife's time and market goods according to household production functions, whose properties are determined by the state of technology.

The model begins with a lifetime utility function, in which a number of children, N, and standard of living S, appear as arguments subject to resource constraints, which include the prices or the costs of production of the arguments.

$$U*(C, S) = U*(\Psi N, S) = U (N, S) \quad \dots (1)$$

The lifetime utility approach of this model implies that given the optimal level of production of N and S, the expected lifetime level of the utility is maximized subject to budget and time constraints. To generate a testable hypothesis, it is assumed that the production of children is relatively female time intensive and a negative relationship exists between number of children and female opportunity wage rates. The major implication of the model is that because of the high value of female time, families will substitute fewer high quality children (those who have embodied more human capital such as education) for a large number of low quality children.

The Becker (1965) theory of the allocation of time posits that an individuals' total time is shared between work (labor force participation) and other activities including fertility such that as more time is spent on fertility activities of childbearing and childcare, less time is allocated for work. Thus, a negative relationship exists between labor participation and fertility, thus revealing their incompatibility.

There are arguments that the negative effect of labor participation on fertility which obtains in Western and industrialized countries characterized by larger formal sector labor activities does not necessarily apply in developing countries and African societies. This is because developing countries and African societies of which Nigeria is one are usually characterized by large informal sector labor activities and rural agrarian societies in which sometimes, the workplace and home are not distinctly separated so that childcare and work can be simultaneously carried out. [4] Also, there are no restrictions as to the presence of children in the workplace in rural or agricultural communities. [10] There are also situations of women who do not work but are housewives or dependants. The extended family strong ties also account for various childcare support which could increase women's work time while at the same time encourage increased childbirth. [9,15,4]

These arguments explain the inconsistency of the negative fertility-employment relationship and the no relationship or positive relationship obtained in some developing country studies. [7,16,9,10,4] Thus, the study extends the Becker model to include the informal labour market and non-working women outside the labor force. Following an extension of the theory of time allocation as seen in the literature [17] to apply to the case for developing countries, this study extends the model by including some choice variables available to households in developing countries that may not be readily available in industrialized countries. One of such variable is the household size used as a proxy for the presence of surrogate mothers in the form of relatives, older children or paid domestic helpers which altogether increase the number of household members. The other variables are various measures of maternal labor participation, intended to modify the assumption that labor force activities are totally incompatible with fertility. This is because in developing African countries, a large portion of the female labor force is employed in the informal sector characterized by little or no restrictions as to the presence of children in the workplace, and a substantial number are also not

working as a result of the high level of unemployment while others are not working probably due to cultural norms, personal decision or spouse decision and are therefore, out of the labor force. Thus the maternal labor participation variable is presented in the model to capture not only women in the labor force (employed and unemployed) in the formal and informal sectors, but also women who are out of the labor force.

Model Specification

This study mainly examines the interrelationship among fertility, child mortality and maternal labor participation. Thus, the estimated model takes a simultaneous equation form as presented in equation (2).

$$Y_1 = \delta_f Y_2 + \delta_f X_{f} + \varepsilon_f \qquad (a)$$
$$Y_2 = \delta_m Y_1 + \delta_m X_{m} + \varepsilon_m \qquad (c) \qquad \dots (2)$$

Where: equation (a) represents the fertility equation; (b) is the maternal labor participation equation. Fertility (Y_1) is a function of maternal labor participation (Y_2) and the exogenous variables (X_f); ε_f is the error term. An equation (b) is defined along the same lines. In the fertility equation (a), the exogenous variables (X_f) include the productive capacity of a woman's time, which depends on her education, household characteristics such as household size and residence, individual characteristics such as age, religion, marital status, age at first childbirth, and household income proxied by household per capita expenditure. The exogenous variables (X_m) in the maternal labor participation equation are the number of hours of work per day, a woman's educational attainment, per capita household expenditure, individual characteristics consisting of a woman's age, and her marital status, household characteristics including area of residence and household size.

Statistical Analysis

Estimation begins with a test for endogeneity of potential endogenous variables using the Hausman test. Based on the test, the estimation technique employed is the two-stage estimation method. The two-stage estimation method for models with mixed continuous and qualitative variables was applied because the two equations estimated include continuous and qualitative variables, some of which have potential endogeneity. Endogenous variables were instrumented for and tests for relevance and validity of instruments were conducted. The two-stage method involved the ordinary least squares (OLS) and the probit methods. The first stage estimation involved estimating the reduced form equations of the endogenous explanatory variables and obtaining their predicted values. The predicted values of the endogenous explanatory variables obtained from their first stage regression were substituted for their actual values in the second stage estimations. Estimations were carried out at the national level, for rural and urban locations and for the six geopolitical zones. The Stata 12 software package was used for the analysis. Results are reported at the 5% significance level.

Data Source, Description and Statistics

This study made use of data from the 2010 Harmonised Nigeria Living Standard Survey [18] developed by the National Bureau of Statistics (NBS) and its sponsors. A total of 41,575 women within the reproductive ages of 15 and 49 with at least a child ever born were used. Fertility was measured as the number of children ever born and three measures were used for maternal labor participation including- the probability of formal sector employment, the probability of informal sector employment, and the probability of being out of the labor force.

The three measures enabled the inclusion of all women within the labor force (employed and unemployed) and those outside the labor force such as housewives. The probability is equal to 1 if yes and 0 if otherwise. The probability of formal sector employment captures whether a woman works in a public or private enterprise. The probability of informal sector employment captures whether a woman is an own account worker/self-employed, engaged in

unpaid family work or engaged in farm work. The probability of being out of the labor force captures women outside the labor force that is, those who are not working and are not searching for work, for instance, housewives. The mean age of mothers is 32.6 at the national level. It is higher in urban than rural locations (33.9 and 32.2 respectively). The mean number of children ever born is 3.8 at the national level, 3.6 in urban and 3.82 in rural locations. This shows a higher fertility in rural than urban locations. Concerning the number of mothers participating in the labor force, 82 percent of mothers are within the labor force while 18 percent are outside the labor force. A large percentage of women work in the informal sector than the formal sector.

RESULTS

The test for endogeneity showed that fertility was endogenous only in two of the three maternal labor participation equations; when maternal labor participation is measured as the probability of being out of the labor force, fertility was not endogenous. The three maternal labor participation variables were however endogenous in the fertility equation. From the first stage regressions, the instruments were found to be relevant. They were also found to be valid since they do not have any significant effect on the dependent variable. The estimated results are presented below.

Fertility equation

The estimates of the fertility equation at the national level, by location and by geopolitical zones are presented on Tables 1 and 2 below. There is a negative effect of maternal labor participation on fertility in both the formal and informal sectors. Women who work have fewer numbers of children ever born than those who do not work and this is significant in both formal and informal sector employment. This negative effect was significant in both urban and rural locations only among formal sector employed women. In the case of women employed in

the informal sector, the negative effect is not significant among urban women. The probability of being outside the labor force has a positive significant effect on fertility such that women who decide not to work tend to have more number of children ever born than those who work. This is significant in both urban and rural locations. Thus while labor participation or a woman's decision to work significantly reduces fertility among rural women, the effect is only significant among urban women when the employment is in the formal sector. Also, despite some level of compatibility between work and childcare in rural locations, particularly in the formal sector, the fact that a woman works indeed reduces fertility. The negative effect of formal sector labor participation was significant in all zones except North East and South East geopolitical zones where the effect was positive. Informal sector labor participation maintained a significant effect only in the North Central, North East and South West zones.

The control variables included in the equation are mother's age, age at first child birth and log of household income which significantly reduced fertility; others are education, household size and cost of contraceptives, which were found to increase fertility in both urban and rural locations.

Maternal labour participation equations

1. Formal sector employment: as shown in Tables 3 and 4, the number of children ever born had a positive significant effect on the probability of a formal sector employment. Thus, a unit increase in the number of children ever born increased the probability that a woman works in the formal sector. This was significant at the national level and only among urban women. It was not significant in rural locations. It was significant in all zones except the South East and South West. Examining the control variables, an increase on the number of hours of work per day significantly increased the probability of

a formal sector employment in both urban and rural locations. This is because such increase is usually synonymous with increased earnings. This was significant in all zones except the south west. Education was found to have a positive effect only when secondary education is the least educational level attained. This was seen in both urban and rural locations. The probability of formal sector employment was higher among urban than rural women. Household size was negatively significant only among urban women in all six zones.

2. The effect of fertility on labour participation was negative in the case of the informal sector. Thus an increase in the number of children ever born reduced the probability of an informal sector employment. Thus high fertility reduced the probability that a woman works in the informal sector. This was significant in both urban and rural locations as presented in Table 5. This

was also significant in all zones except the South South and South West as seen in Table 6. Household size, secondary education and below, hours of work per day are control variables which significantly increased the probability of an informal sector employment in both urban and rural locations.

3. Probability of being out of the labour force: The estimates are presented in Tables 7 and 8. An increase in the number of children ever born significantly reduced the probability of being out of the labour force. Thus a woman has a lower probability of deciding not to work as her number of children ever born increases. However, this was only significant in rural locations and in the North East and North West zones only. The size of the household and the hours of work per day are control variables that significantly reduced the probability that a woman decides not to work.

Table 1: Estimates of the Fertility Equation at the National Level and by Location

	National	Urban	Rural
Variables			
Employment status			
Working in the formal sector	-0.699(-4.23)*	-0.671(-2.40)**	-0.840(-4.07)*
Not working in the formal sector	RC	RC	RC
Working in the informal sector	-1.212(-2.91)*	-0.236(-0.42)	-1.806(-2.83)*
Not working in the informal sector	RC	RC	RC
Out of the labour force	2.239(5.19)*	2.039(3.21)*	2.604(4.11)*
Within the labour force	RC	RC	RC
Education			
No education	RC	RC	RC
Primary education	0.705(10.18)*	0.576(5.25)*	0.790(7.99)*
Secondary education	0.816(6.11)*	0.519(2.57)*	1.050(5.47)*
Post-secondary education	0.979(2.23)**	1.372(1.91)	1.084(1.88)
Urban residence	0.177((3.06)*	-	-
Rural residence	RC	RC	RC
Religion			
Christianity	1.083(6.02)*	0.606(1.82)	1.377(5.52)*
Muslim	0.803(3.87)*	0.135(0.39)	1.152(3.77)*
Traditional	RC	RC	RC
Others	1.433(4.24)*	0.646(1.15)	1.908(4.07)*
Age	0.265(16.51)*	0.203(7.47)*	0.292(12.96)*
Age squared	-0.002(-8.53)*	-0.001(-2.87)*	-0.002(-7.25)*
Household size	1.710(40.58)*	1.829(24.53)*	1.688(30.70)
Age at first childbirth	-0.020(-1.89)	0.012(0.66)	-0.030(-2.28)**
Age at first childbirth squared	-0.002(-6.61)*	-0.002(-4.81)*	-0.002(-4.78)*
Log per capita expenditure	-0.010(-4.45)*	-0.014(-3.57)*	-0.011(-3.55)*
Marital status			
Married monogamous	-0.813(-7.39)*	0.503(-2.55)**	-0.925(-7.08)*
Married polygamous	-1.466(-5.64)*	-0.529(-1.27)	-1.950(-5.94)*
Divorced/separated/widowed	0.035(0.30)	0.589(2.78)*	-0.093(-0.64)
Single	RC	RC	RC

Continued Table 1…			
Geopolitical zone			
North-Central	0.848(-3.09)*	0.452(-1.22)	1.221(-2.90)*
North-East	-1.926(-3.25)*	-0.936(-1.14)	-2.650(-2.94)*
North-West	-1.104(-2.57)*	-0.506(-0.87)	-1.597(-2.43)**
South-East	-0.734(-2.14)**	0.057(0.12)	-1.282(-2.44)**
South-South	0.067(-0.29)	0.395(1.23)	-0.394(-1.13)
South-West	RC	RC	RC
Use of contraceptives	-0.055(-0.90)	-0.054(-0.63)	-0.076(-0.83)
Non-use of contraceptives	RC	RC	RC
Cost of contraceptives	0.000(5.96)*	0.000(3.92)*	0.000(4.67)*
Constant	-3.072(-6.33)*	-2.930(-3.78)*	-3.131(-4.66)*
R-squared	0.406	0.4693	0.3902
F-statistic(p-value)	1031.27(0.0000)	306.77(0.0000)	795.50(0.0000)
Observations	41575	9798	31777

Note: Values within parenthesis represent t-statistics where (*) and (**) represent significance at (1%) and (5%) respectively. RC denotes reference category.

Table 2: Estimates of the Fertility Equation by Geopolitical Zones

Variables	North Central	North East	North West	South East	South South	South West
Employment status						
Working in the formal sector	-0.676(-1.96)**	0.635(1.37)	-1.217(-3.52)*	0.223(0.43)	-2.017(-4.17)*	-0.695(-2.32)*
Not working in the formal sector	RC	RC	RC	RC	RC	RC
Working in the informal sector	-2.755(-3.63)*	-5.259(-5.92)*	-0.085(-0.16)	0.471(0.37)	-1.213(-1.45)	-1.304(-2.51)**
Not working in the informal sector	RC	RC	RC	RC	RC	RC
Out of the labour force	3.462(4.25)*	5.878(6.29)*	1.032(1.74)	0.869(0.63)	4.261(4.34)*	2.636(4.40)*
Within the labour force	RC	RC	RC	RC	RC	RC
Education						
No education	RC	RC	RC	RC	RC	RC
Primary education	0.698(5.34)*	1.125(7.42)*	0.983(9.24)*	0.175(0.78)	0.854(5.09)*	0.440(4.29)*
Secondary education	1.163(4.60)*	1.466(4.92)*	0.791(4.04)*	-0.238(-0.56)	1.332(4.19)*	0.655(3.45)*
Post-secondary education	0.140(0.16)	-3.167(-2.72)*	2.583(2.94)*	-0.217(-0.16)	3.726(3.13)*	0.834(1.09)
Urban residence	0.415(3.64)*	0.714(5.20)*	0.226(2.66)*	-0.337(-1.97)**	0.041(0.33)	0.060(0.76)
Rural residence	RC	RC	RC	RC	RC	RC
Religion						
Christianity	1.526(4.38)*	2.373(5.34)*	1.193(4.17)*	0.174(0.31)	1.865(4.58)*	1.219(4.49)*
Muslim	1.296(3.40)*	2.987(6.08)*	0.698(2.45)*	0.569(-0.59)	0.684(1.44)	0.916(3.29)*
Traditional	RC	RC	RC	RC	RC	RC
Others	1.785(1.90)	3.266(4.10)*	1.457(1.97)**	-0.152(-0.15)	3.068(4.33)*	1.363(2.13)**
Age	0.334(10.56)*	0.391(11.68)*	0.226(8.98)*	0.160(3.04)*	0.265(6.90)*	0.260(9.37)*
Age squared	-0.003(-6.13)*	-0.003(-7.64)*	-0.001(-3.22)*	-0.001(-1.08)	-0.001(-2.95)*	-0.002(-4.92)*
Household size	1.598(17.41)*	2.022(20.62)*	1.565(22.23)*	2.204(15.64)*	2.004(18.71)*	1.399(18.17)*
Age at first childbirth	0.022(0.94)	-0.010(-0.40)	-0.046(-1.98)**	-0.009(-0.31)	-0.042(-1.79)	0.070(3.43)*
Age at first childbirth squared	-0.003(-5.53)*	-0.002(-3.28)*	-0.001(-2.19)**	-0.002(-2.90)*	-0.001(-1.60)	-0.004(-7.23)*
Log per capita expenditure	-0.020(-4.36)*	-0.022(-4.07)*	-0.007(-1.57)	-0.000(-0.05)	-0.016(-2.63)*	-0.014(-3.59)*
Marital status						
Married monogamous	-0.039(-0.14)	-1.390(-4.45)*	-1.534(-7.17)*	-0.187(-0.43)	-0.656(-2.99)*	-0.001(-0.01)
Married polygamous	-1.290(-1.88)	-4.222(-6.94)*	-3.403(-6.49)*	0.601(0.92)	-1.708(-2.87)*	-0.238(-0.62)
Divorced/Separated/ Widowed	0.937(3.08)*	-0.706(-2.10)**	-1.036(-4.72)*	0.485(1.00)	1.225(4.83)*	0.913(4.17)*
Single	RC	RC	RC	RC	RC	RC
Use of contraceptives	-0.239(-2.07)**	-0.778(-5.22)*	-0.121(-1.18)	0.407(2.04)**	-0.322(-2.34)*	0.057(-0.71)
Non-use of contraceptives	RC	RC	RC	RC	RC	RC
Cost of contraceptives	0.000(4.03)*	0.000(3.56)*	0.000(2.83)*	0.000(0.34)	0.000(5.03)*	0.000(4.96)*
Constant	-4.998(-6.34)*	-5.231(-4.63)*	-4.231(-6.38)*	-1.413(-1.19)	-3.801(-3.68)*	-3.534(-4.50)*
R –squared	0.4551	0.417	0.3528	0.44	0.4381	0.4849
F-statistic(p-value)	312.70(0.0000)	267.30(0.0000)	300.80(0.0000)	141.40(0.0000)	190.37(0.0000)	252.14(0.0000)
Observations	7516	7364	12473	3708	4954	5560

Note: Values within parenthesis represent t-statistics where (*) and (**) represent significance at (1%) and (5%) respectively. RC denotes reference category.

Table 3: Marginal Effects Estimates of the Probability of Labour Participation in the Formal Sector at the National Level and by Location

Variables	National	Urban	Rural
Number of children ever born	0.027(2.38)**	0.091(2.62)*	0.009(0.78)
Hours of work per day	0.004(15.60)*	0.007(8.95)*	0.003(12.57)*
Education			
No education	RC	RC	RC
Primary education	0.001(0.24)	-0.009(-0.55)	0.005(0.95)
Secondary education	0.073(17.00)	0.097(8.04)*	0.069(14.97)*
Post secondary education	0.573(37.26)*	0.626(21.78)*	0.564(29.19)*
Urban residence	0.028(9.61)*	-	-
Rural residence	RC	RC	RC
Age	-0.004(-1.98)**	-0.012(-1.87)	-0.001(-0.61)
Age squared	0.000(1.48)	0.000(0.94)	0.000(0.69)
Household size	-0.051(-2.71)*	-0.160(-2.86)*	-0.019(-0.99)
Per capita expenditure	-0.000(-0.76)	-0.000(-0.19)	-0.000(-0.81)

Continued Table 3…			
North-Central	0.007(1.41)	0.033(2.23)**	0.001(0.12)
North-East	0.006(0.63)	-0.006(-0.19)	0.012(1.09)
North-West	0.027(2.60)*	-0.020(-0.73)	0.035(3.13)*
South-East	0.004(0.65)	0.009(0.55)	0.001(0.18)
South-South	0.016(2.18)**	0.006(0.34)	0.017(2.05)**
South west	RC	RC	RC
Pseudo R –squared	0.2486	0.2526	0.2058
Wald Chi2(prob-chi2)	5066.42(0.0000)	1817.07(0.0000)	2573.10(0.0000)
Observations	41575	9798	31777

Note: Values within parenthesis represent z-statistics where (*) and (**) represent significance at (1%) and (5%) respectively. RC denotes reference category.

Table 4: Marginal Effects Estimates of the Probability of Labour Participation in the Formal Sector by Geopolitical Zones

Variables	North central	North east	North west	South east	South south	South west
Number of children ever born	0.058(2.41)**	0.042(2.01)**	-0.067(-2.05)**	-0.031(-0.71)	0.072(2.18)**	0.048(1.19)
Hours of work per day	0.003(5.47)*	0.002(5.12)*	0.005(11.10)*	0.007(6.52)*	0.007(7.65)*	0.001(0.47)
Education						
No education	RC	RC	RC	RC	RC	RC
Primary education	-0.000(-0.02)	-0.010(-1.12)	0.043(2.48)**	0.051(2.09)**	-0.055(-3.18)*	0.006(0.28)
Secondary education	0.081(9.08)*	0.087(9.27)*	0.052(6.09)*	0.122(5.21)*	0.043(2.93)*	0.083(5.38)*
Post-secondary education	0.765(17.38)*	0.618(14.85)*	0.272(8.04)*	0.556(9.96)*	0.517(13.87)*	0.619(14.67)*
Urban residence	0.038(6.42)*	0.028(4.13)*	0.003(0.50)	0.049(4.55)*	0.051(4.67)*	0.027(3.06)*
Rural residence	RC	RC	RC	RC	RC	RC
Age	-0.006(-1.34)	-0.009(-2.69)*	0.010(1.90)	0.000(0.00)	-0.003(-0.57)	-0.006(-0.82)
Age squared	-0.000(-0.01)	0.000(2.46)**	-0.000(-0.75)	0.000(0.92)	-0.000(-0.82)	0.000(0.50)
Household size	-0.105(-2.66)*	-0.067(-1.93)	0.110(2.04)**	0.060(0.84)	-0.133(-2.48)*	-0.088(-1.34)
Per capita expenditure	0.000(1.72)	0.001(2.01)**	-0.001(-1.48)	-0.001(-1.68)	-0.000(-0.20)	-0.001(-1.79)
Pseudo R –squared	0.4033	0.231	0.1142	0.2477	0.2012	0.2829
Wald Chi2(prob-chi2)	1151.57(0.0000)	571.31(0.0000)	606.85(0.0000)	554.08(0.0000)	682.11(0.0000)	1055.74(0.0000)
Observations	7516	7364	12473	3708	4954	5560

Note: Values within parenthesis represent z-statistics where (*) and (**) represent significance at (1%) and (5%) respectively. RC denotes reference category.

Table 5: Marginal Effects Estimates of the Probability of Labour Participation in the Informal Sector at the National Level and by Location

Variables	National	Urban	Rural
Number of children ever born	-0.319(-9.93)*	-0.232(-4.18)*	-0.355(-8.99)*
Hours of work per day	0.023(33.65)*	0.032(22.16)*	0.020(25.52)*
Education			
No education	RC	RC	RC
Primary education	0.089(6.69)*	0.117(4.89)*	0.090(5.65)*
Secondary education	0.043(5.1)*	0.044(2.90)*	0.046(4.57)*
Post secondary education	-0.378(-23.92)*	-0.448(-15.65)*	-0.308(-14.48)*
Urban residence	0.103(14.90)*		
Rural residence	RC	RC	RC
Age	0.059(10.83)*	0.053(5.33)*	0.063(9.65)*
Age squared	-0.000(-8.30)*	-0.000(-4.59)*	-0.000(-7.48)*
Household size	0.517(9.74)*	0.395(4.33)*	0.576(8.80)*
Per capita expenditure	0.000(0.23)	0.000(0.34)	0.000(0.22)
North-Central	-0.038(-2.83)*	-0.085(-3.70)*	0.038(2.16)**
North-East	0.098(3.79)*	-0.028(-0.57)	0.190(5.93)*
North-West	0.198(7.96)*	0.024(0.56)	0.296(9.62)*
South-East	-0.236(-16.29)*	-0.235(-8.81)*	-0.183(-9.74)*
South-South	-0.127(-7.12)*	-0.107(-3.35)*	-0.067(-2.96)*
South west	RC	RC	RC
Pseudo R –squared	0.0657	0.1487	0.0428
Wald Chi2(prob-chi2)	3412.43(0.0000)	1527.96(0.0000)	1718.06(0.0000)
Observations	41575	9798	31777

Note: Values within parenthesis represent z-statistics where (*) and (**) represent significance at (1%) and (5%) respectively. RC denotes reference category.

Table 6: Marginal Effects Estimates of the Probability of Labour Participation in the Informal Sector by Geopolitical Zones

Variables	North central	North east	North west	South east	South south	South west
Number of children ever born	-0.389(-4.38)*	-0.581(-5.32)*	-0.763(-9.04)*	-0.223(-2.77)*	-0.085(-1.38)	0.015(0.22)
Hours of work per day	0.018(10.85)*	0.017(10.86)*	0.029(21.65)*	0.029(13.41)*	0.017(10.13)*	0.032(15.69)*
Education						
No education	RC	RC	RC	RC	RC	RC
Primary education	0.115(3.45)*	0.114(2.64)*	0.206(6.28)*	0.187(5.04)*	0.120(3.94)*	0.128(4.63)*
Secondary education	-0.011(-0.58)	-0.110(-4.80)*	-0.051(-2.54)*	0.235(8.11)*	0.188(7.91)*	0.157(9.16)*
Post-secondary education	-0.450(-11.94)*	-0.369(-7.68)*	-0.448(-11.57)*	-0.115(-2.45)**	-0.128(-3.30)*	-0.288(-7.40)*
Urban residence	0.112(6.99)*	0.005(0.25)	-0.065(-4.80)*	0.180(8.65)*	0.226(12.33)*	0.206(13.81)*
Rural residence	RC	RC	RC	RC	RC	RC

Continued Table 6…					
Age	0.073(4.83)*	0.088(5.07)*	0.126(9.15)*	0.029(1.90)	0.024(2.10)**	0.006(0.45)
Age squared	-0.000(-3.91)*	-0.000(-3.09)*	-0.001(-6.47)*	-0.000(-0.60)	-0.000(-2.26)**	-0.000(-1.09)
Household size	0.602(4.11)*	1.002(5.49)*	1.243(8.87)*	0.369(2.81)*	0.098(0.97)	0.015(0.13)
Per capita expenditure	-0.001(-1.19)	0.001(1.22)	-0.000(-0.31)	-0.001(-0.38)	0.002(1.49)	0.000(0.08)
Pseudo R –squared	0.0334	0.0179	0.037	0.0985	0.0633	0.1707
Wald Chi2(prob-chi2)	309.93(0.0000)	168.80(0.0000)	545.39(0.0000)	407.57(0.0000)	384.92(0.0000)	871.37(0.0000)
Observations	7516	7364	12473	3708	4954	5560

Note: Values within parenthesis represent z-statistics where (*) and (**) represent significance at (1%) and (5%) respectively. RC denotes reference category.

Table 7: Marginal Effects Estimates of the Probability of Being Out of the Labour Force at the National Level and by Location

Variables	National	Urban	Rural
Number of children ever born	-0.004(-3.77)*	0.001(0.64)	-0.005(-4.44)*
Hours of work per day	-0.023(-40.19)*	-0.022(-21.50)*	-0.023(-34.07)*
Education			
No education	RC	RC	RC
Primary education	-0.016(-3.27)*	0.006(0.63)	-0.024(-4.21)*
Secondary education	-0.006(-1.10)	-0.003(-0.44)	-0.005(-0.62)
Post secondary education	-0.037(-4.22)*	-0.020(-1.88)	-0.043(-3.05)*
Urban residence	0.012(2.60)*		
Rural residence	RC	RC	RC
Age	0.004(2.51)**	0.001(0.25)	0.005(2.29)**
Age squared	-0.000(-2.49)**	-0.000(-0.81)	-0.000(-1.99)**
Household size	-0.027(-5.65)*	-0.035(-3.84)*	-0.024(-4.28)*
Per capita expenditure	0.001(2.27)**	0.001(1.01)	0.001(1.99)**
Marital status			
Married monogamous	0.054(3.34)*	0.068(2.78)*	0.047(2.36)**
Married polygamous	0.152(2.77)*	0.228(2.26)**	0.130(2.01)**
Divorced/separated/widowed	-0.008(-0.35)	0.048(1.18)	-0.026(-1.03)
Single	RC	RC	RC
North-Central	0.042(5.29)*	0.019(1.74)	0.071(5.64)*
North-East	0.173(18.49)*	0.121(7.43)*	0.212(15.07)*
North-West	0.056(7.15)*	0.031(2.73)*	0.087(7.07)*
South-East	-0.006(-0.70)	-0.065(-5.55)*	0.038(2.63)*
South-South	-0.038(-4.47)*	-0.049(-4.15)*	-0.015(-1.11)
South west	RC	RC	RC
Pseudo R –squared	0.1379	0.1819	0.127
Wald Chi2(prob-chi2)	3670.85(0.0000)	1069.92(0.0000)	2648.97(0.0000)
Observations	41575	9798	31777

Note: Values within parenthesis represent z-statistics where (*) and (**) represent significance at (1%) and (5%) respectively. RC denotes reference category.

Table 8: Marginal Effects Estimates of the Probability of Being Out of the Labour Force by Geopolitical Zones

Variables	North central	North east	North west	South east	South south	South west
Number of children ever born	0.004(1.58)	-0.007(-2.30)**	-0.008(-4.04)*	-0.003(-1.10)	-0.003(-1.52)	0.004(1.62)
Hours of work per day	-0.025(-18.83)*	-0.026(-17.37)*	-0.036(-25.22)*	-0.009(-7.69)*	-0.005(-6.99)*	-0.016(-15.62)*
Education						
No education	RC	RC	RC	RC	RC	RC
Primary education	-0.017(-1.81)	0.069(3.93)*	-0.054(-4.54)*	-0.044(-4.42)*	-0.012(-1.28)	-0.002(-0.19)
Secondary education	-0.011(-1.03)	0.061(2.74)*	-0.013(-0.83)	-0.043(-4.19)*	-0.003(-0.31)	-0.010(-1.04)
Post-secondary education	0.020(1.06)	-0.071(-1.77)	-0.091(-3.40)*	-0.051(-4.45)*	-0.012(-1.02)	-0.014(-1.27)
Urban residence	-0.000(-0.01)	0.018(1.00)	0.037(3.35)*	-0.028(-3.49)*	0.006(0.87)	0.026(3.56)*
Rural residence	RC	RC	RC	RC	RC	RC
Age	0.008(2.00)**	0.016(2.99)*	0.005(1.22)	0.001(0.36)	-0.010(-3.73)*	-0.009(-2.53)*
Age squared	-0.000(-2.33)**	-0.000(-2.74)*	0.000(-0.90)	-0.000(-0.93)	0.000(3.20)*	0.000(2.37)*
Household size	-0.026(-2.38)*	0.015(0.98)	-0.063(-6.37)*	0.027(-2.65)*	0.007(0.89)	-0.030(-3.32)*
Per capita expenditure	0.001(1.41)	0.001(0.80)	0.000(0.47)	0.001(0.88)	0.001(1.40)	0.000(0.84)
Marital status						
Married monogamous	0.032(0.69)	0.178(3.35)*	0.089(2.61)*	0.017(0.65)	0.014(0.98)	0.050(1.64)
Married polygamous	0.002(0.02)	0.140(0.68)	0.169(1.11)	0.390(1.74)	-0.009(-0.22)	0.306(2.71)*
Divorced/separated/widowed	-0.004(-0.07)	0.035(0.41)	-0.135(-2.77)*	-0.008(-0.27)	-0.004(-0.21)	0.099(1.52)
Single	RC	RC	RC	RC	RC	RC
Pseudo R –squared	0.116	0.0498	0.0934	0.0915	0.07	0.138
Wald Chi2(prob-chi2)	386.28(0.0000)	365.21(.0000)	831.59(0.0000)	173.72(0.0000)	117.79(0.0000)	313.68(0.0000)
Observations	7516	7364	12473	3708	4954	5560

Note: Values within parenthesis represent z-statistics where (*) and (**) represent significance at (1%) and (5%) respectively. RC denotes reference category.

DISCUSSION

The relationship between fertility and maternal labour participation was bicausal. Whether the effect is negative or positive depends on the direction of causality. Labour participation in both the

formal and informal sectors was found to significantly reduce fertility. This shows that the incompatibility hypothesis is consistent in both formal and informal sectors. However while it is consistent in both urban and rural formal sector employment, it was only consistent in rural informal sector employment. Being outside the labour force significantly increased fertility. Thus a negative fertility-employment relationship was observed. This implies that as more women work, fertility levels would decline.

However, when the effect of fertility on labour participation is considered, the negative relationship and incompatibility hypothesis was only observed in the informal sector. A positive relationship was obtained in the formal sector. Despite the greater level of compatibility of work and childcare in the informal sector, high fertility was found to reduce informal sector labour participation but increase formal sector labour participation. Surprisingly, high fertility was found to reduce the probability of non-participation or being outside the labour force. This is probably due to the need for more income to meet the needs of the increasing number of household members.

CONCLUSION

While labour participation reduces fertility levels, high fertility reduces labour participation only in the informal sector but increases labour participation in the formal sector. Thus for women who had more children, it was more important to seek for financial resources particularly in the formal sector to meet the increasing needs since income is relatively higher and stable. On the other hand, for a working woman, less time was available for fertility activities. Conclusively, whether there is a positive or negative relationship and whether there exist some compatibility or not, depends on the direction of causality.

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