

# CHILD MORTALITY AND FEMALE LABOUR PARTICIPATION IN NIGERIA

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## ABSTRACT

Child mortality is an indicator of the health status of children and ultimately the population. This has economic implications through several relationships. One of such relationship is that between child mortality and female labour participation. Attempting to contribute to empirical works concerning the growing challenge of high child mortality and low female labour participation, this study examined the relationship between child mortality and female labour force participation in Nigeria. Employing a two-stage estimation method for a simultaneous equation model, a uni-directional and bi-directional relationship was obtained depending on the sector of labour force participation. The influence of education on this relationship is key. Women who work had reduced child death experience if they had at least a secondary education for the case of informal sector employment and a post secondary education for the case of formal sector employment.

**Keywords:** Child mortality, relationship, female labour participation, Nigeria, formal sector.

**JEL Classification:** J13, J21,

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## 1. Introduction

Child mortality is still a matter of great concern in West Africa and Nigeria is not an exception. It has serious implications on an economy through several ways, one of which is through its relationship with female labour participation. The greater the participation in the labour force, the more the quantity of total output. However, female productivity could be higher when such a female has less worry concerning her child's health. From the World Development Indicators (2016), in 1997, female labour participation stood at 42.92 while that of the male was 69.903. By 2007, it rose to 47.728 and 62.524 respectively. Following a slight increase, the female labour participation rate was 48.472 while that of male participation was 64.149 in 2016. The female labour participation rate is still yet to equalize or surpass that of the male and has remained below 50 percent. This is of great concern especially because the total labour force participation was still as low as 56.478, 55.203 and 56.42 in 1997, 2007 and 2016 respectively. This has implications on development since it indicates that more women contribute less to output despite their potential. Considering a few developed and developing countries, the WDI 2016 data reveal that the female labour participation rate for Canada was 60.82 in 2016, with an under-five mortality rate of 4.9 in 2015. Ghana also with a relatively higher female and male labour participation rate in 2016 of 75.603 and 78.648 respectively, has a relatively lower under-five mortality rate of 61.6 in 2015. In Niger however, a 40.296 and 89.299 female and male labour participation rate respectively in 2016 leaves them with a high under-five mortality rate of 95.5 in 2015. In South Africa, a low female labour participation rate of 46.308 and 60.624 for the male (revealing not so wide a gap), leaves them with a 40.5 under-five mortality rate. Thus, the low level of female labour supply deserves some explanation especially in a country

characterised by a high child mortality rate and where a greater burden of child care is left to women. The Infant mortality rate stood at 119.9, 90.3 and 69.4 in 1997, 2007 and 2015 while the under-five mortality rate was 201.4, 146.4 and 108.8 in 1997, 2007 and 2015 respectively (WDI 2016). This shows a high level of the number of child deaths experienced by mothers, the poor health state of most children as well as the low level of child survival in the country. This tends to have serious implication on the decision to work or not among women. Thus, whether there is really a relationship, what direction it takes and the nature of the relationship is what this study attempts to investigate. This area of focus of the paper is based on the fact that though the effect of one on the other have been examined in the literature, little emphasis has been given to analyzing their relationship especially for a developing country case. This study thus examines the relationship between child mortality and female labour participation in Nigeria using a sample of women of childbearing age with at least a child. The rest of the paper reviews some of the literature, analyzes the data employed and discusses the implications of the findings made on development policy.

## **2. Some Related Studies**

Explaining the impact of female employment and empowerment on child survival, the probability of a child dying is greater for an employed mother than for one who does not work as a result of the lack of time for childcare, especially among the poorer sections of a population (Basu and Basu, 1991). Chowdhury, Islam and Houssin (2010) found that child mortality is higher among women that work but lower among housewives. Other studies argue that infant mortality is less, if mother works, suggesting that the benefits accruing from mother's earnings outweigh any decrease in her time for childcare (Rosenzweig and Schultz, 1983).

Using the 1981 India census data, Tulasidhar (1993) explained that the impact of female labour force participation on child mortality are in two forms; first it can have an adverse effect on child health due to less than full attention from the mother and a possible denial of the benefits of breastfeeding especially in poor families where a mother has to participate in the labour market soon after delivery to increase household income. Second, a mother's work force participation has a positive effect on child nutrition and health thus reducing child mortality because it increases total household income and consequently, childcare expenditures. The study however did not consider the possibility of endogeneity

bias. On the other hand, poor child health has been found to hinder maternal labour force participation as shown by Frijters *et al.* (2009).

Some contributions on the relationship between child mortality and labour force participation of mothers showed that household income and female employment cannot be over emphasised for reductions in the number of child deaths since low levels of income which results in absolute deprivation (including lack of food and clean water) adversely affect health. As the family earns more income, the welfare of a child improves thus more expenditure on the food and healthcare of children will reduce child mortality (Eswaran, 2002). Handa (2000) found income significant among rural women but not among urban women.

On the other hand, poor child health has been found to hinder maternal labour force participation as shown by Frijters *et al.* (2009). They used data from the Longitudinal Study of Australian children for the year 2004 to examine the effect of child development on maternal labour supply. Their findings showed that poor child development decreases maternal labour force participation by approximately 10 per cent. As a result, mothers of children experiencing poor childhood development would prefer to stay back home to care for their children. They controlled for the potential endogeneity of child development with the aid of an instrumental variables method, the 2SLS method which involved the use of child handedness as an instrument. The study however was limited to less than 5,000 children aged 4 to 5. Ruhm (2000) finds a stronger negative effect of parental leave on post-neonatal and child mortality than for perinatal mortality and neonatal deaths.

Studies have shown that greater time allocations to childcare have better implications on child health than increases in income earnings due to a woman's employment. Page, Schaller and Simon (2017) found that poorer child health can be attributed to improvements in women's employment opportunities but such improvements in the case of men increases a child's health status. Another study by Schaller and Zerpa (2015) found that parental job displacement improve child health outcomes in the short run by reducing the incidence of infectious illnesses. Both studies however did not consider formal and informal sector differentials. Maternal employment was found to increase the negative health episodes of children including overnight hospitalizations, injuries and asthma episodes (Morrill, 2011).

### 3. Methodology

#### Model Specification

This study mainly examines the relationship between child mortality and maternal labour participation. The estimated model takes a simultaneous equation form as presented in equation (1).

$$Y_1 = \delta_c Y_2 + \delta_c X_c + \varepsilon_c \quad (a)$$

$$Y_2 = \delta_m Y_1 + \delta_m X_m + \varepsilon_m \quad (b) \quad (1)$$

Where: equation (a) is the child mortality equation where child mortality ( $Y_1$ ) is a function of maternal labour participation ( $Y_2$ ), and the exogenous variables ( $X_c$ );  $\varepsilon_c$  is the error term. Equations (b) is the maternal labour participation equation defined along the same lines. The exogenous variables ( $X_c$ ) in the child mortality equation include a woman's education, age, individual characteristics of the child including hospital delivery and vaccination use, household characteristics including per capita household expenditure and household size, and community and environmental characteristics including the source of drinking water and type of toilet facility, use of prenatal and postnatal care and rural-urban residence. The exogenous variables ( $X_m$ ) in the maternal labour 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.

The estimated model is the simultaneous equation model (equation 1) used to examine the relationship between child mortality and maternal labour participation. The two-stage estimation method was employed involving the ordinary least squares method and the probit method. The estimation procedure began with a test for endogeneity of child mortality and maternal labour participation. Child mortality was measured as the number of child deaths, and maternal labour participation was captured using three measures including- the probability of formal sector employment, the probability of informal sector employment, and the probability of being out of the labour force.

## Data

Data used in this study is from the Harmonised Nigeria Living Standard Survey 2010. The choice of this data is its content of demographic information as well as income or expenditure information. A sample of 41,575 women within the age of 15 to 49 and have at least a child were included in the study.

## 4. Results

The test for endogeneity was conducted using the Hausman test and in the child mortality equation, the probability of formal sector employment was found to be exogenous while the other two measures including probability of informal sector employment and the probability of being out of the labour force were endogenous. However, in the maternal labour participation equations, number of child death was exogenous in all the three measures used. The endogenous variables were therefore instrumented for and from the first stage regression of the reduced form equations of the endogenous variables, the instruments were found to be relevant. The instruments are also valid because their effect on the dependent variable is not statistically different from zero. Based on the Breusch-Pagan/Cook-Weisberg heteroskedasticity test also conducted, the presence of heteroskedasticity was revealed, thus robust standard errors were estimated.

### Child Mortality Equation

The probability of a formal sector employment had no significant effect on the number of child death. An increase in the probability that a woman works in the informal sector significantly reduces the number of child death. This was obtained at the national level and in both urban and rural areas. There is less restriction on the presence of children in informal sector jobs thus affording mothers the opportunity to spend more time on childcare even as they work. The number of child deaths significantly increases with a greater probability of a woman being out of the labour force. Thus, women who are not working and do not intend to work have a higher number of child death. This means that despite the more time available to them for child care, since they do not earn income, they could be quite incapacitated in meeting the health, food and other expenditure needs of their children. This is however insignificant among urban women. The number of child deaths increases as the household size gets larger. This is especially seen in rural areas. This means that the household resources available per person in the households decreases and this then adversely affect the health of the children. Education was significant at all levels thus, educated women have less

experience of child death than women with no education. This is as a result of the greater awareness and enlightenment that education offers and hence the more likelihood of observing health and sanitation practices that ultimately promote child health. An increase in the birth weights of children reduce the number of child deaths. This is significant among rural and not among urban women. Surprisingly, the use of flush and pit toilets still increased the number of child death than having no toilet or using a bush. Thus the emphasis should not only be on the availability of such facilities but on enabling their proper use such as the availability of water for flushing and clean maintenance.

**Table 1. Estimates for the Number of Child Death Equation**

<b>Number of Child Death</b>			
<b>Variable</b>	<b>National</b>	<b>Urban</b>	<b>Rural</b>
Probability of formal sector employment	0.029(1.35)	-0.030(-1.20)	-0.028(-0.88)
Probability of informal sector employment	-0.120(-4.09)*	-0.115(-2.49)*	-0.117(-3.18)*
Probability of being out of the labour force	0.042(2.64)*	-0.007(-0.25)	0.054(2.74)*
Household size	-0.030(-2.10)**	0.039(1.66)	-0.051(-2.96)*
No education	RC	RC	RC
Primary education	-0.126(-7.61)*	-0.160(-4.71)*	-0.119(-6.12)*
Secondary education	-0.157(-9.53)*	-0.200(-6.39)*	-0.141(-6.95)*
Post secondary education	-0.333(-8.43)*	-0.355(-5.97)*	-0.314(-5.72)*
Residence	0.061(3.53)*		
Birth weight	-0.008(-3.5)*	0.002(0.13)	-0.008(-3.03)*
Flush toilet	0.054(3.07)*	0.024(0.91)	0.068(2.77)*
Pit latrine	0.094(7.64)*	0.059(2.20)**	0.097(7.02)*
No toilet/bush	RC	RC	RC
F-Statistic(Prob F-Statistic)	37.27(0.0000)	8.62(0.0000)	27.67(0.0000)

\* and \*\* imply significance at 1% and 5% levels.

### **Child Mortality Equation with Interactions**

Interacting the three measures of maternal labour participation with education, we find that the probability of a formal sector employment becomes significant in reducing child mortality only when a woman has a post secondary education. This is significant at the national level and in rural locations. This is because she would be able to earn higher income and thus be able to increase health and other expenditures per child. An increase in the probability that a woman works in the informal sector also reduces the number of child death only if a woman has at least a secondary education. This is however obtainable in rural locations

only. An informal sector employment affords a woman more time for childcare since there is less restrictions on child presence in the workplace thereby increasing proximity. However, having at least a secondary education enhances the awareness and understanding of the need for clean and hygienic conditions around the child to promote good health. This is significant at the national level and in rural locations. The probability of being out of the labour force was insignificant.

**Table 2. Estimates for the Number of Child Death Equation with Interactions**

Number of Child Death with Interaction			
Variable	National	Urban	Rural
primary edu *formal sector employment	-0.011(-0.21)	0.007(0.08)	-0.020(-0.29)
secondary edu *formal sector employment	0.007(0.17)	-0.004(-0.12)	0.018(0.26)
post secondary edu *formal sector employment	-0.088(-2.57)*	-0.043(-1.19)	-0.146(-2.26)**
primary edu*informal sector employment	-0.020(-0.52)	0.069(0.92)	-0.017(-0.30)
Secondary edu*informal sector employment	-0.142(-3.49)*	-0.130(-1.75)	-0.190(-2.61)*
post secondary edu*informal sector employment	-0.123(-1.86)	0.045(0.46)	-0.252(-2.05)**
primary edu*probability of being out of the labour force	0.028(0.96)	0.052(1.19)	0.023(0.63)
secondary edu *probability of being out of the labour force	0.025(0.97)	0.009(0.26)	0.009(0.23)
post secondary edu *probability of being out of the labour force	0.055(1.61)	0.043(0.82)	0.061(1.09)
household size	-0.028(-1.98)*	0.038(1.61)	-0.049(-2.85)*
no education	RC	RC	RC
primary education	-0.097(-2.50)	-0.103(-1.71)	-0.100(-1.89)
secondary education	-0.118(-3.53)*	-0.122(-2.18)**	-0.145(-3.02)*
post secondary education	-0.221(-3.11)*	-0.173(-1.67)	-0.282(-1.88)
Residence	-0.085(-5.31)*		
birth weight	-0.009(-3.26)*	0.002(0.13)	-0.009(-3.31)*
flush toilet	0.066(3.67)*	0.020(0.74)	0.086(3.40)*
pit latrine	0.105(8.57)*	0.061(2.31)**	0.110(8.04)*
No toilet/bush	RC	RC	RC
F-Statistic(Prob F-Statistic)	32.50(0.0000)	6.90(0.0000)	22.46(0.0000)

### Maternal Labour Participation Equation

The ability for the number of child death to affect a woman's decision to participate in the labour force was significant only with the probability that she opts for an informal sector employment. Thus an increase in the number of child death significantly increased the probability of an informal sector employment in urban locations but reduced the probability among rural women. This is probably due to the proximity that such an employment affords to ones child (especially in rural areas) which helps increase the amount of time and attention given for the care of a child. The number of child death did not significantly explain the probability that a woman chooses to work in the formal sector or be out of the labour force. Education was significant in increasing the probability of labour participation. Having at least a secondary education increased the probability of a formal sector employment for both urban and rural women than having no education. Having at least a primary education was highly significant in reducing the probability that a woman choses to be out of the labour force than having no education. Women with at least a primary education had a lower probability of working in the informal sector than women with no education, however, this was significant at the national level and in rural locations only.

The number of hours of work per day was positively significant for both the formal and informal sector employment. Thus as women get to earn more with higher hours of work per day, it increased the probability of employment whether in the formal or informal sector and rather reduced the probability of being out of the labour force. The higher the log of per capita household expenditure, the lower the probability of being out of the labour force.

**Table 3 Marginal Estimates of the Maternal Labour Participation Equations**

<b>Probability of formal sector employment</b>			
<b>Variable</b>	<b>National</b>	<b>Urban</b>	<b>Rural</b>
Number of child death	-0.001(-1.06)	-0.004(-1.14)	-0.001(-0.57)
Urban residence	0.019(7.15)*	-	-
Rural residence	RC	-	-
No education	RC	RC	RC
Primary education	0.004(1.19)	0.10(0.88)	0.002(0.56)
secondary education	0.058(15.50)*	0.074(6.95)*	0.055(13.93)*
post secondary education	0.505(57.02)*	0.536(32.08)*	0.516(44.18)*
log of per capita household income	-0.000(-0.81)	000(0.08)	-0.000(-1.07)
hours of work per day	0.004(14.33)*	0.007(9.27)*	0.003(10.66)*
Wald Chi(2) (prob chi(2))	4987.05(0.0000)	1791.19(0.0000)	2493.29(0.0000)

<b>Probability of informal sector employment</b>			
number of child death	0.006(2.57)*	-0.011(-2.01)**	0.010(3.89)*
urban residence	0.166(26.73)*	-	-
rural residence	RC	-	-
no education	RC	RC	RC
primary education	-0.083(-13.11)*	0.050(3.54)*	-0.110(-15.68)*
secondary education	-0.016(-2.02)**	0.067(4.92)*	0.037(4.08)*
post secondary education	-0.320(-28.56)*	-0.344(-19.01)*	-0.261(-16.16)*
log of per capita household income	0.000(0.27)	-0.000(-0.06)	0.000(0.67)
hours of work per day	0.017(28.08)*	0.033(24.09)*	0.012(17.34)*
Wald Chi(2) (prob chi(2))	2080.47(0.0000)	1205.40(0.0000)	721.03(0.0000)
<b>Probability of being out of the labour force</b>			
number of child death	-0.001(-0.58)	0.004(1.02)	-0.002(-1.10)
urban residence	0.002(0.36)	-	-
rural residence	RC	-	-
no education	RC	RC	RC
primary education	-0.054(-12.06)*	-0.025(-2.88)*	-0.063(-12.01)*
secondary education	-0.046(-8.78)*	-0.038(-4.55)*	-0.046(-6.83)*
post secondary education	-0.064(-7.89)*	-0.045(-4.46)*	-0.070(-5.38)*
log of per capita household income	0.001(2.29)**	0.001(1.04)	0.001(1.94)
hours of work per day	-0.024(-45.13)*	-0.024(-24.37)*	-0.024(-37.97)*
Wald Chi(2) (prob chi(2))	2845.54(0.0000)	863.34(0.0000)	1951.37(0.0000)

\* and \*\* imply significance at 1% and 5% levels.

### The Relationship

There is a unidirectional relationship between the number of child death and the probability of formal sector employment. The fact that a woman works in the formal sector reduces her experience of child mortality only when she has a post secondary education. However, the number of child death a woman experiences does not explain her decision to work in the formal sector.

A bi-directional relationship exists between the number of child death and the probability of an informal sector employment. While increasing cases of child mortality increased the probability of informal sector employment among rural women, it reduced the probability among urban women. Working in the informal sector reduced the number of child death; however, at least a secondary school education is necessary especially in rural locations. Thus a negative relationship is seen in rural locations while a positive and no relationship obtains in urban locations.

A uni-directional and negative relationship exists between the number of child death and the probability of being out of the labour force. Being out of the labour force increased the number of child deaths, however, an increase in child mortality does not explain the probability that a woman is outside the labour force.

## 5. Conclusion

Greater efforts towards increasing labour participation among women is pertinent for child mortality reduction. Labour participation significantly reduces child mortality only among women educated beyond the primary level and the secondary level for the case of the informal and formal sector employment respectively. Education is a significant factor for enhancing child mortality reduction and increasing the labour participation of mothers. Empowering women through education and increasing their opportunities to access it is pertinent for increasing child survival.

## References

- Basu, Alaka Malwade and Kaushik Basu 1991. "Women's economic rules and child survival; the case of India." *Health Transition Review* 1, 1.
- Chowdhury, Quamrul Hasan, Rafiqul Islam and Houssin, K. 2010. "Socio-economic determinants of neonatal, post neonatal, infant and child mortality." *International Journal of Sociology and Anthropology* 2, 6: pp. 118-125.
- Eswaran, Mukesh 2002. "The Empowerment of women, fertility and child mortality: towards a theoretical analysis". *Journal of Population Economics* 15, 3 : pp. 433-454.
- Frijters, Paul, David W. Johnston, Manisha Shah and Michael A. Shields. 2009. "To work or not to work? child development and maternal labour supply". *American Economic Journal Applied Economics* 1, 3: pp. 97-110.
- Handa, Sudhanshu. 2000. "The impact of education, income and mortality on fertility in Jamaica." *World Development Review* 28, 1: pp. 173-186.
- Morrill, Melinda Sandler 2011. "The effects of maternal employment on the health of school-age children." *Journal of Health Economics*, 30, 2: pp. 240-257.
- Page, Marianne, Jessamyn Schaller and David Simon (2017) "The effects of aggregate and gender-specific labor demand Shocks on child health." *Journal of Human Resources* 0716-8045R

Rosenzweig, Mark. R. and Paul T. Schultz. 1983. "Consumer demand and household production; the relationship between fertility and child mortality". *American Economic Review* 73, 2: pp. 38-42.

Ruhm, Christopher J. 2000. "Parental leave and child health". *Journal of Health Economics* 19, pp. 931-960.

Schaller, Jessamyn, and Mariana Zerpa. 2015. "Short-run effects of parental job loss on child health." *National Bureau of Economic Research, Working Paper 21745*.

Tulasidhar, V. B. 1993. "Maternal education, female labour force participation and child mortality: evidence from the Indian census". *Health Transition Review* 3, 2: pp.177-190.

World Development Indicators 2016. The World Bank.