

Infant-Child Mortality and Maternal Employment in Nigeria

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Abstract

Recently, scholars have focused on assessing economic progress within countries via some important development indicators including infant-child mortality and maternal employment. These are in tandem with the sustainable development goals (SDGs) whose target is 2030. To model the impact of child and infant mortality on nursing mothers' employment status, the study adopted the Grossman (1972) theoretical framework while employing the Fully Modified Ordinary Least Square (FMOLS). Prior to this, some preliminary test was conducted including the descriptive statistics, correlation test, and the unit-roots test. The Johansen cointegration was utilized to ascertain whether the variables cointegrate. The outcome of the trace and maximum eigenvalue tests supports the fact that there is at minimum five cointegrating equation. Furthermore, the FMOLS test confirmed that the influence of infant mortality on mother's employment is negative, while the relationship between child mortality and mothers' employment was positive. Owing to the above, the study concluded that the contextual evidence is essential for culturally sensitive child survival interventions and programmes as well as improved women's formal employment participation which favours Nigerian child survival. Lastly, the government should provide adequate education and support for mothers in order to reduce drastically both child and infant mortality.

Key words: infant mortality, child mortality, maternal employment, household income
J.E.L. vlassification: I12, J16, J21

1. Introduction

Recently, scholars have focused on assessing economic progress within countries via some important development indicators including infant-child mortality and maternal employment. This is because the higher the record of child and infant mortality the lower the life expectancy of such an economy. More importantly, life expectancy is an important index used to calculate the human development index (HDI) which is a global measure to group countries along the categories of developed, emerging and less developed countries depending on the position in which such a country fall within the zero to one scale on which the HDI scale is built. In addition, scholars such as Akinyemi, Solanke and Odimegwu, (2018) have argued that employment of women seeks to ensure as well as avail them the required finance to seek adequate health care which might reduce infant-child mortality. In addition, this necessitates increased women labour force participation, which was also one of the forerunners of third-millennium development goals.

Interestingly, the above is in tandem with the Sustainable Development Goal (SDG) which is expected to last till the next 14 years, however, the 17 goals, are inter-related and cut across all the critical but numerous aspects of health as well as development. This paper connects to the interlink amongst the third (SDG 3) and fifth (SDG 5) goal, which engrossed on well-being and gender equality and empowerment especially the employment of women within childbearing age (United Nations, 2015). For instance, according to the 2016 world development report, Sub-Saharan Africa female employment raised from 57.1% in 1990 to 63.0% in 2014 (World Bank, 2016). More so, the mortality rate for under-five dwindled by 52% between 1990 (179 per 1000 live births) as well as in

2015 (86 per 1000 live births) over the same period (United Nations (UN), 2015). Meanwhile, the household income tends to improve as a result of female labour force participation, thereby resulting in the children of the employed mother having improved and a better living standard (DeRose, 2007). Also, the literature suggests that female labour force participation tends to have an impact on demographic outcomes such as childhood mortality as well as fertility. The female labour force participation influence on fertility are comparatively documented in the literature. Nonetheless, Akinyemi provided evidence on the link between female labour force participation and fertility rate could be argued to be varied depending on the background of the study, the prevalent result is that women's employment relates to lower fertility. The connection is habitually ascribed to the divergence amidst employment and childbearing responsibilities (Bloom, Canning, Fink and Finlay, 2009). Obviously, in most scenario's an employed woman would likely go for a smaller family size in order to meet up with her job demands unlike her counterpart at home. Regarding infant-child mortality rate, there is no substantial indication on the role played by maternal employment, particularly in developing nations. Though, a few studies proposed that children of employed women tend to face a higher risk of mortality than those of unemployed women, due to time constraint (Akinyemi et al., 2018). A comprehensive study carried out in South-East Asia indicates that in Nepal there is a negative relationship amid infant-child mortality and maternal employment. It is based on this dichotomy, controversy and ongoing argument that propel the need for the re-examination of this debacle.

In the case of Nigeria, this anticipation was established by Ukwuani and Suchinbdran (2003), who discovered that children whose mothers participate actively in the labour force tends to have good nutritional stand and as well able to take them along. However, women in the formal sector who are not entitled to maternity leaves, their active participation in the labour force may impact negatively on their children's subsistence, more exclusively during the neonatal period. Regrettably, most sub-Saharan Africa women work in the informal sector, where such opportunities are not feasible. The recent determination to promote women employment as well as plans to drastically reduce infant-child mortality and morbidity could be actually hampered without appropriate balancing. The Nigerian case is not different since the report from the National Bureau of Statistics, 2018 divulges that despite the rise in Nigerian female labour force participation from 39% in 1990 to 48.3% in 2015, also, women nonagricultural employments rose from 35% to 41.0% over the same period (World Bank, 2016).

Owing from the above, it can be deduced that most scholars analyzed these phenomena using qualitative analysis. However, this study would adopt a rather different and unique approach which is the quantitative technique of analysis. Here, the study utilized the fully modified ordinary least square technique after testing for unit roots. Furthermore, the Johansen cointegration technique was adopted to ascertain whether or not prolonged relationship (cointegration) exist among the variables. The remaining parts of this research report is presented as: section 2 literature review, section 3 research methodology and technique of analysis, section 4 presentation of results and interpretation, section 5 conclusion and recommendation.

2. Literature review

This section of the study reviews the theories, empirical research works, and concepts that are in line with the area of study. Several theories abound which provides the link between infant -child mortality and maternal employment in Nigeria. The capability theory or approach to human welfare as propounding by Sen (1980). The capability approach or theory was conceived in the 1980s as an alternative approach to welfare economics by Amartya Sen. The theory made an intentional effort to consider human life as a set of "doings and beings" which are called "functioning" and it relates the evaluation of the maternal and child wellbeing to the assessment of the capability of human being to function through conscious efforts of proper nutrition and health care. In this approach, Sen brought together a range of ideas that were previously excluded from (or inadequately formulated in) traditional approaches to the economics of welfare.

The core focus of the capability approach is on what individuals can do. According to him, capabilities are the alternative combinations of functionings that are feasible for a person to achieve. Formulations of capability have two parts which are functionings and opportunity freedom that is the

substantive freedom to pursue different functioning combinations (Alkire, 2009). Ultimately, capabilities denote a person's opportunity and ability to generate valuable outcomes, considering relevant personal characteristics and external factors. The important part of this definition is the freedom to achieve, because if freedom had only instrumental value (valuable as a means to achieve an end) and no intrinsic value (valuable in and of itself) to a person's well-being, then the value of the capability set as a whole would simply be defined by the value of a person's actual combination of functionings (Sen, 1992).

There are several scholars who have studied infant-child mortality in relation to maternal employment. This include but not limited to the following.

Adewusi and Nwokocha (2018) utilizing data elicited from the Nigerian Demographic Health Survey of 2013 and evaluated using descriptive and inferential statistical techniques. The research observed that uneducated and under-educated mothers tend to have high infant-child mortality when compared with educated mothers, even though sex of household head, size of the family, wealth index as well as religious affiliation together have strong impact on these women.

Also, the survey carried out in 1992-1993 by the India's National Family Health Survey (NFHS) in supports of the Family Welfare as well as the Health Ministry. The study, however, make available state-level as well as national fertility approximations, maternal-child healthcare, infant-child mortality, family planning practices, as well as appropriate use of available services to promote mothers and children welfare.

Similarly, Adetoro and Amoo (2014) focused on Nigerian under-five mortality upsurge from 138 per 1,000 live births in 2007 to 158 per 1,000 live births in 2011 contrary to the Millennium development Goal target of 71 per 1,000 live births, using cross-tabulation as well as binary logistic regression techniques. Employing data from the Nigeria Demographic and Health Survey (NDHS) 2008 to examine the analysts of Nigerian infant-child (aged 0-4 years) mortality. The study also utilized data from women who are currently married, and the data were filtered by their infant-child mortality experience (n = 9,809). The study examined 16,065 women in totally. The reveals that mortality rate was at peak (49.14%) for children whose mothers are illiterate and bottommost (13.29%) amid women with higher education profile, more so the logistic regression analysis, shows that both parent level of education and mother's occupation were found to be statistically significant in the reduction of infant-child mortality rate. In addition, to the aforementioned, the result as well revealed that women age at first birth, maternal wealth index, and place of residence all have significant effect on Nigerian infant-child mortality rate. The study then concluded that intensification of women education will in turn upsurge their age at first birth and moderate the menace of poor infant-child health outcomes.

Akinyemi, Solanke and Odimegwu (2018) using Cox proportional hazards models, provided answers relationship among infant-child mortality and maternal employment in Nigeria, the impact of paternal occupation, accommodation type, as well as geopolitical region. Employing retrospectively techniques, they study analyzed a sample weight of 31,828 infant-child cross-sectional data extracted from 2013 Demographic and Health Survey, in Nigeria. The study reveals that approximately two-third (68.7%) infant-child mortality were children whose mothers are actively participating in the labour force especially self-employed women. Meanwhile, infant-child mortality rate amid children of employed mothers (65 per 1000 live births) was to some extent lower when compared with that of children of unemployed mothers (70 per 1000 live births). Also, the hazards regression models showed that the risk of infant-child mortality was higher amidst unemployed women. The result also revealed that infant-child mortality rate risk was more predominate among women that are self-employed while the interaction effects analysis, showed variations by type of residence, father's occupation as well as geopolitical region.

In the same light, Morrill (2011), conducted a study on the consequences of maternal employment on the health of school-age children using bivariate probit and two-stage least squares estimation models. Employing data from National Health Interview Survey (1985–2004), the study found that children of employed mothers are better off in terms of nutritional stand as well as household income. Gennetian, Heater, London and Leonard (2010) deliberated on the effects of low-income mothers' employment on young children health and discovered that there the children did not benefit from such maternal employment rather it impacted hazardously on the children's experience. Meanwhile, Baker, Gruber and Milligan (2008) evaluated the effect of maternal labor supply on young children's

health by examining the impact of a local childcare subsidy program in Quebec in the late 1990s. The study however, employed difference-in-differences identification strategy and as well found that the policy put in place to improve women employment as well as infant-child healthcare, were not properly implemented, thereby not having any effect on the infant-child and maternal welfare.

3. Research methodology

This section focuses on describing and stating the source of data utilized for analysis in this study. The theoretical base of this study is adopted from Grossman (1972) who developed a theoretical health production function, which is specified as:

$$H = F(X) \dots \dots \dots (3.1)$$

Where H is a measure of individual health output and X is a vector of individual inputs to the health production function F. The elements of the vector include literacy rate, government health expenditure, numbers of medical physicians, real per capita income and female labor participation. To capture both the consumption and investment aspects of health inputs, the demand for health by an individual is analyzed via the utility optimization framework. This is represented in equation as:

$$H_t = \beta X_t + \varepsilon_t, t = 1 \dots T \dots \dots \dots (3.2)$$

Where H_t is the explained variable (Health Status), X_t is a vector of explanatory variables which can determine the health outcomes, t is the time series, β represent the coefficient of the vector of explanatory variables and ε_t is the random variable with zero mean and constant variance. Introducing other variables into the equation 2.42 above, the resultant functional model is specified below as:

$$ME = F(SETF, SESF, HI, CM, IM) \dots \dots \dots (3.3)$$

Applying transformation to the equation 2.44 below, the resultant mathematical equation is specified as represented below:

$$ME_t = \beta_0 + \beta_1 SETF_t + \beta_2 SESF_t + \beta_3 HI_t + \beta_4 CM_t + \beta_5 IM_t + \varepsilon_t \dots \dots \dots (3.4)$$

Where IMMR is the infant-maternal mortality rate, CHE is the capital health expenditure, FLFR is the female labour participation rate, RPCI is the real per capita income, EDU stands for level of education (secondary school enrolment).

The study utilized mainly secondary data sourced from the World Bank World Development Indicators (WDI) 2017 from 1980 to 2017.

The estimation technique for analysis in the study adopted the Fully Modified Ordinary Least Square technique. Also, the descriptive statistics, unit roots test, correlation test and cointegration test (Johansen test) were conducted.

4. Findings

Unarguably, this section presents the expected results of the analysis, by means of the data that was drawn via the world development indicator. Based on the above, it starts with the variables' descriptive statistics. Furthermore, table 4.1 reveals that maternal employment within the period of study 1980-2017 averaged 48.271, as it rallies between 47.132 and 50.390. However, the table revealed that school enrollment tertiary female on the average was 61.914, it also increased from 59.925 to 64.467, while school enrolment secondary female increased from 4.997 to 12.250 and as well averaged 8.346, in the same manner, household income raised from 18.548 to 58.784 while its average is 34.221. Meanwhile, child and infant mortality per 100,000 birth raised from 1323.501 to 2563.092, 100.200 to 213.700, and averaged 1748.906 as well as 175.555 respectively. All the same, the probability value will be used to give a better clarification of the Jarque-Berra statistics test, from the table, it can be concluded that all the variables are normally distributed. Therefore, the null hypothesis was not rejected, by means of the probability value of the variables being more than 5% level of significant.

Table no. 4.1 Descriptive Statistics

Statistics	ME	SETF	SESF	HI	CM	IM
Mean	48.27107	5.291205	26.82449	1748.906	175.5553	105.8789
Median	47.56150	5.028729	22.54573	1547.367	193.9500	115.8000
Maximum	50.39000	8.664780	53.48824	2563.092	213.7000	126.6000
Minimum	47.13200	1.770140	8.698330	1323.501	100.2000	64.60000
Std. Dev.	1.183063	2.589917	10.27354	429.9799	39.35953	21.38727
Skewness	0.768920	0.003386	0.720805	0.685018	-0.643254	-0.652992
Kurtosis	1.960187	1.414499	2.950471	1.933177	1.859612	1.882338
Jarque-Bera	4.020528	2.828092	3.207734	4.773926	4.679680	4.678374
Probability	0.133953	0.243157	0.201117	0.091908	0.096343	0.096406
Sum	1351.590	142.8625	992.5063	66458.43	6671.100	4023.400
Sum Sq. Dev.	37.79025	174.3994	3799.644	6840661.	57319.39	16924.36
Observations	28	27	37	38	38	38

Source: Authors' Computation using World Development Indicator

In the same light, it will be important for the study to conduct a correlation test to observe the degree of the relationship among the variables. Meanwhile, the essence of the investigation is to ensure that the variables do not share a flawless relationship; in order to avoid multicollinearity problem in econometric. Clearly, from the results presented in table 4.2 below, the maternal employment, female tertiary school enrollment, female secondary school enrollment, per capita income, child and infant mortality per 100,000 birth

Table no. 4.2 Correlation Test Result

Variables	ME	SETF	SESF	PCI	CM	IM
ME	1.00	0.72	0.936151	0.92541	-0.91781	-0.91911
SETF		1.00	0.79	0.76	-0.9265	-0.92587
SESF			1.00	0.95	-0.93	-0.93508
HI				1.00	-0.93	-0.93
CM					1.00	0.99
IM						1.00

Source: Authors' Computation using World Development Indicator

Evidently, it is important that the unit root test be estimated, as this will evade spurious regression problem. Meanwhile, the Kwiatkowski-Phillips-Schmidt-Shin test (KPSS) test technique follows the null hypothesis that the series are stationary against the alternative hypothesis of series having unit root process. More so, table 4.3 divulged that all the variables employed are all stationary at first difference.

Table no. 4.3 Unit Root Test

Variables	KPSS (1992) Null Hyp: Series is Stationary			Order
	5% C.V	Statistic I(0)	At Statistic At I(1)	
ME	0.463000	0.596605	0.372031	1(1)
SETF	0.463000	0.744191	0.125436	1(1)
SESF	0.463000	0.653945	0.079675	1(1)
HI	0.463000	0.530045	0.436080	1(1)
CM	0.463000	0.678678	0.136055	1(1)
IM	0.463000	0.678856	0.134278	1(1)

Source: Authors' Computation using World Development Indicator

Based on the foregoing, Johansen cointegration test is employed in the estimation of the model's cointegration for variables that unified at different orders. Equally, the table showed that the five (5) equations are cointegrated, meaning that there is cointegration in the relationship that the study seeks to establish. This is further supported as the trace statistics (TS) disclosed value that is more than 5% critical value.

Table no. 4.4 Johansen Cointegration Test Result

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.995062	288.4039	95.75366	0.0000
At most 1 *	0.983910	182.1861	69.81889	0.0000
At most 2 *	0.889766	99.59435	47.85613	0.0000
At most 3 *	0.781448	55.49140	29.79707	0.0000
At most 4 *	0.691522	25.07675	15.49471	0.0013
At most 5	0.074787	1.554632	3.841466	0.2125

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Source: Authors' Computation using World Development Indicator

Table no. 4.5 Fully Modified Least Squares (FMOLs)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SETF	-0.247074*	0.058899	-4.194879	0.0007
SESF	0.020195	0.012516	1.613628	0.1262
HI	-0.000371	0.000477	-0.778364	0.4477
IM	-1.144227*	0.435914	-2.624894	0.0184
CM	0.580913**	0.241531	2.405131	0.0286
C	68.64122*	3.374899	20.33875	0.0000
Result Properties				
R-squared	0.986970	Mean dependent var	47.74832	
Adjusted R-squared	0.982898	S.D. dependent var	0.673445	
S.E. of regression	0.088069	Sum squared resid	0.124098	
Long-run variance	0.007190			

* Implies Statistically significant at 1% and ** implies statistically significant at 5%

Source: Authors' Computation using World Development Indicator

Ostensibly, table 4.5 above shows that female tertiary school enrollment impacted negatively on maternal employment as well as statistically significant at 1%. Unarguably, this implies that female tertiary school certificate is not necessarily used in maternal employment but other lower educational qualification as shown by the study, despite its impactor factor of -0.247. Basically, this can be attributed to poor educational system and that is why Nigerian graduates are unemployable. In line with the above, the result also reveals that female secondary school enrollment is positively correlated to maternal employment, and as well has 0.020 impact factor and is statistically insignificant. The implies that most of the maternal employment of the literate mothers is basically based on their secondary school certificate. More so, its statistical insignificant can be attributed to the fact that there are other sources of female employment that is not necessarily their secondary certificates such as small and medium enterprise (self-employment).

Meanwhile, household income is negatively related to maternal employment and is statistically insignificant. It means that the income generating strength of Nigerian women is not inclusive. However, infant mortality is negatively related to maternal employment and as well statically significant at 1%. This implies that maternal employment helps to curb infant mortality in Nigeria, as it has an impact factor of -1.144. basically, this can be attributed to the fact that if mothers are

educated and empowered financially, they tend to take good care of their infant, in terms of feeding the infant with the right meals, ensuring that their feeding utensils are properly sterilized, properly vaccinated as well as routine visits to their pediatrician (s). Evidently, child mortality is positively related to maternal employment as well as statistically significant at 5%. It also has the impact factor of 0.581 on maternal employment. Unarguably from table 4.5 above, child mortality did not tally with a prior expectation as it is expected to have a negative relationship with maternal employment.

This may be attributed to the fact that working-class mothers resume fully after maternity leave and four months half day work immediately after resumption from maternity leave. Thereby leaving the child under the care of the Nanny, who may or may not care about the wellbeing of the child which may result to child mortality, as most of the working-class mother leave their homes early while the kids are still sleep and return home late in the night when they are asleep, Lagos state mothers are a typical example. Some also go to work during the weekends especially the bankers among them.

5. Conclusions

This paper investigated the impact of maternal employment on infant- child mortality in Nigeria. However, the result concludes that infant mortality is negatively correlated with maternal employment and as well as statistically significant at 1%. Furthermore, the result also concluded that child mortality and female secondary school enrollment are positively linked with maternal employment as well as statistically significant at 5% and statistically insignificant respectively. Based on the foregoing, female tertiary school enrollment impacted negatively on maternal employment as well as statistically significant at 1%. From the result, the level of household income is negatively associated with maternal employment and as well statistically insignificant. In line with the above, this study concludes that a well-structured, effective, improved institutional management, as well as increased government long term expenditures on the health sector, will not only enhance infant-child healthcare but as well improve women labour force participation as well as their welfare. Lastly, the government should provide adequate education and support for mothers in order to lessen child-infant mortality to the barest minimum level in Nigeria.

6. References

- Adetoro, G., and Amoo W., 2014. A Statistical Analysis of Child Mortality: Evidence from Nigeria. *Journal of Demography and Social Statistics*; Vol. (1), pp. 110-120.
- Adewusi, O. A., and Nwokocho, E. E., 2018. *Maternal Education and Child Mortality in Nigeria*.
- Alkire, S., 2009. *The human development and capability approach bin Deneuline, Severine*. Earthscan International Development Research Centre, pp. 22-48.
- Baker, M., Gruber, J., & Milligan, K., 2008. Universal childcare, maternal labor supply and child well-being. *Journal of Political Economy* 116 (4), pp. 709–745.
- Baker, M., and Milligan, K.S., 2008. Maternal employment, breastfeeding, and health: evidence from maternity leave mandates. *Journal of Health Economics* 27 (4), pp. 871–887.
- Bloom, D.E., Canning, D., Fink, G., and Finlay, J.E., 2009. Fertility, female labor force participation, and the demographic dividend. *Journal of Economic Growth* no. 14, pp. 79–101. DOI: <https://doi.org/10.1007/s10887-009-9039-9>.
- DeRose, L., 2007. Women's Work and Breastfeeding Simultaneously Rise in Ghana. *Economic Development and Cultural Change* no. 55, pp. 583–612. DOI: <https://doi.org/10.1086/511193> 6.
- Gennetian, L.A., Heather, D.H., London, A.S., and Leonard, M.L., 2010. Maternal employment and the health of low-income young children. *Journal of Health Economics* 29 (3), pp. 353– 363.
- Morrill, M.S., 2011. The effects of maternal employment on the health of school-age children. *Journal of Health Economics* pp. 240–257.
- National Family Health Survey Subject Reports International Institute for Population Sciences Mumbai, India Macro International Inc. Calverton, Maryland, U.S.A., No. 8.
- Sen, A., 1980. *The capability approach to human functionings*.
- Sen, A., 1992. *Capability approach*

- Ukwuani, F.A., and Suchindran, C. M., 2003. Implications of women’s work for child nutritional status in Sub-Saharan Africa: A case study of Nigeria. *Soc Sci Med.*, 56, pp. 2109–21. DOI: [https://doi.org/10.1016/S0277-9536\(02\)00205-8](https://doi.org/10.1016/S0277-9536(02)00205-8)
- United Nations, 2018. *Sustainable Development Goals; 2015*.
- World Health Organization (WHO), 2015. *Health in 2015: From MDG to SDG*. Geneva: World Health Organization.
- World Bank, 2018. *World Development Indicators*, Washington DC: World Bank Group.
- United Nations, 2015. *The Millennium Development Goals Report*. New York.