
BARRIERS TO OPTIMAL HEALTH OUTCOMES: AN IN-DEPTH ANALYSIS OF HEALTHCARE AND DELIVERY SERVICES IN DELTA STATE, NIGERIA

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ABSTRACT

This study investigates the barriers to optimal health outcomes: an in-depth analysis of healthcare and delivery Services in Delta State, Nigeria. Quantitative research design was adopted and a sample size of 400 was arrived at from a population of 2,728,800; and these samples made up the number of questionnaires that were distributed; while structural equation modelling technique was used for analyzing the data gathered through structured questionnaire. The empirical analysis showed that healthcare and delivery services also have no significant effect on life expectancy at birth in Delta State; and it was also revealed from the study that healthcare and delivery services have no significant effect on maternal mortality rates in the State. These were attributed to lack of basic healthcare facilities in the Delta State, lack of health personnel, equipment, medical supplies and pharmaceuticals needed for effective service delivery towards improving maternal mortality rates. Based on these findings, the study recommends that efficient health care and service delivery health policies that increase Nigeria's life expectancy must be prioritized by both state governments and households; and lastly, the government should promote the formation of village/ward health development committees, whose duties include assisting the government in the construction of health posts, the maintenance of existing health facilities, the provision of logistics during health campaigns, and the monitoring of health workers' activities at health facilities.

KEYWORDS: Life Expectancy at Birth, Maternal Mortality Rates, and Health Outcomes

1.1 INTRODUCTION

Effective healthcare delivery services have been a common strategy used by development-driven nations, organizations, leaders, and policymakers to improve the health of their citizens and life expectancy. However, an enhanced economic structure is largely responsible for an effective and efficient health care system. Similarly, healthcare delivery services are seen as a very important aspect of a person's wellbeing and one of the key ways ensuring improved life expectancy as well as human capital development. According to Edeme, Emecheta and Omeje (2017), improved health conditions have the potential to increase economic growth in both developed and developing nations by improving not only life expectancy but also child mortality rates. Likewise, life expectancy and healthcare delivery services are proportional.

The urgent need for an effective healthcare delivery service in Nigeria, cannot be overemphasize, with a population of 213.4 million citizens, there is no doubt, that there is a need to meet the global standard for healthcare delivery service. It's obvious that the need for global standard for healthcare delivery services is due to the daily increase in population, aging and the daily decrease in life expectancy. Statistics from World Bank (2023) showed that the life expectancy in Nigeria for both sexes stood at 54.49 years in 2019, while in 2023 is 52.8 year, this is revealing an insignificant improvement, Nigeria was Ranked 161 out of 195 countries, with an average of 55.2% in the world based on life expectancy in 2023 which is lower than. that of Algeria which is 76.1 years, Libya 70.61 years, Egypt 70.23 years, India 69.16 years and South Africa which stood at 61.46 years, while Nigeria ranks among the countries with the highest child and maternal mortality rates globally: the under-five mortality rate from 201 per 1,000 live births, in 2019 to 53.7 death per 1000 live births, maternal mortality ratio is estimated at 800 per 100,000 live births from 2019 to 1047 death per 100,000 live births in 2023 (UNICEF, 2023). Analysis of Nigeria's inadequate government leadership, fragmented healthcare delivery, limited health infrastructure, imbalanced personnel distribution, and ineffective collaboration among key players hamper the health sector (Adedokun, Adekanmbi & Uthman, 2017).

Nigeria health outcomes have continually been deprived, even with one of the largest stocks of human resources for health in Africa comparable only to Egypt and South Africa. There are about 56,210 doctors and 161,629 nurses registered in the country, which translates into about 50 doctors and 120 nurses per 100,000 population (UNICEF, 2022). This compares to a Sub-Saharan African average of 30 doctors and 82 nurses per 100,000 populations (WHO, 2023). While the number of healthcare professionals in the country represents a cause to be joyful, the current exodus of qualified doctors and healthcare workers coupled with the inadequacy and obsolescence of health infrastructure presents a worrying trend of 77.3% poor healthcare service, life expectancy to be 56.3%

Health outcome indicators of infant mortality rate (IMR) for Delta State Nigeria is estimated to be in the region of 131 per 1,000 live births. Under-five mortality rate (U- 5M R) is over 200/1,000 live births. According to UNICEF (2017) Delta State have a maternal mortality rate/ratio between 1,900 - 3,000 per 100,000 live births, and appears to be the highest when compared to South- South Zone of the country which has 5000 - 8,000 per 100,000 live births despite the health policy framework such as National Strategic Health Development Plan of 2009, National Health Financing Policy, 2006, Revised National Health Policy, 2004 and other programmes that were aimed at achieving health for all Nigerians. Since healthcare services and delivery are limited, they are not likely to be efficiently accessible and affordable by the poor. It is against this background that this study is out to uncover Healthcare and Delivery Services: their dual effect on Life Expectancy at Birth in Delta State, Nigeria. However, this study intends to fill the gap in the literature by empirically analyzing the effect of healthcare services and delivery on health outcomes, with special emphasis on maternal mortality rates and life expectancy at Birth in Delta State. The objectives of the study are therefore: (1) Evaluate the effect of healthcare and delivery services on life expectancy at birth in Delta State, Nigeria. (2) Examine the effect of healthcare and delivery services have on maternal mortality rates in Delta State. The rest of the study is presented as follows: section 2 presents the literature review involving the

theoretical underpinning of the study and the review of empirical studies. Section 3 focuses on material and methods which captures the data and model specifications. Section 4 analyses the data and divulges the findings, while sections 5 conclude the paper and highlights the recommendations

2.0 REVIEW OF RELATED LITERATURE

2.1 Conceptual Framework

2.1.1 Healthcare System

According to Michael and Rifat (2018), a good health system delivers quality services to all people, when and where they need them. The exact configuration of services varies from country to country, but in all cases requires a robust financing mechanism; a well-trained and adequately paid workforce; reliable information on which to base decisions and policies; well-maintained facilities and logistics to deliver quality medicines and technologies. Therefore, the health care system can be described as production entities consisting of components or subdivisions oriented towards improvement of the health status of the populace. On this level, health facilities and services such as hospitals and primary care are considered as parts of the input domain in the health care system. There are, however, components with health enhancing benefits which are primarily not intended to influence overall level of health within the society. For example, prohibition of smoking in public places, regulations and actions aimed at the safety or health of individuals, among others, constitute such health promotion actions. The implication of the foregoing is the need to define the boundary of the health system as a production entity.

According to the World Health Report (2018), a health care system is defined as comprising all organisations, institutions and resources that are devoted to producing health actions. The health system provides an organised manner for providing healthcare services or health actions. A health action is defined as any effort, whether in personal health care, public health services or through intersectoral initiatives focuses primarily at promoting, restoring or maintaining health.

2.1.2 Health:

Health is a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity, which is promoted by encouraging healthful activities, such as regular physical exercise and adequate sleep, and by reducing or avoiding unhealthful activities or situations, such as smoking or excessive stress. Some factors affecting health are due to individual choices, such as whether to engage in a high-risk behaviour, while others are due to structural causes, such as whether the society is arranged in a way that makes it easier or harder for people to get necessary healthcare services. Still, other factors are beyond both individual and group choices, such as genetic disorders (World Health Organization, 2006).

2.1.3 Health Outcomes:

Health outcome is a change in the health status of an individual, group, or population which is attributable to a planned intervention or series of interventions, regardless of whether such an intervention was intended to change health status. Centre for Diseases Control, (CDC) (2022).

Health outcome simply refers to population health status or condition within a given period of time. It is usually measured by health status indicators or indices. Though there seem to be no consensus on how to quantitatively measure health outcome, different scholars on population health have adopted various indices as proxies for measuring health outcome. Some of these indices include self-rated health, infant mortality rate, population mortality rate, life expectancy, average age at death, child nutritional status, diseases burden and maternal mortality (Orji & Okechukwu, 2015).

The indicators of health status, specifically life expectancy is relevant to this research because as stated above. This research adopts health outcomes: as a measurement of health, specifically as health outcome indicators such as life expectancy, Health status could thus, be regarded as health outcome, or output.

Life Expectancy: Life expectancy is the most common indicator of health conditions in a country. Life expectancy is the expected number of years of life remaining at a given age. It is the average life a person is expected to live. Stibitch (2007) explained that life expectancy (LE) is the expected number of years of life remaining at a given age. This means that life expectancy could be at birth, at age 65, or 80. Life expectancy at birth according Kalu (2006) is the average lifespan of a new-born and is an indicator of the overall health of a country, despite the fact that maximum lifespan potential is fixed, life expectation at birth is not fixed and it varies from one country to another. Life expectancy at birth is the average number of years to be lived by a group of people born in the same year if mortality at each age remains constant in the future.

Maternal Mortality: Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. It refers to deaths related to pregnancy or childbirth. While motherhood is often a positive and fulfilling experience, for too many women it is associated with suffering, ill-health and even death. According to Maternal and Neonatal Programme Effort Index (MNPI, 2010) maternal mortality as the deaths caused by complications due to pregnancy or childbirth, these complications may be experienced during pregnancy, delivery itself, or 42 days following childbirth. For each maternal death, many more suffer injuries, infection and disabilities brought about by pregnancy or childbirth complications. The major direct causes of maternal morbidity and mortality include hemorrhage, infection, high blood pressure, unsafe abortion and obstructed labour.

2.2. Theoretical framework

2.2.1 Health Inequity and Access to Care Theory

The study is hinged on the combined Theory of Health Inequity and Access to Care Theory by Sir Michael Marmot and Ronald M. Andersen in the 1960 and 1980 which suggest that optimal health outcomes are significantly influenced by both the unequal distribution of social, economic, and environmental resources and the accessibility of healthcare services. This framework explores how disparities in socioeconomic conditions and barriers to healthcare access and delivery services contribute to variations in health outcomes such as life expectancy at birth and maternal mortality rates.

The theory further examined how factors like income level, education, and employment status impact an individual's ability to access quality healthcare services. It also considers how proximity to healthcare facilities, availability of healthcare professionals, and affordability of medical treatments further influence these health outcomes. The theory posits that addressing these inequities and access barriers is crucial for improving health outcomes and achieving equitable health status across different populations within the region. This holistic approach highlights the interplay between social determinants of health and healthcare service delivery, advocating for integrated strategies to enhance health system effectiveness and ensure equitable health for all residents of Delta State.

2.3 Empirical Review

Samson and Clinton (2022) examined the effect of access to improved healthcare services and infrastructure on life expectancy in Chad. The study was aimed at examining the effect of improved healthcare services and infrastructure, on life expectancy in Chad. The Data for the study were gathered from a sample of 64 communities' healthcare centers, Chad. The study employs structural equation model (SEM) for the analysis of the study. This was made possible by examining healthcare services and infrastructure as the independent variables, determining their effects on life expectancy, using descriptive survey research design, sourcing data through questionnaires and one on one interview. Findings of the study revealed that, hospitals and improved infrastructure are important and sometimes the reason for increase in life expectancy. The study concluded that hospitals should maintain which include: handling social factor that determine health; using current and innovative virtual care strategies; plan universal budgets; and use the inpatient/outpatient.

3.1 MATERIALS AND METHODS

The study adopted Quantitative research design which was used to evaluate the barriers to optimal health outcomes: an in-depth analysis of healthcare and delivery Services in Delta State, Nigeria. The study used the descriptive (survey) research design which was used, given that the research contains three variables viz: healthcare and delivery service (independent) and maternal mortality rates and life expectancy (dependent variables). The study used Questionnaire, by distribution via resident within the three senatorial zones, of Delta State. These include Delta North, Delta South, and Delta Central. However, the target population among these senatorial districts is the most populous local government area. The total population for the study, 2,728,800 this was gotten from National Population commission (NPC 2022). The study also employed the stratified random sampling technique, using Taro Yamane (1967) to determine the sample size which was Two million, seven hundred and twenty-eight thousand and eight hundred (2,728,800) from the earmarked population, given a total sample of four hundred (400) for the study.

Table 3.1: Sample Size of Populous Selected Local Government Area

S/N	SENATORIAL DISTRICT		NAME OF L G A	POPULATION	SAMPLE SIZE
1.	DELTA NORTH	i.	Ika North East	250,600	$\frac{250,600 * 400}{2,728,800} = 36$
		ii.	Ika South	229,000	$\frac{229,000 * 400}{2,728,800} = 34$
		iii.	Ndokwa West	205,600	$\frac{205,600 * 400}{2,728,800} = 30$
2.	DELTA SOUTH	i.	Warri South	322,300	$\frac{322,300 * 400}{2,728,800} = 47$
		ii.	Isoko South	285,000	$\frac{285,000 * 400}{2,728,800} = 42$
		iii.	Burutu	427,600	$\frac{427,600 * 400}{2,728,800} = 63$
3.	DELTA CENTRAL	i.	Ughelli North	322,300	$\frac{439,500 * 400}{2,728,800} = 64$
		ii.	Ughelli South	285,000	$\frac{291,400 * 400}{2,728,800} = 43$
		iii.	Ethiope West	427,600	$\frac{277,800 * 400}{2,728,800} = 41$
TOTAL				2,728,800	400

Source: Field Survey, 2023

3.2 Model specification

The study adapts structural equation model (SEM) proposed by work of Samson and Clinton (2022) who investigated on the effect of access to improved healthcare services and infrastructure on life expectancy in Chad. Since the dependent variable (health outcomes), the model takes the implicit form as follows:

The study thus presents the health outcomes model in a structural equation model as:

$$LEX_B = f(HCS, HCD) \text{-----} (1)$$

Where: HCS is the Healthcare Services represented by Access to health facility, Health facility patronage, and Quality of Health Services, While, HCD is the health care delivery represented by Adequacy and availability, Distance to health facility and Service productivity. The explicit model is given as:

$$LEX_B = f(HCS, HCD) \text{-----} (1)$$

Where: HCS is the Healthcare Services represented by Access to health facility, Health facility patronage, and Quality of Health Services, While, HCD is the health care delivery represented by Adequacy and availability, Distance to health facility and Service productivity. The explicit model is given as:

$$LEX_{B1-5} = \phi_0 + \left[\sum_{i=1} \phi_1 HCS \right] + \left[\sum_{i=1} \phi_2 HCD \right] \text{-----} -2$$

$$LEX_{B1-5} = \phi_0 + \left[\sum_{i=1} \phi_1 AHF + \sum_{i=1} \phi_2 AHP + \sum_{i=1} \phi_3 QHS \right] + \left[\sum_{i=1} \phi_4 AA + \sum_{i=1} \phi_5 DHF + \sum_{i=1} \phi_6 SP \right] + v_\tau - 3$$

The a priori expectations of the parameters to be estimated are as expressed below:

$$\phi_1 < 0; \phi_2 < 0; \phi_3 < 0; \phi_4 < 0; \phi_5 < 0; \phi_6 < 0$$

That is, the access to health facility, health facility patronage and quality of health services coefficient are expected to be positive. These imply that a decrease in health care services (access to health facility, health facility patronage, quality of health services) and health care delivery (Adequacy and availability, distance to health, service productivity) will all things being equal, lead to a corresponding decrease in infant mortality rates. An increase in the value of the variables above will lead to an increase in life expectancy at birth, all things being equal.

Finally, with respect to the relationship between healthcare delivery services and maternal mortality rates, the implicit model is given as:

$$MMR = f(HCS, HCD) \text{-----} (4)$$

Where: HCS is the Healthcare Services represented by Access to health facility, Health facility patronage, and Quality of Health Services, While, HCD is the health care delivery represented by Adequacy and availability, Distance to health facility and Service productivity. The explicit model is given as:

$$MMR_{1-5} = \lambda_0 + \left[\sum_{i=1} \lambda_1 HCS \right] + \left[\sum_{i=1} \lambda_2 HCD \right] \dots -2$$

$$MMR_{1-5} = \lambda_0 + \left[\sum_{i=1} \lambda_1 AHF + \sum \lambda_2 AHP + \sum \lambda_3 QHS \right] + \left[\sum_{i=1} \lambda_4 AA + \sum \lambda_5 DHF + \sum \lambda_6 SP + \xi_{\tau} - 3 \right]$$

Where:

QHS	=	Quality of Health Services
HFP	=	Health facility patronage
AHF	=	Access to health facility
SP	=	Service productivity
AA	=	Adequacy and availability
DHF	=	Distance to health facility
LEX _B	=	Life Expectancy at Birth
MMR	=	Maternal Mortality Rates

4.1 Data Analysis and Discussions

It was observed that out of the 400 questionnaires distributed, 8 were not returned, and 9 were not properly filled; thus, making the properly filled questionnaire to be 383, which was returned. The 383 properly filled questionnaires were thus used for the analysis. This shows that 97.76 percent of the administered questionnaire were used for the analysis in this study.

SEM Regression Output

Dependent Variable: Life Expectancy at Birth

Path	Path Coefficients			
Model	Beta	Stderror	t-value	p-value
(Constant)	0.266	0.157	1.691	0.996
Healthcare Service-> LEX _B	0.255	0.135	1.885	0.220
Healthcare Delivery-> LEX _B	0.276	0.143	1.922	0.124
Summary Outputs				
R-Square	0.514		F-value	3.288
		Wald:		
Adjusted R-Square	0.501		p-value	0.098
Durbin-Watson(DW)	1.688			

Source: Authors Computation, 2023 (Smart-PLS-3)

The path coefficient value of 0.255 for healthcare services, showed that a unit increase in Healthcare Service, on the average, increases life expectancy at birth by 0.255. More so, the path coefficient value of health care delivery showed that a unit increase in health care delivery, on the average, leads to 0.276 increase in life expectancy at birth all things being equal.

The coefficient of determination (R-square), which was used to measure the goodness of fit of the estimated model, indicates that the model is reasonably fit in prediction. It showed that 81.39 percent

changes in life expectancy at birth were collectively due to healthcare and delivery Services while 18.61 percent unaccounted variations were captured by the error term.

The model also indicated that there was no autocorrelation among the variables as indicated by Durbin Watson (DW).statistic of 1.688. This showed that the estimates were unbiased and can be relied upon also for policy decisions.

H01: Healthcare and delivery Services has no significant effect on life expectancy at birth in Delta State

The Wald-test in Table 3, indicated that the calculated F- statistic value for the relationship between healthcare/delivery Services and life expectancy at birth in Delta State was found to be 3.288 and its probability value was0.098. Since the probability value is greater than 0.05 or 5percent level of significance (and fell in the acceptance region), the third null hypothesis (H01) was accepted. The study concludes that healthcare and delivery services also have no significant effect on life expectancy at birth in Delta State.

Table 4: Maternal Mortality Rates Structural Path Model Result

SEM Regression Output				
Dependent Variable: Maternal Mortality Rate				
Path	Path Coefficients			
Model	Beta	Std error	t-value	p-value
(Constant)	0.586	0.276	2.122	0.036
Healthcare Service->MMR	-0.093	0.052	-1.788	0.572
Healthcare Delivery->MMR	0.072	0.042	1.729	0.660
Summary Outputs				
R-Square	0.663		F-value	2.892
		Wald:		
Adjusted R-Square	0.547		p-value	0.233
Durbin-Watson(DW)	1.723			

Source: Authors Computation, 2023 (Smart-PLS-3)

The path coefficient value of healthcare service was found to be -0.093, which shows that a unit increase in healthcare service, on the average, leads to 0.093 decrease in maternal mortality rate all things being equal. However, the path coefficient value of healthcare delivery which was to be found 0.072, showed that a unit increase in healthcare delivery, on the average, leads to 0.072 increase in maternal mortality rate.

The coefficient of determination (R-square), which was used to measure the goodness of fit of the estimated model, indicates that the model is also reasonably fit in prediction. The (R-square) value of 0.663 showed that Healthcare and delivery Services has a good fit on Maternal Mortality Rates. It indicated that about 66.3 per cent of the variation in Maternal Mortality Rates was explained by healthcare and delivery Services, while the remaining unaccounted variation of 33.7 percent was captured by the error term.

The model also indicated that there was no autocorrelation among the variables as indicated by Durbin Watson (DW) statistic of 1.723. This showed that the estimates were unbiased and can be relied upon for policy decisions.

H02: Healthcare and delivery Services has no significant effect on maternal mortality rates in Delta State. The Wald-test in Table 4, the indicated that the F-value for the relationship between healthcare /delivery services and maternal mortality rates in Delta State was found to be 2.892 with an associated

probability value of 0.233. Since the probability value is greater than 0.05 or 5percent level of significance, the fourth null hypothesis (H02) was accepted. The study thus concludes that healthcare and delivery services have no significant effect on maternal mortality rates in Delta State.

4.2 Policy Implication

Findings from the study showed that healthcare services and delivery also have no significant effect on life expectancy at birth in Delta State. The implication of these findings is that most hospitals located in this region do not regularly provide drugs for age-related diseases so as to enhance the life span of the aged or elderly people. Medical advice is not usually given to older people on certain food to avoid due to their age to enhance their life expectancy; even as basic hygiene and routine habits amongst people has not been able to enable them live longer in advance age. This is in line with the findings of Ephraim-Emmanuel (2018) whose study showed that quality of systems of healthcare service delivery has not significantly impacted life expectancy at birth of rural population is poor. They reported an unsatisfactory pace of developing quality systems in healthcare delivery in the country.

Above all, findings from the study revealed that healthcare services and delivery have no significant effect on maternal mortality rates in Delta State. These insignificant effects are essentially due to the fact that pregnant women are not regularly checked at the hospital using adequate machines to ensure that the position of the baby will not lead to bad delivery; drugs are usually not provided for pregnant women to ensure steady growth of the baby in the womb and health of the mother; and most women on ante-natal in these regions are not adequately well taken care of to ensure timely and safe delivery. This agrees with World Bank (2016) whose report showed that healthcare facilities in several part of Nigeria have decaying infrastructure, don't offer basic services, lacks health personnel, equipment, medical supplies and pharmaceuticals needed for effective service delivery towards improving maternal mortality rates.

5.1 Conclusion

Finally, this study, from the analysis and discussions so far, has illuminated the profound and multifaceted impact of healthcare and delivery Services, on life expectancy at birth and maternal mortality rate in Delta State, Nigeria. These findings resonate deeply with the tenets of health Inequity and Access to Care Theory, shedding light on the substantial economic, health, and societal burdens imposed significantly by both the unequal distribution of social, economic, and environmental resources and the accessibility of healthcare services.

First and foremost, the structural equation model (SEM) results affirmed that health outcomes in Delta State have remained relatively low especially in the areas of life expectancy and maternal mortality rate. This finding resonates with the economic dimension of the Health Inequity and Access to Care Theory. The theory further examined how factors like income level, education, and employment status impact an individual's ability to access quality healthcare services. It also considers how proximity to healthcare facilities, availability of healthcare professionals, and affordability of medical treatments further influence these health outcomes. Moreover, the study reflected that healthcare services and delivery have not significantly impacted on life expectancy and maternal mortality rate in Delta State. The study thus concludes in general that healthcare services and delivery in Delta State have had no significant effect on health outcomes

5.2.1 Recommendations

The following recommendations were based upon the findings

- i. Efficient health care and service delivery health policies that increase Nigeria's life expectancy must be prioritized by both state governments and households. Health-care programmes and delivery should not be solely focused on healthcare, neglecting other aspects

of health such as prevention. Preventive health measures such as physical activity and eating a healthy diet free of tobacco, alcohol, high fat, processed, and refined foods, among other things, can extend life expectancy.

ii. The government should promote the formation of village and ward health development committees, whose duties include assisting the government in the construction of health posts, the maintenance of existing health facilities, the provision of logistics during health campaigns, and the monitoring of health workers' activities at health facilities. This will help to alleviate the problem of high maternal mortality rates in the North Central regions. It would also help to minimize the cost of transportation as well as the time spent waiting or queuing, which discourages many pregnant women from evaluating or using healthcare and delivery facilities.

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