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Spatial Location and the Utilization of Primary Health Care Services by Nursing Mothers in Niger South Senatorial Zone, Niger State, Nigeria

MOHAMMED BELLO ALIYU, ANAS DANASABE ABUBAKAR, LARAI USMAN
Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria

Abstract. Nigeria's infant mortality ranking has become worrisome despite efforts to curb the negative trend. Rural areas are the most affected. The establishment of Primary Health Care Centers (PHCs) as a move to improve child and maternal health is yet to decimate the problem. Thus, this study is informed by the need to explore the role of spatial location on the utilization of PHCs in a bid to find a lasting solution to infant mortality in Niger South senatorial zone. The study leverages the 3-Delays model as its theoretical framework. 400 nursing mothers were purposively selected for the study and data were collected using structured questionnaire and focus group guide. Interviews were also conducted with heads of PHCs. Results from the findings revealed that nursing mothers significantly patronized the PHCs, especially in the rural areas. Many of them visited the PHCs at least once a year. Access to PHCs was easier in the rural areas than the urban areas and rural mothers were relatively satisfied with the service rendered to them compared to the urban mothers. However, the rural areas still recorded more infant mortalities than the urban areas owing to poor staffing, lack of medical equipment and supplies in the PHCs. Therefore, the study concludes that patronage of PHCs alone is not adequate in resolving the infant mortality crisis. Thus, the study recommends proper staffing and equipping of PHCs and establishment of additional ones in order to halt the trend in infant mortality.

Keywords: Infant Mortality; Neonatal Mortality; Nursing Mothers; Primary Health Care Centers; Spatial Location

1. Introduction

A healthy population is an indispensable asset for socioeconomic growth and stability. Despite its indispensability, Nigeria's healthcare system is submerged in a pool of perennial challenges such as service failure, financial and material leakages, poor human resources and management, infrastructural deficit, among others (Dada et al., 2022). These challenges have resulted in increased cases of infant, child, and maternal mortalities; and rising vaccine-preventable deaths, etc. due to poor management of such conditions. In this empirical piece, infant mortality takes the front burner as Nigeria's poor ranking in the area of infant, child and maternal health has become worrisome. Specifically, the country's listing among countries with the highest Infant Mortality Rates (IMRs) in the world (World Health Organization [WHO], 2022) is suggestive of a negative trend in neonatal health services utilization. The importance attached the wellbeing of mothers and children led the United Nations in the year 2000, to adopt and specifically dedicate goals 2, 3, 4 and 5 of the Millennium Development Goals (MDGs) to the wellbeing of mothers and children (World Bank, 2005). Similarly, The Primary Health Care approach was initiated in response to rising cases of diseases and deaths among mothers and children in third world countries like Nigeria. This explains why a component of Primary Health Care is dedicated to wellbeing of women and children (Nwaebuni, 2014).

Unfortunately, despite these efforts and initiatives, Nigeria's maternal and child health have only worsened. Globally, Nigeria ranks second, after India, in the list of countries with the highest neonatal deaths (WHO, 2022). The World Health Organization attributes the trend in neonatal mortalities to preterm births, child-related complications, infections and birth defects. A close observation reveals the causes of neonatal deaths to be predominantly care-related issues which could be handled effectively if the mothers utilized the PHCs during pregnancy and child birth. In their study of infant mortality and risk factors in Nigeria, Shobiye et al., (2022) observe that Nigeria's record in the area of infant mortality is shocking and it suggests the

country has missed its track towards achieving the Sustainable Development Goal (SDG) of reducing infant and child mortality. The study further asserts that the trend is worsened by the limited access of rural women of reproductive ages to health care services particularly in northern Nigeria.

Nigeria's 2021 IMR is 71/1,000 as against 72/1,000 live births in 2020 (UNICEF, 2023). This indicates a decrease of -1/1,000 live births. The data shows a marginal improvement. However, given the poor access of rural women to health care services, chances are that the marginal improvement reported may not be a true reflection of what obtains in the rural areas. Such statistics on mortality rates hide the differences between the 36 states of Nigeria and could also slow progress in some of them. These spatial discrepancies have been scarcely explored by researches and is poorly understood. The issue of access to, and utilization of, health services remains an understudied portion in the etiology of infant mortality in Nigeria especially in the rural suburbs where the phenomenon is unacceptably pervasive. Thus, this study seeks to investigate the role of spatial location in the utilization of primary health care services among nursing mothers in Niger South geographical zone.

2. Study Aim and Objectives

The objectives of the study are:

To determine the utilization of Primary Health Care facilities by mothers in Niger South senatorial zone.
To assess the impact of the utilization of Primary Healthcare facilities on infant mortality in Niger South senatorial zone.

3. Research Hypotheses

The hypothesis of this study is stated in the Null form while the alternative is implied.

H_0: There is no statistically significant relationship between the distance covered by mothers to primary health care centers and their level of access to primary health care services.

4. Theoretical Framework

The study is anchored on the Three-Delays model which was propounded by Thaddeus and Maine (1994). The model explains trends in maternal mortality as being caused by delays in three health seeking stages. Maternity worldwide (2023) describes the three delays encountered by care seekers as follows:

Delay in seeking appropriate medical care: Delays in this stage may be due to one or all of the following reasons: low status of women, previous poor experience of health care, financial implications, power of decision making among others reasons.

Delay in reaching an appropriate health facility: In this stage, the decision to seek medical help is successfully taken. However, certain barriers affect access to the health facilities. These barriers include: poor road network, distance to the health facility, geographic obstructions such as rivers, mountains, etc. and high cost of transport.

Delay in receiving adequate care when facility is reached: Having successfully crossed the two preceding delays, a patient may still encounter delay upon reaching the health facility. Delays in the health facilities may be due to: lack of medical supplies and poor facilities, inadequate manpower, or inadequate referral system.

In the three-delays model, any of all the three delays may significantly affect mortality. From the decision to seek medical care, to reaching the care, and finally receiving the needed care. A delay in any of these stages may culminate in mortality. Early mortality is recorded when the care is not sought at all while late mortalities occur when care is sought but faces barriers in the subsequent stages of health seeking behavior.

Therefore, the study adopts the three-delays model given its ability to explain the concern of the study, utilization of PHCs by nursing mothers. The issue of utilization of health facilities is affected by many factors which fit into the stages outlined in the three-delays model. Firstly, the decision to seek care for an infant in a health facility is usually not the exclusive right of a woman. This is common in northern Nigeria due to the cultural and religious inclinations. Furthermore, the decision to seek care may be affected by economic difficulties and thus, the decision is delayed. Secondly, in the event, a mother secures consent for medical care form a health facility, the challenge of reaching the health facility at the appropriate time also constitutes a major challenge. Issues of distance, cost of transportation and road networks remain big challenges to medical care in this stage. Lastly, the successful arrival of a mother at a health facility may also not guarantee quality medical care as the third strand of delays such as poor facilities, inadequate manpower, poor referral

system may all constitute hindrances to medical care even after reaching the health centers. Thus, the study examines the role of the foregoing delays in the utilization of PHCs in the study area.

5. Research Methodology

The study was conducted in Niger South senatorial zone where three local governments were selected using balloting method. A mixed method research design was adopted for the study. As such, both quantitative and qualitative instruments were used in data collection. Structured questionnaire was administered in order to collect quantitative data, while Focus Group Discussion (FGD) and interview guide were used in the collection of qualitative data. Mothers of child-bearing age who were administered the questionnaires were sampled using purposive sampling technique. In-depth interviews were conducted with heads of three (3) Primary Healthcare Centers (PHCs) from each of the Local Government Areas (LGAs) under study. FGDs were held with rural and urban mothers respectively to extract qualitative data from the respondents. In determining the sample size, the study adopted Yamane (1967) formula to determine the sample size with 90% confidence level and 5% error margin. Therefore,n is approximately equal to 400. Finally, the data collected were analyzed using descriptive and inferential statistics. Specifically, the descriptive technique employed is the frequency tables and cross tabulation (containing the actual counts and percentages) while the inferential statistics involves the testing the hypothesis of the study using T-test for independent sample.

6. Findings

Table 1: Socio-Demographic Characteristics of the Respondents

Items		Frequency	Percentage (%)
Total Number of Respondents		377	100
Age	15-20years	39	10.3
	21-25years	162	43.0
	26-30 years	148	39.3
	31-35 years	18	4.8
	36 and above	10	2.7
Education	No formal education	139	36.9
	First school certificate	47	12.5
	Secondary School	56	14.9
	Tertiary Institution	128	34.0
	Masters and above	7	1.9
Place of Residence	Urban	100	26.5
	Rural	277	73.5

Table 1 shows that the total number of the questionnaires retrieved was 377. The respondents' age groups vary with the majority (40.0%) falling between the age bracket of 21-25 years, 39.3% were between the age bracket of 26-30 years, while 2.7% of the respondents were between the age bracket of 30 years and above. This outcome was based on the fact that our sample population consists of married women of childbearing ages only.
The table further revealed that 36.9% of the respondents had no formal education, while 12.5% and 14.9% obtained primary and secondary education respectively, and 34.0% obtained postgraduate certificates. Another 1.9% of the respondents obtained other educational qualification other than the ones included in the study, mostly Quranic education. These patterns of educational attainment of the respondents can be attributed to the study locations and characteristics of the women, i.e. the majority of the respondents were married women and resident mostly in the rural areas known for low literacy level.

In terms of residential location of the respondents, majority (73.5%) of the respondents were resident in the rural areas, while the remaining 26.5% resided in the few urban locations of the study areas. This can be attributed to the fact that the Niger south senatorial zone was characterized by a higher number of rural areas compared to the urban areas.

Health Care Services Providers Patronized by Mothers

Table 2: Most Visited Places for Infant Health Care Services

PHC	Private hospital	Traditional Healer	Chemist	Total
310 (82.2%)	40 (10.6%)	11 (2.9%)	16 (4.2%)	377 (100%)

Table 2 indicates that majority (82.2%) of the respondents used the Primary Healthcare Centers (PHCs) more than any other healthcare service providers for the treatment of their infant children. The choice of the PHCs by mothers of infant can be attributed to the relatively low cost of the PHCs services and the reliability of the services rendered. The cost of PHCs services were relatively low and most nursing mothers were also confident of the services they provided. On the other hand, only 10.6%, 2.9% and 4.2% mostly patronized private hospitals, traditional healers and chemists respectively.

Distance Covered by Mothers to the Nearest PHC

The distance covered by the respondents to access primary health-care services in the study areas was also assessed. The various responses are shown in Table 3.

Table 3: Approximate Distance to the Nearest PHC

1km	2km	3km	4km	5km and above
114 (30.2%)	118 (31.3%)	89 (23.6%)	39 (10.3%)	17 (4.5%)

Table 3 shows that 30.2% of the respondents covered not more than 1 kilometer to access the nearest PHC, another 31.3% covered between 1 – 2 kilometers, while yet another 23.6% covered between 2 – 3 kilometers from their various residential abodes. A total of 10.3% covered between 4 – 5 kilometers, while only 4.5% covered more than 5 kilometers. This response pattern indicates that the PHCs were relatively not too far away from the residences of the mothers of infant and are therefore, relatively accessible distance-wise. This partly explains why visits to the PHCs is high as observed from table 2.

Estimated Interval of Visiting Periods

Table 4: Estimated Interval for Visiting the PHCs

Daily	Weekly	Monthly	Yearly	Never	Total
5 (1.3%)	78 (20.3%)	131 (35.0%)	158 (42.2%)	4 (1.1%)	374 (100)

Table 4 shows the intervals of visits by mothers to PHCs. The table shows that most mothers (42.2%) visited the PHCs about once in a year, 35.0% visited monthly, while a total of 20.3% reported that they visited on weekly basis. This pattern indicates that the visits of nursing mothers to the PHCs were considerable in the study area.

Analysis of Qualitative Response on the Distance to the PHC and Access to PHC

Qualitative Response from Rural Participants

In the FGD, the mothers in the rural parts of the study areas were of the view that the PHCs nearby (not too far away or walking distances) their residencies. According to one of the participants:

> *"The PHC I usually patronized is just about ten to 15 houses away from my house. As a result I can visit it whenever I want, I do not need a car or bike to take me there".*

Another FGD participant also added that:

> *"I can go there even in the night as the distance is not far from my house".*

Qualitative Response from Urban Participants

Contrary to the views expressed by most of the rural participants in the FGD, majority of the participants in the urban areas described the distance they usually covered to the PHCs to be relatively far from their residences as a

result many of them reported that they usually had to take commercial motorcycle before getting there. One of the participants had this to say:

> *"I spend about N100 to get to the PHC I usually patronized although there other smaller health care centers close by who offer similar services but the services were costly".*

Another urban participant added that:

> *"I cannot readily determine the distance of the PHC to my house, however I mostly need to take a commercial motorcycle or taxi before I can get to the PHC".*

Healthcare Service Satisfaction and Infant Mortality

Table 5: Cross-tabulation of Infant Deaths in the Community and PHC Service Satisfaction Level

	Experience Infant Death In The Community			Health Care Service Satisfactory		
Place of residence	Yes	No	Total	Satisfied	Not at all satisfied	Total
Rural	247 (89.2%)	30 (10.8%)	277	191 (69.0%)	86 (31.0%)	277
Urban	81 (81.0%)	19 (19.0%)	100	35 (35.0%)	65 (65.0%)	100
Total	328 (87.0%)	49 (13.0%)	377	226 (59.9%)	151 (40.1%)	377

Table 5 presents combined data on the health satisfaction of mothers and experience of infant mortality. majority (89.2% and 81.0%) of mothers indicated that they had in one or more occasions experienced infant death in their community. The result of the healthcare service satisfactory level also shows that two-third (69.0%) of the total respondents from the rural areas were satisfied with the services of the PHCs. On the contrary majority (87.0%) of the urban respondents indicated not to be satisfied with the services of the PHCs.

The implications of these findings can be related to the differences in the level of availability of health facilities in rural and urban communities. In urban communities there were several other hospitals aside the PHCs with better facilities and more qualified health personnel that offered better services than the PHCs. Given these scenarios, the urban dwellers were often unsatisfied with the services rendered by the PHCs. On the contrary, in the rural communities the best they had was usually the PHC which offered the better services compared to the chemists and other small health-care dispensaries which the people patronized. Given these scenarios, the rural dwellers were often more satisfied with the services rendered by the PHC.

Analysis of Qualitative Response on Pattern of Infant Mortality

Qualitative Response from Rural Participants

In the FGD, participants in rural areas were of the view that infant deaths in their community were rampant or frequent. One of the rural participants stated that:

> *"We do witness infant deaths most of the time, in fact many of our people have now believed it is normal to lose an infant on frequent occasion".*

Similarly, during the IDI session in the rural areas, the heads of the PHC centers were asked how frequent the infants died in their respective PHCs. They also described infant deaths to be a frequent occurrence. One of the IDI participants from the rural areas commented that:

> *"We do witness infant deaths on regular occasions and this is because we do not have enough facilities to properly take care of the infants. In most cases when the case gets worst we do refer them to better facilities in the cities".*

Another rural IDI participant stated that:

> *"I started working here about three years ago and I have lost count of the numbers of infant deaths I have witnessed. The main reason for this is the lack of sufficient staff and necessary health facilities".*

Qualitative Response from Urban Participants

Compared to the rural participants the urban participants in the FDG held different opinions on the level of death of infants in their communities. Most of these participants from the urban areas described the level of deaths of as low in their communities and very occasional in their PHCs. In one of the FGD, one urban participant stated that:

> *"We do not witness so many infant deaths like that since there are several health care centers close by. People do go to the hospital during childbirth and whenever their infants become ill".*

Another urban participant stated that:

> *"Yes, infants die but not that frequently. I cannot remember the last time I heard that any of my neighbours lost an infant".*

This view regarding the low level of infant deaths in the urban communities was also supported by one of the heads of the PHCs during the IDI session. According to one of them:

> *"We witness infant death in this facility occasionally and this is because death is inevitable. Our health facilities are up to standard and we can take care of most of the cases reported to us".*

Another urban IDI participant held a similar view by saying:

> *"We do not witness much of infant deaths here. We have the required manpower and the facilities to take care of most of the cases reported to us".*

Test of Research Hypotheses

The null hypothesis that "there is no statistically significant relationship between the distance covered by mothers to primary health care centers and their level of access to primary health care services" was tested using the spearman rank-order correlation and the result is presented in Table 6.

Table 6: Spearman Rank-Order Correlation (Test of Hypothesis 3)

	Access to PHC	N	P-Value
Infants' parent distance to the nearest health care center	-0.252**	377	0.000

Note: The test is significant at 0.05 level of significance

Table 6 shows that the first figure (-0.252) gives the correlation coefficient, the middle (377) gives the total number of the sample, and the last (0.000) gives the probability. The correlations coefficient is weakly negative and statistically significant which implies the rejection of the null hypothesis. Thus, the study concludes that there is a significant negative relationship between the distance covered to the nearest health care center and the level of accessibility to primary health care centers among mothers in the study area. In other words, this result implies that an increase in the distance covered by the mothers to the nearest healthcare center the decreases their access to primary healthcare services.

7. Discussion of Findings

The study findings revealed a significant negative relationship between mothers' distance to the nearest health care center and their access to primary health care centers. In other words, an increase in mothers' distance to the nearest health care center decreases their access to primary health care services in Niger South senatorial zone. This finding is similar to the empirical result obtained by Kadobera, et al. (2012), and Azuh et al. (2017). This researcher generally contends that mothers who lived in homes with the networked distance of at least >5km to the nearest health facility has little access to health care services compared to those who live at a distance of <5km. Thus, higher distance network to the nearest health facility increases infant mortality due to poor access to health care services.

Furthermore, the study revealed that there is a significant difference in the experience of rural and urban infant parents in respect to infant mortality. In other words, the rate of infant mortality experienced in the rural areas is significantly higher than that which is experienced in urban areas of Niger South senatorial zone. This result confirms the submissions of Mahmood (2002), Sastry (2004), and Shobiye et al. (2022) who are of the view that infant mortality is generally higher in rural areas than in the urban areas for the fact that the urban areas usually have better health infrastructure, improve hygienic practices, clean water, sanitation among others, all of which cannot be found rural areas. The above scenario

implies that infants who are born in rural areas are more likely to suffer health problems and may have little or no access to better healthcare facilities thereby resulting in mortalities. It is pertinent to note that while the rural respondents expressed significant satisfaction with the healthcare services they received, such services were not adequate to forestall the recurrence of infant mortalities in the study area. This position was substantiated by the heads of PHCs interviewed. As such, it should be understood that expression of satisfaction does not suggest adequacy of services offered in the healthcare centers. In fact, the study attributed the rural satisfaction of the services of the PHCs to non-availability of competitors as opposed to the urban areas which have numerous healthcare centers competing with the PHCs in efficient service delivery. Reference to this has been made earlier.

On the whole, the study has established that nursing mothers in the community significantly patronize the PHCs for their infants' care. The frequency of the patronage is also commendable given that monthly visits were reported by one-third of the respondents. This implies that in the three stages of delay, the first two stages of delay have been successfully averted by the mothers. Furthermore, majority of the respondents, especially the rural dwellers expressed satisfaction with the services rendered to them at the PHCs. However, this did not translate to a positive outcome on the infant mortality rate. The rural areas still recorded higher infant mortalities than the urban areas who did not express much satisfaction with the services offered at the PHCs. Consequently, the study notes that the patronage of the PHCs in the study area is yet to yield the desired result despite the significant patronage by the rural dweller. By implication, this suggests the existence of the third stage of delay in the study area. Barriers or delays to efficient service delivery such as inadequate manpower, shortage of equipment and supplies were highlighted by heads of the PHCs interviewed. This explains why mortality remains high in the rural areas where other reliable health care options are almost non-existent. In this regard, this study suggests that future studies may explore the problem of service delivery in PHCs in order to deepen knowledge in the area.

8. Conclusion and Recommendations

Conclusively, the study submits that spatial factors such as rural-urban divide, distance to healthcare centers are major factors affecting the utilization of Primary Healthcare Centers (PHCs) in Niger South senatorial zone. These factors in turn affect the infant mortality rates in the area as rural areas experience more mortalities than the urban areas despite their commendable patronage of PHCs. The study concludes that patronage of PHCs alone is not adequate to resolve the infant mortality problem as the inadequacy of personnel, equipment and supplies still pose great challenges to PHCs especially in the rural areas. Consequently, the study makes the following recommendations:

- The State Health services as well as Local Government Services Commission should recruit more medical personnel to equip the healthcare centers especially in the rural areas. Specifically, there should be at least one midwife in every health center to ensure safe delivery and reduce infant mortality.
- Also, there is a need to establish more health care centers in rural communities (at least one in each ward) in Niger south senatorial zone since the study disclosed that greater distance to the nearest health care center decreases access to primary health care services. A Step in this direction is necessary since shorter distances to health care facilities will boost patronage and consequently reduce infant mortality.

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