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Awareness and Perceived Availability of Emergency Transport Schemes for Maternal Health in Kaduna State, Nigeria

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Abstract

Introduction: Timely access to skilled care during pregnancy and childbirth is key to reducing maternal deaths. The Emergency Transport Scheme (ETS) was introduced in Kaduna State to address the second delay in accessing skilled care. This study assessed awareness and perceived availability of ETS services among pregnant women in Kaduna State, Nigeria.

Methods: A community-based, cross-sectional study using a mixed-methods approach was conducted in December 2019 among 309 women of reproductive age who had been pregnant in the year preceding the study. A multistage sampling technique was used to select respondents across three Local Government Areas (LGAs) representing the three senatorial zones of the state. Quantitative data were collected using interviewer-administered questionnaires and analysed. Descriptive and bivariate analyses were conducted. Qualitative data from focus group discussions and key informant interviews were analysed thematically.

Results: Overall, 49.2% of respondents were aware of ETS services. Health workers (44.7%) were the main source of information. Only 36.1% perceived ETS to be readily available when needed. ETS awareness was significantly associated with respondents' education level ($p < 0.001$), ANC attendance ($p < 0.001$), and LGA of residence ($p = 0.027$). The qualitative findings from this research revealed limited awareness of ETS in the community and irregular availability of the scheme.

Conclusion: Nearly half of the participants were aware of ETS services, but the perceived availability was low. Improving sensitisation, strengthening community engagement and addressing gaps in logistics have the potential of enhancing the utilisation of ETS services.

Keywords: Emergency Transport Scheme, emergency obstetric care, maternal mortality, perceived availability

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Background

Maternal mortality remains one of the most urgent public health challenges in low- and middle-income countries (LMICs), accounting for approximately 94% of global maternal deaths, according to the World Health Organization (WHO). [1] Nigeria alone contributes 14% of the global maternal death burden, with an estimated maternal mortality ratio (MMR) of 512 per 100,000 live births as of the 2018 Nigeria Demographic and Health Survey (NDHS). [2] State-level data suggest that in Kaduna State, the MMR may be as high as 1,025 per 100,000 live births.[3]

The causes of maternal death are well-documented: postpartum haemorrhage, sepsis, eclampsia, and obstructed labour. It is pertinent to know that the underlying contributors are usually systemic and contextual. Thaddeus and Maine's "Three Delays" model is a widely used framework to explain delays in accessing care. They include (1) delay in deciding to seek care, (2) delay in reaching care, and (3) delay in receiving adequate care.[4] The second delay is the inability to reach a health facility on time. This is of particular importance in rural Northern Nigeria, where there are poor road networks, long distances to health facilities, and limited transport options.[5]

Only 43% of births in Nigeria occur in a health facility, while 39% are assisted by skilled birth attendants, according to the NDHS 2018.[2] These figures are even lower in Kaduna State, with 32.4% and 35.5%, respectively.[2] Furthermore, the Northwest region records the highest proportion (55.4%) of women who receive no antenatal care. [2]

To address the second delay, the Emergency Transport Scheme (ETS) was introduced as a community-based intervention leveraging volunteer drivers—mostly members of the National Union of Road Transport Workers (NURTW)—trained to transport pregnant women during obstetric emergencies. [6] This model has been scaled across multiple Nigerian states in Nigeria. However, there have been limited studies assessing the level of community awareness and perceptions about its availability. [7,8] This study was designed to evaluate both the awareness and perceived availability of ETS among pregnant women in Kaduna State. A better understanding of these dimensions is essential to optimise the effectiveness of ETS, as this will inform maternal health interventions in similar resource-limited settings.

Method

Study Design

This study employed a community-based cross-sectional design using a mixed-methods approach to explore awareness and perceived availability of Emergency Transport Scheme (ETS) services among pregnant women in Kaduna State, Nigeria. Kaduna State, located in the northwestern region of Nigeria, is administratively divided into three senatorial zones: Kaduna North Senatorial Zone (Ikara, Kubau, Kudan, Lere, Makarfi, Sabon Gari, Soba, and Zaria LGAs), Kaduna Central

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Senatorial Zone (Birnin Gwari, Chikun, Giwa, Igabi, Kaduna North, Kaduna South, and Kajuru LGAs), and Kaduna South Senatorial Zone (Jaba, Jema'a, Kachia, Kagarko, Kaura, Kauru, Sanga, and Zangon Kataf LGAs), varying in terms of population density, health infrastructure, and sociocultural characteristics.[3]

To ensure adequate geographical representation, one LGA was selected by simple random sampling using balloting from each of the three senatorial zones: Kudan from the North, Chikun from the Central, and Kachia from the South. These LGAs reflect a blend of urban, semi-urban, and rural settings, thus allowing for broader contextual interpretation of findings.

Study Population

The study targeted women of reproductive age (15–49 years) who had experienced pregnancy in the 12 months preceding data collection.[6]

Sample size calculation

We used the Cochran formula for estimating sample size in a population-based cross-sectional study[19]:

$$n = \frac{(Z_{\alpha/2})^2 pq}{d^2}$$

Where n = minimum sample size required

$Z_{\alpha/2}$ = Standard normal deviate 1.96

p = level of utilization of emergency transport scheme for obstetric emergencies obtained from a previous study p = 76.3% = 0.763[20]

d = Degree of accuracy desired set at 0.05 level.

q = (1-p) = 1-0.763 = 0.237

Therefore $n = \frac{1.96^2 \times 0.763 \times 0.237}{0.05^2}$

n = 277.84

Adjusted sample size (fn) = n/1-x

Where x is non-response and it is equal to 10%

= 277.84/0.9 = 308.7

Adjusted sample size = 309

Sampling Technique

A multistage sampling technique was adopted. In the first stage, one LGA was selected by simple random sampling using balloting from each senatorial zone. In the second stage, one ward was selected by simple random sampling using balloting from each selected LGA. In the third stage, three communities were selected from each ward using simple random sampling by balloting. In the fourth stage, the compiled number of houses (1905 in total) in the communities was used as the sampling frame, from which the sampling interval was calculated and the required number of houses selected. The fifth stage involved the selection of a household in each of the houses by simple random sampling using balloting. In the sixth stage, one eligible woman was selected per household by balloting where more than one qualified woman was present. A total of 309 respondents were surveyed.

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Data Collection Instruments and Procedure

Data were gathered using an interviewer-administered semi-structured questionnaire, designed to collect information on sociodemographic characteristics, awareness of ETS, and perceptions of its availability. The questionnaire was adapted from previous studies[23] and translated into the Hausa language, then back-translated to ensure accuracy. A team of five trained interviewers fluent in both Hausa and English administered the questionnaires. Prior to data collection, the tool was pre-tested in Kaura LGA, and adjustments were made based on feedback.

To provide contextual insights, nine Focus Group Discussions (FGDs) and four Key Informant Interviews (KIIs) were conducted using adapted FGD and KII guides.[23] One FGD was conducted per community. The FGDs were conducted with women who had used ETS, those who had not, and ETS volunteer drivers. The participants for the FGD were purposively selected. The FGDs were conducted in the most convenient places agreed upon by the participants. One KII per head of health facility per LGA was conducted within the facilities, while one KII with the state coordinator of ETS was conducted at the State Primary Health Care Development Agency.

Data Management and Analysis

Quantitative data were entered and analysed using SPSS version 23. Frequencies and percentages were computed for descriptive analysis, and chi-square tests were used to assess associations between ETS awareness and sociodemographic variables (statistical significance set at $p < 0.05$). Qualitative data from FGDs and KIIs were transcribed and analysed thematically. Triangulation of qualitative and quantitative data enhanced validity.

Ethical Consideration

Ethical approval was granted by the Kaduna State Ministry of Health. Permission from the chairmen and the community leaders of the selected LGAs was obtained. Written informed consent was obtained from all participants after explanation of the study's objectives, confidentiality safeguards, and their voluntary participation rights.

Results

As outlined in tables 1a to 1c, the total of 309 women participated in the study, with a mean age of 28.6 years. Most were aged 25–34 (50.8%), married (93.9%), Hausa (69.0%), and Muslim (74.8%). Educational attainment varied; 35.6% had no formal education, while 34.3% had secondary education or higher. Farming was the predominant occupation (41.4%). Overall, 49.2% of respondents were aware of the Emergency Transport Scheme (ETS), with awareness highest in Kudan LGA (54.4%) and lowest in Kachia LGA (43.7%) (See table 2 & Figure 1). Among those aware, 45.6% recognised ETS as providing

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transport during labour, though only 11.6% knew it also served postnatal emergencies (Figure 2). Half (50.7%) of the respondents stated that they contacted ETS drivers directly when needed, while 38.8% relied on their husbands to contact them (Table 3).

Perceptions of ETS were largely positive: 69.7% said the service was working very well, 80.9% believed it improved maternal outcomes, and over 90% expressed trust in the scheme and its drivers (Table 4). Awareness was significantly associated with education ($p < 0.001$), antenatal care attendance ($p < 0.001$), and LGA of residence ($p = 0.027$) (Table 5). The qualitative findings revealed operational challenges such as limited coverage, fuel issues, and difficulty reaching the drivers. Although ETS was widely acknowledged as a beneficial and life-saving service, as described by one participant, "If not for ETS, I would have delivered at home and maybe died." However, it also has its challenges, as described by another participant: "Sometimes, the drivers say they don't have fuel."

Discussion

This study examined awareness and perceived availability of Emergency Transport Scheme (ETS) services among pregnant women in Kaduna State. The overall ETS awareness level of 49.2% observed in this study is consistent with other research from similar northern Nigerian settings. For instance, Ibrahim et al. reported 44.7% awareness of ETS among women in Zaria, Kaduna State, highlighting persistent gaps in community outreach and health promotion efforts despite programme presence. [3] Similarly, Adedokun et al. noted that in Gombe State, only 52.5% of women surveyed had heard of ETS, indicating that knowledge of the programme remains suboptimal in many parts of northern Nigeria.[23]The similarities in these studies are likely due to poor sensitisation of the public on the availability of ETS services where they exist and the challenges faced in using them even when available.

One of the strongest determinants of ETS awareness in this study was educational status. Women with formal education were significantly more likely to have heard about ETS than those without. This finding supports prior studies suggesting that education increases women's capacity to access, comprehend, and retain information related to health services. [14] A study conducted by Doctor et al. in rural northern Nigeria also emphasised the link between literacy and maternal health knowledge, including awareness of community-based interventions like ETS. [6] Educated women are often more engaged with formal health systems and tend to benefit more from facility-based health education.

Antenatal care (ANC) attendance was found to be associated with ETS awareness. One of the participants in the FGD stated, 'If not that I attend ANC each time I'm pregnant, I would not have heard about ETS services.' Women who had attended ANC during their most recent pregnancy were substantially more likely to be aware of ETS services.

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Table 1a: Socio-demographic characteristics of respondents by LGA in Kaduna State

Variables	LGAs					
	Chikun (N = 103)	Kachia (N=103)	Kudan (N= 103)	Total (N = 309)	χ^2 value	P Value
	n (%)	n (%)	n (%)	n (%)		
Respondent Age (years)						
15 – 24	23(22.3)	31 (30.1)	40 (38.8)	94 (30.4)	16.39	0.003*
25 – 34	49(47.6)	57 (55.3)	51 (49.5)	157(50.8)		
≥ 35	31(30.1)	15 (14.6)	12 (11.7)	58 (18.8)		
Marital status						
Married	101(98.1)	92 (89.3)	97 (94.2)	290 (93.9)	6.01	0.050
Single/divorced/widowed	2 (1.9)	11 (10.7)	6 (5.8)	19 (6.1)		
Religion of respondent						
Islam	102(99.0)	26 (25.2)	103(100.0)	231 (74.8)	200.76	<0.001*
Christianity	1 (1.0)	77 (74.8)	0 (0.0)	78 (25.2)		
Ethnicity						
Hausa	90 (87.4)	22 (21.4)	101 (98.1)	213 (69.0)	189.17	<0.001*
Fulani	10 (9.7)	10 (9.7)	2 (1.9)	22 (7.1)		
Kuturmi	3 (2.9)	71 (68.9)	0 (0.0)	74 (23.9)		
Educational status						
No formal education	21 (20.4)	46 (44.7)	43 (41.7)	110 (35.6)	71.07	<0.001*
Arabic	11 (10.7)	4 (3.9)	33 (32.0)	48 (15.5)		
Primary	31 (30.1)	37 (35.9)	18 (17.5)	86 (27.8)		
Secondary	40 (38.8)	16 (15.5)	9 (8.7)	65 (21.0)		
Occupation						
Farming	0 (0.0)	21 (20.4)	7 (6.8)	28 (9.1)	29.68	<0.001*
Trading	53 (51.5)	55 (53.4)	52 (50.5)	160 (51.8)		
Artisan	50 (48.5)	27 (26.2)	44 (42.7)	121 (39.2)		

* Statistical significance, χ^2 = chi square test

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Table 1b: Socio-demographic characteristics of respondent's partner by LGA in Kaduna State

Variables	Chikun (N = 103) n (%)	Kachia (N =103) n (%)	Kudan (N = 103) n (%)	Total (N = 309) n (%)	X^2 value	P Value
Age (years)						
< 35	17 (16.5)	21 (20.4)	13 (12.6)	51 (16.5)	4.303	0.367
35 – 44	45 (43.7)	43 (41.7)	39 (37.9)	127(41.1)		
≥ 45	41 (39.8)	39 (37.9)	51 (49.5)	131 (42.4)		
Educational status						
No formal education	27 (26.2)	18 (17.5)	24 (23.3)	69 (22.3)	16.09	0.013*
Primary	15 (14.6)	25 (24.3)	32 (31.1)	72 (23.3)		
Secondary	45 (43.7)	52 (50.5)	32 (31.1)	129 (41.7)		
Tertiary	16 (15.5)	8 (7.8)	15 (14.5)	39 (12.6)		
Occupation						
Farming	3 (2.9)	76 (73.8)	49 (47.6)	128 (41.4)	118.72	<0.001*
Trading	47 (45.6)	6 (5.8)	11 (10.7)	64 (20.7)		
Artisan	35 (34.0)	13 (12.6)	25 (24.2)	73 (23.6)		
Civil servant	18 (17.5)	8 (7.8)	18 (17.5)	44 (14.2)		

* Statistical significance, χ^2 = chi square test

Table 1c: Other socio-demographic variables of respondents by LGA in Kaduna State

Variables	Chikun (N = 103) n (%)	Kachia (N = 103) n (%)	Kudan (N = 103) n (%)	Total (N = 309) n (%)	X^2 value	P Value
Number of cowives						
None	18 (17.5)	39 (37.9)	15 (14.6)	72 (23.3)	34.543	<0.001*
One cowife	52 (50.5)	31 (30.1)	29 (28.1)	112 (36.2)		
Two cowives plus	33 (32.0)	33 (32.0)	59 (57.3)	125 (40.5)		
Wife's position						
First wife	67 (65.0)	67 (65.0)	37 (36.0)	171 (55.3)	32.233	<0.001*
Second wife	19 (18.5)	13 (12.6)	16 (15.5)	48 (15.5)		
Third wife plus	17 (16.5)	23 (22.5)	50 (48.5)	90 (29.1)		
Number of children						
No child	9 (8.7)	14 (13.6)	13 (12.6)	36 (11.7)	2.192	0.901
1 – 2 children	33 (32.0)	30 (29.1)	35 (34.0)	98 (31.7)		

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3 – 4 children	31 (30.1)	30 (29.1)	27 (26.2)	88 (28.5)		
≥ 5 children	30 (29.1)	29 (28.2)	28 (27.2)	87 (28.2)		
Age of youngest child (years)						
< 1	52 (50.5)	53 (51.5)	50 (48.5)	155 (50.2)	2.004	0.735
1 – 2	30 (29.1)	34 (33.0)	38 (36.9)	102 (33.0)		
≥ 3	21 (20.4)	16 (15.5)	15 (14.6)	52 (16.8)		

* Statistical significance, χ^2 = chi square test

Table 2: Awareness of ETS service by LGA in Kaduna State

Awareness	**Chikun (N = 103) n (%)**	**Kachia (N = 103) n (%)**	**Kudan (N = 103) n (%)**	**Total (N = 309) n (%)**	***X*² value**	**P Value**
Ever heard	51 (49.5)	45 (43.7)	56 (54.4)	152 (49.2)	2.301	0.317
Never heard	52 (50.5)	58 (56.3)	47 (45.6)	157 (50.8)		

* Statistical significance, χ^2 = chi square test

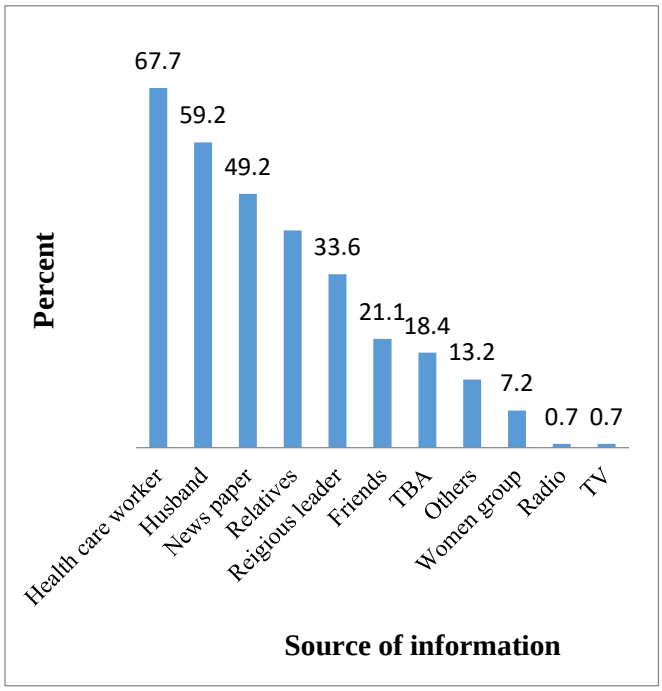

Figure 1: Sources of information about ETS services in Kaduna State

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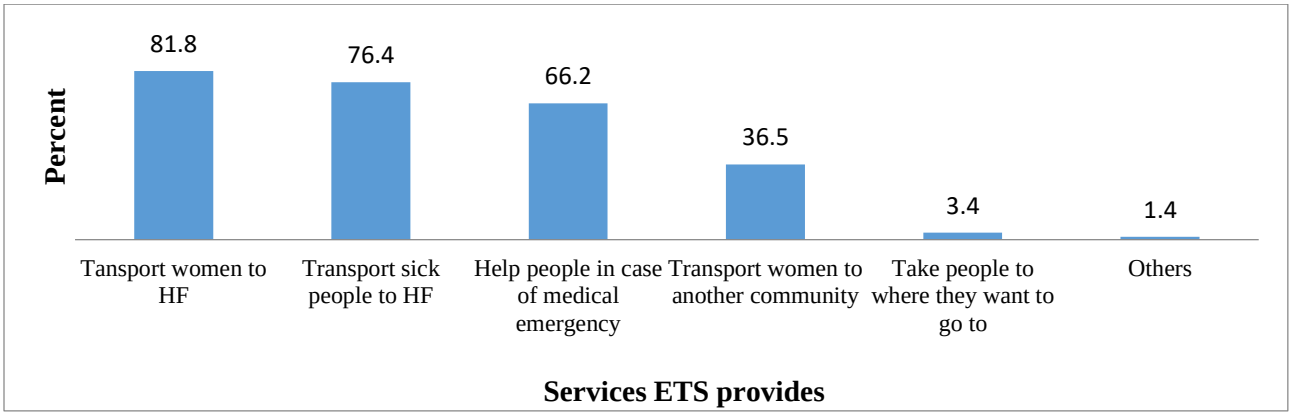

Figure 2: Awareness of services ETS provides in Kaduna State

Table 3: Opinion of participants who were aware of ETS services about the ETS scheme in Kaduna State

Variables	Frequency (n = 152)	Percent 100%
How was the driver contacted		
By calling them directly on phone	77	50.7
By telling my husband to call them	59	38.8
By going to the motor park to call them	5	3.3
By telling the religious leader to call them	11	7.2
Workability of ETS in improving utilization of maternal health services in the community		
Working very well	106	69.7
Working averagely well	17	11.2
Not working very well	29	19.1
Felt ETS brought improved utilization of EmOC	123	80.9
Positive commitment of drivers to continue to work with ETS?	140	92.1
Ownership of ETS programme by the community	110	72.4

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Changes seen since the introduction of ETS		
No changes	23	15.1
More women now use the health facility	94	61.8
Fewer women now use the health facility	35	23.0
Recommendation of ETS services to other people	139	91.4

Table 4: Availability of ETS services for use in the community by LGA in Kaduna State

Variable	LGAs						
	Chikun (N = 47) n (%)	**Kachia (N = 45) n (%)**	**Kudan (N = 60) n (%)**	**Total (N = 152) n (%)**	X^2 **value**		**P Value**
Availability of ETS for use in the community	34 (72.3)	30 (66.7)	55 (91.7)	119(78.3)	10.872		0.004*
Difficulty accessing ETS services in the community							
Not at all difficult	46 (97.9)	30 (66.7)	54 (90.0)	130(85.5)	21.276		<0.001*
Not too difficult	0 (0.0)	13 (28.9)	6 (10.0)	19 (12.5)			
Somewhat difficult	1 (2.1)	2 (4.4)	0 (0.0)	3 (2.0)			
Problem with availability of ETS drivers							
There is no problem	25 (53.2)	19 (42.2)	39 (65.0)	83 (54.6)	5.437		0.066
` *There is a problem*	22 (46.8)	26 (57.8)	21 (35.0)	69 (45.4)			

* Statistical significance, χ^2 = chi square test

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Table 5: Association Between Sociodemographic Characteristics and Awareness of ETS (N = 309)

Variable	Aware of ETS (n = 152) n (%)	Not Aware of ETS (n = 157) n (%)	Total	χ^2	p-value
Age Group (years)				3.57	0.168
15–24	30 (50.0)	30 (50.0)	60		
25–34	77 (48.1)	83 (51.9)	160		
≥35	45 (50.6)	44 (49.4)	89		
Marital Status				0.73	0.392
Married	143 (49.5)	146 (50.5)	289		
Others	9 (45.0)	11 (55.0)	20		
Education Level				17.86	<0.001*
No formal education	30 (27.5)	79 (72.5)	109		
Primary	25 (46.3)	29 (53.7)	54		
Secondary	52 (64.2)	29 (35.8)	81		
Tertiary	45 (76.3)	20 (23.7)	65		
Religion				1.58	0.208
Islam	115 (50.0)	115 (50.0%)	230		
Christianity	37 (46.8)	42 (53.2%)	79		
Ethnicity				2.09	0.352
Hausa	100 (47.0)	113 (53.0)	213		
Fulani	15 (62.5)	9 (37.5)	24		
Others	37 (54.4)	31 (45.6)	68		
Occupation				6.45	0.091
Farmer	65 (51.6)	61 (48.4)	126		
Trader	36 (60.0)	24 (40.0)	60		
Civil servant	18 (66.7)	9 (33.3)	27		
Housewife/Others	33 (37.9)	54 (62.1)	87		

This reinforces existing evidence that ANC visits are a critical touchpoint for providing maternal health information. [5] In a study in rural Kano, Abubakar et al. found that women who received health talks during ANC were more informed about emergency plans, including transport arrangements.[7] This highlights the potential of ANC platforms to boost ETS awareness through improved health communication strategies.

Differences in ETS awareness across the three selected LGAs were statistically

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significant, with Kudan LGA showing the highest level of awareness. Kudan LGA also had the highest availability of ETS services for use (91.7%), while Kachia LGA had the least (66.7%). These differences may reflect unequal distribution of ETS activities, partner support, or programme visibility across the senatorial zones. Adegoke et al. found similar regional disparities in their multi-state ETS evaluation, attributing them to variations in local political commitment, community mobilisation strategies, and the strength of transportation unions involved in the programme. [8]

Perceptions of ETS among respondents who were aware of the scheme were largely positive. Most women rated the program as working "very well", and a high proportion believed ETS had improved access to care for pregnant women. This positive outlook is consistent with prior evaluations that reported high levels of community satisfaction with the ETS model in rural settings. [9] Such perceptions likely stem from the programme's reliance on community-based volunteer drivers, which strengthens social trust and enhances service acceptability.

However, qualitative findings also uncovered several challenges, including limited coverage in remote areas, driver unavailability during nighttime hours, and concerns about fuel costs. These issues have been documented in ETS evaluations elsewhere, including those in Jigawa and Niger States, where logistic and financial barriers affected programme responsiveness. [10] Sustained efforts are needed to address these operational gaps to ensure equitable awareness and availability across all communities.

Conclusion

Awareness of the Emergency Transport Scheme (ETS) among the respondents was around fifty percent. However, perceived availability of the scheme varied across the LGAs. Education, antenatal care attendance, and LGA of residence were significantly associated with awareness. Enhancing ETS impact requires broader community sensitisation, sustained logistical support, and involvement of men, religious leaders, and community influencers to overcome the second delay.

Conflicts of interest

There are no conflicts of interest.

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